TEMMINCK'S ORDER

Debates on Zoological Classification: 1800–1850

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Debates on Zoological Classification: 1800–1850

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Contents

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Note on quotations and translations

In all quoted texts, the orthography and typography are as in the original.

Unless stated otherwise, all translations are my own. Transcriptions of the texts translated by me can be found in their original language and spelling in Appendix I.

Introduction

"Never be surprised by the crumbling of an idol or the disclosure of a skeleton."

Lord Acton, *Inaugural Lecture on the Study of History*.[1]

If you are fortunate enough to have the opportunity to walk through the splendid collections of the natural history museum in Leiden, you immediately notice the collector's names written on old labels in careful—almost loving—handwriting: Reinwardt, Kuhl & Van Hasselt, Temminck, Büttikofer, S. Müller… Truth be told, we know surprisingly little about these men. Take Coenraad Jacob Temminck. He owned a magnificent bird collection and was the author of a series of often-cited monographs on birds and mammals. Also, Temminck promoted the foundation of the Leiden museum and became its first director in 1820. One might expect that his peers and biographers had definite views of Temminck, both as a naturalist and a museum director, giving us an idea of the stature and character of the man. And yet, they have left us with only a few portrayals of his work and significance, which are not only superficial, but also downright contradictory. Some found Temminck one of the most outstanding ornithologists of the day, while others depicted him as an educated aficionado. Some stated that he played a key role in standardizing the methods of zoological nomenclature and classification, but a few accused him of being mostly occupied with stealing the work of others. I have discovered that they were all right.

Obviously, Temminck could not be all of the above at the same time. But with time he specialized and evolved as he occupied a leading position in a national museum until, in the end, zoological classification was developing faster than he could—or was willing to—digest. It is precisely because of this link between Temminck's reputation and the developments in systematics that a more careful and in-depth study of his life and work helps us understand the transformation of the field during the early nineteenth century. This transformation has received almost as little attention as has Temminck himself. In particular, the emergence and evolution of the field of zoological

[1] John Emerich Edward Acton, *Lectures in Modern History* (London: MacMIllan and Co., Limited, 1906), 24.

classification and its significance for the natural sciences has not been adequately treated. The literature about its practices, philosophies, debates and cultural influences during this period is scant and fragmented. By integrating Temminck's scientific biography with an account of the development of zoological classification we kill two birds with one stone: this book provides a more accurate portrait of a key Dutch historical figure while at the same time unearthing the main outlines of the history of systematics between 1800 and 1850.

Portraits of Coenraad Jacob Temminck

Placing the biographies of Temminck and the reviews of his works side by side leaves one disappointingly confused. How disparate the judgements on Temminck are can be seen from the following examples.[2]

Temminck's first monographs were received with enthusiasm. On this, everyone agreed. The books appeared during the first decade of the nineteenth century and treated his favorite birds: the pigeons and the gallinaceous birds. The British naturalist William John Swainson found Temminck's work "clear and masterly" and thought it "should be taken as a pattern for all such dissertations."[3] Temminck's avifauna of Europe (the *Manuel d'Ornithologie*) cemented his reputation, and his system of classification was quickly adopted by naturalists. Swainson even equalled Temminck to Linnaeus, "next to whom, as an ornithologist, he assuredly ranks."[4] This is arguably the best compliment a naturalist could ever hope for. Both reviews were written in the mid-1830s. But thirty years later, the Keeper of Zoology at the British Museum in London John Edward Gray had quite a different view:

[2] For Temminck's biographies, see Willem Hendrik de Beaufort, "Coenraad Jacob Temminck, uit zijne brieven geschetst," *Ardea* 9, no. 2 (1920); Lipke Bijdeley Holthuis, "The Three Dutch Authors of von Siebold's Fauna Japonica, with some Notes on the Artists," in *Ph.F. von Siebold and Natural History of Japan. Crustacea*, ed. Takai Yamaguchi (Tokyo: The Carcinological Society of Japan, 1993), 689-731; Lipke Bijdeley Holthuis, *Rijksmuseum van Natuurlijke Historie 1820–1958* (Leiden: Nationaal Natuurhistorisch Museum, 1995), 18-25; Alberta Maria van Lynden-de Bruïne, *In vogelvlucht door Europa: de reisjournalen van Dionysia Catharina Temminck-Cau, 1807–1824* (Zutphen: Walburg, 2001), 11-21; Alexis J. P. Raat, "Coenraad Jacob Temminck (1778–1858). Een biografische schets," *De Negentiende Eeuw* 2, no. 2 (1978); Samuel Constantinus Snellen van Vollenhoven, "Coenraad Jacob Temminck," *Algemeene Konst- en Letterbode* 9 (1858); Erwin Stresemann, *Ornithology from Aristotle to the Present*, trans. Hans J. Epstein and Cathleen Epstein (Cambridge, MA: Harvard University Press, 1975), 111-25; Joannes Andreas Susanna, "Levensschets van Coenraad Jacob Temminck," *Jaarboek van de Maatschappij der Nederlandse Letterkunde* (1858); Willem Vrolik, "Levensbericht van Coenraad Jacob Temminck," *Jaarboek van de Maatschappij der Nederlandse Letterkunde* (1857).

[3] William Swainson, *On the Natural History and Classification of Birds*, 2 vols., The Cabinet Cyclopædia. Natural History (London: John Taylor, 1836–1837), 205.

[4] William Swainson, *A Treatise on the Geography and Classification of Animals*, The Cabinet Cyclopædia. Natural History (London: Longman, Rees, Orme, Brown, Green & Longman, Taylor, 1835), 185.

> M. Temminck was an eminent ornithologist, and has studied some groups of Mammalia, perhaps not with so much success. He was an amiable naturalist, but has carried his political anglophobia into his zoological studies. [...] It is to be observed that he never had a regular scientific training, never attempted to form scientific specific characters, and is rather to be regarded as a patron and amateur than as a scientific zoologist.[5]

Even if Temminck's classification system was outdated by the time John Gray wrote this, what had happened to tarnish Temminck's reputation in this way? Linnaeus' system had long been outdated too, but his name was still revered by naturalists. Clearly, what made somebody eminent, how to measure success and even the importance of scientific training had changed since the beginning of the century. But how much so and why? And what about Temminck's political anglophobia?

In the Netherlands, we find that Temminck was also both praised and criticized. His peers seemingly could not agree on Temminck's competence nor could his later biographers, although here the balance is tipped in Temminck's favor. One biographer, the cartographer and architect Pieter Harmen Witkamp, argued that Temminck's works were appreciated because of the "very accurate descriptions, accurate synonymy and the many descriptions of the way of life and habits of birds, which surpassed everything that had been written previously."[6] Willem Vrolik—the celebrated Dutch anatomist and pathologist—affirmed that Temminck had become a "systematist zoologist of the highest level."[7] Vrolik did not specify why or how Temminck achieved such scientific eminence. On the other hand, Temminck's successor Hermann Schlegel portrayed him as a greedy, selfish man, who locked away specimens to prevent his colleagues from working on them, and who would not hesitate to publish another's discoveries as his own.[8] This was his personal perception of Temminck after thirty-three years of collaboration.

About a century later, Erwin Stresemann devoted a whole chapter to Temminck in his influential *Die Entwicklung der Ornithologie* and concluded that, in the end, Temminck "remained what he had been in 1820 […]—a well-informed zoological amateur."[9] The chapter is mostly a chronological biography, full of details about Temminck's social network: his correspondents, his visits to fellow naturalists during his extensive travels

[5] John Edward Gray, "A Revision of the Genera and Species of Viverrine animals (Viverridae) founded on the Collection in the British Museum," *Proceedings of the Zoological Society of London* (1864): 505.

[6] Pieter H. Witkamp, "Vier-en-twintig voorgangers," *Jaarboekje Natura Artis Magistra* (1869): 199.

[7] Vrolik, "Levensbericht van Coenraad Jacob Temminck," 66.

[8] Gustav Schlegel, "Levensschets van Hermann Schlegel," *Jaarboek Koninklijke Akademie Wetenschappen* (1884).

[9] Stresemann, *Ornithology from Aristotle to the Present*, 147.

through Europe and his role as director of the Leiden museum. The information is extracted from letters and from Hermann Schlegel's autobiography—as is almost the entire chapter on Schlegel. Stresemann's book offers no insights into Temminck's systematic work, except a severe judgement on Temminck's treatment of the material sent to Leiden from the Dutch colonies: "Temminck did not have that sort of intellect."[10] There is no mention of Temminck in other chapters of the book (for instance, in chapter 10, *The Effect of Natural Philosophy*), which might have helped in understanding what kind of naturalist Temminck was. In addition to the *Entwicklung der Ornithologie*, Stresemann also published the correspondence between Temminck and some of his colleagues, his associate the Baron Meiffrein Laugier de la Chartrouse (together they published the *Nouveau Recueil de Planches Coloriées* between 1820 and 1839), or Temminck's exchanges with Karl Illiger and his successor Hinrich Lichtenstein (both directors of the Zoological Museum in Berlin).[11] There is, however, no reflection upon the contents of the letters. Nonetheless, the information provided by Stresemann has been useful firstly—and obviously—for making these primary sources easily accessible and secondly, to better define the social environment in which Temminck worked and communicated.

In the 1990s Lipke Bijdeley Holthuis, curator and "the institutional memory" of the Leiden museum, sought to demonstrate that Schlegel's claims were biased.[12] He argued that antipathy and resentment towards Temminck had distorted Schlegel's interpretation.[13] Holthuis' views of Temminck are very different from Stresemann's: "Temminck's significance for science, especially for ornithology and mammalogy, is considerable. He published many fundamental works and he continued to do so until he reached an advanced age."[14] Disappointingly, neither Stresemann nor Holthuis cover the subjects treated in Temminck's publications, his ideas and propositions, his methods of classification, nor how his work was received by his peers. Holthuis' account is mostly a chronological account of the Leiden museum and therefore limited to Temminck's role as director, without an exploration of his systematic work. The main shortcoming of Holthuis' book about the Leiden museum is, in my view, the absence of

[10] Stresemann, *Ornithology from Aristotle to the Present*, 147.
[11] Erwin Stresemann, "Aus C. J. Temmincks Briefen an H. Lichtenstein," *Ardea* 39, no. 4 (1951); "Histoire des origines des 'Planches Coloriées' de Temminck et Laugier," *L'oiseau et la revue Française d'ornithologie* 21 (1951); "Ornithologen-Briefe aus den Jahren 1816 bis 1820 gewechselt zwischen J. F. Naumann und C. J. Temminck," *Centaurus* 2 (1952); "Aus dem Briefwechsel von C. J. Temminck mit dem Grafen von Hoffmannsegg und C. Illiger 1810-1814," *Ardea* 44, no. 4 (1956).
[12] Charles H. J. M. Fransen and Martien J. P. van Oijen, "L. B. Holthuis, 'The institutional Memory' of the Leiden Museum – Obituary," *Contributions to Zoology* 77, no. 3 (2008).
[13] Holthuis, "Dutch Authors of von Siebold's Fauna Japonica."
[14] Holthuis, *Rijksmuseum*, 24.

references to the history and status of systematics, which was, after all, the core business of the museum. The question therefore remains, how did Stresemann and Holthuis arrive at their conclusions concerning Temminck's role in the history of systematics? This point clearly needs further elaboration.

It was not until 1982 that Temminck was treated in a history of ornithology that also considered the social and intellectual aspects of the practice of classification: Paul Lawrence Farber's *The Emergence of Ornithology as a Scientific Discipline: 1760–1850*. Before 1982, Farber had already explored some factors that influenced the development of ornithology and zoological classification, including taxidermy, the development of collections and the different type concepts.[15] Then, in his history of ornithology he integrated technical, material and cultural aspects in the discussion of the conceptual issues that preoccupied naturalists during those ninety years, revealing the complexity of the history of bird classification. Concerning Temminck, he wrote: "In his writings, we find evidence not only of one of a number of approaches to systematics, but another feature of this group of naturalists who dominated ornithology in the first decades of the nineteenth century: an increased specialization and rigor."[16] His claim is mostly based on Temminck's efforts to standardize nomenclature and his dislike of iconographic, narrative works. Indeed, Temminck focused almost exclusively on bird classification, favoring monographs over encyclopedic work, either on particular groups of birds (pigeons and fowl) or about a specific geographic region (Europe). Farber concludes: "Temminck is one of the key figures in the transition of the study of birds from a sub-branch of natural history to a scientific discipline."[17] Still, there are questions that remain unanswered: how exactly can we appreciate this increased rigor in zoological classifications? How many approaches to systematics were there? What was Temminck's own approach—and why?

In short, the existing literature on Temminck does not situate him in the context of nineteenth-century natural history. In order to rectify this, it is necessary to turn our attention to the history of zoological classification.

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[15] Paul Lawrence Farber, "The Type-concept in Zoology during the First Half of the Nineteenth Century," *Journal of the History of Biology* 9, no. 1 (1976); "The Development of Taxidermy and the History of Ornithology," *Isis* 66, no. 244 (1977); "The Development of Ornithological Collections in the late Eighteenth and early Nineteenth Centuries and their Relationship to the Emergence of Ornithology as a Scientific Discipline," *Journal of the Society for the Bibliography of Natural History* 9, no. 4 (1980); *The Emergence of Ornithology as a Scientific Discipline: 1760–1850* (Dordrecht: D. Reidel, 1982).

[16] Farber, *Emergence of Ornithology*, 85.

[17] Farber, *Emergence of Ornithology*, 90.

A brief review of historiography

A quick review of the existing literature on Dutch natural history reveals that the entire history of biological systematics in the Netherlands is awaiting close examination. For the late eighteenth and early nineteenth century period, the few available accounts have focused either on the institutional history of museums and collections or on the biographies of key figures. The history of the Dutch national museum of natural history in Leiden has been chronicled by Lipke Holthuis but also by the Dutch zoologist Agatha Gijzen. In 1938 Gijzen wrote her doctoral thesis on the history of the museum from its foundation up to the beginning of World War I, after years of ploughing through the chaotic museum archives. As a result, the archives were finally ordered, and her book, entitled *'s Rijks Museum van Natuurlijke Historie 1820-1915*, provides a wealth of information on the collections, their origins, the policies of the museum, and its first three directors and its staff.[18] It quickly became an essential guide for the museum curators—and it still is. But as much as that of Holthuis, her book is a chronological reconstruction of the main developments at the museum between 1820 and 1915, her main focus being on the growth of the collections. As this was also one of Temminck's primary concerns, Gijzen's disclosure and summary of archival material has been extremely useful. Her portrait of Temminck, however, is limited to his directorate, mainly to his decisions concerning the collection, acquisition and exchange of specimens. This, and the fact that it is written in Dutch, may explain why it has been little quoted by historians of science outside the Netherlands despite the many interesting details it reveals.

After Gijzen, the history of the national museum of natural history in Leiden, as well as that of the Dutch national herbarium, has been recorded on several occasions. The best known narrative is that of Lipke Holthuis already mentioned, but it is certainly not the only one. Additionally, a handful of institutional accounts are available, as well as biographies of a few collectors and naturalists, but unfortunately, the total harvest remains disappointing.[19] Complementary information about Dutch natural history can

[18] Agatha Gijzen, "'s Rijks museum van natuurlijke historie, 1820–1915" (PhD dissertation, Leiden University, 1938).

[19] For instance, Stresemann devoted a chapter in his book *Ornithology* to the vicissitudes of the *Natuurkundige Commissie* (the Natural Science Committee for the Dutch East-Indies), created to explore the natural richness of the Indonesian archipelago. See also Marinus Boeseman, "Collectors and Fish Collections of the Rijksmuseum van Natuurlijke Historie in Leiden, the Netherlands (1820–1980)," in *Collection Building in Ichthyology and Herpetology*, ed. Theodore W. Pietsch and William D. Anderson Jr. (Lawrence, Kansas: American Society of Ichthyologists and Herpethologists, 1997); Rolf P. Dreier, "Voor Museum en Vaderland. De oprichtingsjaren van 's Rijksmuseum van Natuurlijke Historie in Leiden (1815–1830)" (Master's thesis, Leiden University, 2003); Charles H. J. M. Fransen, Lipke Bijdeley Holthuis, and J. P. H. M. Adema, "Type-catalogue of the Decapod Crustacea in the Collections of the Nationaal

be gathered from a small number of essays dealing with scientific research in the Indonesian archipelago; the oldest dates back to 1879, and it is still useful today for the amount of archival material it includes.[20] Nevertheless, all these works (the institutional accounts, the biographies and the histories of Dutch science in Indonesia) are curiously silent on Dutch systematics. None of them explore what was involved in systematics during this period: its practices, theories and cultural, political and international influences. Similarly, the relation between the rich botanical and zoological collections in Leiden and the activities of the naturalists working with them is still largely unexamined. This is remarkable because the naturalists referred to in these histories were, in fact, mostly concerned with collecting and classifying specimens, especially at 's Rijks Museum van Natuurlijke Historie in Leiden.[21] And yet, the process and theory of classifying plants and animals has been left out of such studies. Consequently, it is not surprising that references to Dutch nineteenth-century natural history are practically absent from the existing literature on the subject.

Natuurhistorisch Museum, with Appendices of pre-1900 Collectors and Material," *Zoologische Verhandelingen* 311 (1997); Lars W. van den Hoek Ostende, René W. R. J. Dekker, and Guido O. Keijl, "Type-specimens of Birds in the National Museum of Natural History, Leiden. Part 1. Non-Passerines," *NNM Technical Bulletin* 1 (1997); Holthuis, "Dutch Authors of von Siebold's Fauna Japonica"; Charles John Joseph Klaver, *Inseparable Friends in Life and Death: the Life and Work of Heinrich Kuhl (1797–1821) and Johan Conrad van Hasselt (1797–1823), Students of prof. Theodorus van Swinderen* (Groningen: Barkhuis, 2007); W. F. J. Mörzer Bruyns, red., *Met de Triton en Iris naar de zuidwestkust van Nieuw Guinea in 1828: de reisverhalen van Justin Modera en Arnoldus Johannes van Delden*. Werken van de Linschoten-Vereeniging; CXVII (Zutphen: Walburg Pers, 2018); G. A. Six, "Overzicht der diensten door het Rijks-museum van natuurlijke geschiedenis te Leiden aan de dierkunde bewezen," *Album der natuur* 26, no. 1 (1877); Robert P. W. Visser, "Het Rijksmuseum van Natuurlijke Historie in de 19de eeuw," in *Het verdwenen museum. Natuurhistorische verzamelingen, 1750–1850*, ed. Bert C. Sliggers and Marijke H. Besselink, (Haarlem: Teylers Museum, 2002); Takai Yamaguchi, ed. *Von Siebold and Natural History of Japan: Studies on the Unpublished Specimens of Japanese Animals Collected by Von Siebold and Still Preserved in the Museums of the Netherlands* (Kumamoto: Kumamoto University, 1987).

[20] See, for example, Peter Boomgaard, "The Making and Unmaking of Tropical Science: Dutch Research on Indonesia, 1600-2000," *Bijdragen tot de Taal-, Land- en Volkenkunde* 162, no. 2/3 (2006); Andrew Goss, *The Floracrats. State-sponsored Science and the Failure of the Enlightenment in Indonesia* (Madison, Wisconsin: University of Wisconsin Press, 2011); Pieter Honig and Frans Verdoorn, eds., *Science and Scientists in the Netherlands Indies* (New York: Board for The Netherlands Indies, Surinam and Curasao, 1945); Marius Jacob Sirks, "Indisch natuuronderzoek" (PhD dissertation, Utrecht University, 1915); Huibert Johannes Veth, "Overzicht van hetgeen, in het bijzonder door Nederland, gedaan is voor de kennis der fauna van Nederlandsch Indië" (PhD dissertation, Leiden University, 1879); Andreas Weber, "Hybrid Ambitions: Science, Governance, and Empire in the Career of Caspar C. G. Reinwardt (1773–1854)" (PhD dissertation, Leiden University, 2012).

[21] In this book I will refer to the Leiden museum as 's Rijks Museum van Natuurlijke Historie. This is the name used between its foundation in 1820 and 1931, when it was changed to Rijksmuseum van Natuurlijke Historie. In 1989, it was rechristened the Nationaal Natuurhistorisch Museum, and in 1998 it became the Nationaal Natuurhistorisch Museum Naturalis. In 2010, the museum merged with the Zoological Museum Amsterdam (ZMA) of the University of Amsterdam, and the Dutch National Herbaria of the universities of Leiden, Amsterdam and Wageningen, to form the Nederlands Centrum voor Biodiversiteit. In 2012, the institute's name became Naturalis Biodiversity Center.

From Ernst Mayr's classical *The Growth of Biological Thought* (1982), in which he devotes three chapters to classification, to Peter Bowler and John Pickstone's *The Modern Biological and Earth Sciences* (2006), Dutch natural history is occasionally mentioned when the country's collections are discussed—and virtually nowhere else.[22] Similarly, the essays compiled in *Cultures of Natural History*, edited by Nicholas Jardine, James Secord and Emma Spary (1996), which explore the cultural, institutional and political context of natural history and its practices, do not include Dutch natural history.[23] If one were to judge from references to the Netherlands in works dealing specifically with classification—which have proliferated during the last thirty years or so—one might conclude that the contributions from that country were negligible. Of course, there is nothing to support this and as the traditional aphorism proclaims, absence of evidence is not evidence of absence. The need for a historiography of Dutch systematics becomes more pressing because, without it, Dutch natural history is doomed to be routinely excluded from the history of natural history.

From the growing corpus of literature on natural history and biological classification, I wish to highlight two books that have succeeded in capturing and explaining to a great extent the complexity of systematics during the nineteenth century. I have therefore used them—often and gratefully—as a springboard for my own research. These are the re-evaluation of Antoine-Laurent Jussieu's contribution to botany in *The Development of Biological Systematics* (1994) by Peter F. Stevens, and Jim Endersby's depiction of the botanist Joseph Dalton Hooker in his *Imperial Nature* (2008).[24] Stevens deals with many of the theoretical questions I have been mulling over, like the rise and status of systematics or the relation between classification and natural philosophy. Endersby links the material practices of classification to broader issues like philosophy, empire and professionalization. Both works focus primarily on botany, and they are insightful and essential as a starting point for anyone keen to explore the history of zoological classification, an area where a great deal of work remains to be done.

Our understanding of the emergence of zoological systematics remains inadequate because the existing literature is mostly episodic. Some authors have focused on the

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[22] Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution, and Inheritance* (Cambridge, Mass: The Belknap Press of Harvard University Press, 1982); Peter J. Bowler and John V. Pickstone, eds., *The Modern Biological and Earth Sciences*, Vol. 6. The Cambridge History of Science (Cambridge: Cambridge University Press, 2009).

[23] Nicholas Jardine, James A. Secord, and Emma C. Spary, eds., *Cultures of Natural History* (Cambridge University Press, 1996).

[24] Jim Endersby, *Imperial Nature. Joseph Hooker and the Practices of Victorian Science* (Chicago: University of Chicago Press, 2008); Peter Francis Stevens, *The Development of Biological Systematics: Antoine-Laurent de Jussieu, Nature, and the Natural System* (Columbia University Press, 1994).

history of the classification of certain groups of animals.[25] Other historians have explored aspects related to the practice of classification, such as the field work and collecting practices, the history of zoological nomenclature, local or national histories, or the contributions of eminent naturalists.[26] The conceptual history of systematics is also fragmentary. Mostly, historians have focused on specific concepts: the role of essentialism in classification, the concept of species or the type-concept, for instance.[27] But the philosophical premises of classification and what was represented by classifications—and the species, genera and families—, what in the natural world these classifications actually stood for in pre-Darwinian natural history, and why, is all poorly understood. The most complete works are still those of Henri Daudin from 1926.[28] Without denying the interest and value of these studies, I still feel the need for a more detailed history of the foundations and aims of zoological classification, an account in

[25] A few examples are Arthur J. Cain, "The Development of Systematic Ideas of Variation Illustrated by Malacology," in *History in the Service of Systematics*, ed. A. Wheeler and J. H. Price (Society for the Bibliography of Natural History, Special Publication, 1981); Carl H. Lindroth, "Systematics Specializes Between Fabricius and Darwin: 1800-1859," in *History of Entomology*, ed. Ray F. Smith, Thomas E. Mittler, and Carrol N. Smith (California: Annual Reviews Inc. and the Entomological Society of America, 1973); Mary P. Winsor, "The Development of Linnaean Insect Classification," *Taxon* (1976).

[26] See, for example, Toby A. Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin* (Oxford University Press, 1987); Jim Endersby, "Classifying Sciences: Systematics and Status in mid-Victorian Natural History," in *The Organisation of Knowledge in Victorian Britain*, ed. Martin Daunton (British Academy/Oxford University Press, 2005); Paul Lawrence Farber, *Finding Order in Nature: the Naturalist Tradition from Linnaeus to E. O. Wilson* (Baltimore Md.: Johns Hopkins University Press, 2000); Susannah Gibson, "The Careering Naturalists: Creating Career Paths in Natural History, 1790–1830," *Archives of Natural History* 44.2 (2017): 195–214; Robert E. Kohler, *All Creatures: Naturalists, Collectors, and Biodiversity, 1850-1950* (Princeton, Oxford: Princeton University Press, 2013); Gordon McOuat, "Species, Rules and Meaning: The Politics of Language and the Ends of Definitions in 19th Century Natural History," *Studies in History and Philosophy of Science Part A* 27, no. 4 (1996); Richard V. Melville, *Towards Stability in the Names of Animals: a History of the International Commission on Zoological Nomenclature, 1895-1995* (London: International Trust for Zoological Nomenclature, 1995); L. C. Rookmaaker, "The Early Endeavours by Hugh Edwin Strickland to Establish a Code for Zoological Nomenclature in 1842-1843," *Bulletin of Zoological Nomenclature* 68, no. 1 (2011); Martin J. S. Rudwick, *Georges Cuvier, Fossil Bones, and Geological Catastrophes: New Translations & Interpretations of the Primary Texts* (Chicago: University of Chicago Press, 1997); Mary P. Winsor, *Starfish, Jellyfish, and the Order of Life: Issues in Nineteenth Century Science* (New Haven: Yale University Press, 1976).

[27] Of special interest are David L. Hull, "The effect of Essentialism on Taxonomy. Two Thousand Years of Stasis (I)," *The British Journal for the Philosophy of Science* 15, no. 60 (1965); David L. Hull, "The effect of Essentialism on Taxonomy. Two Thousand Years of Stasis (II)," *The British Journal for the Philosophy of Science* 16, no. 61 (1965); Robert J. O'Hara, "Representations of the Natural System in the Nineteenth Century," *Biology and Philosophy* 6, no. 2 (1991); Farber, "Type-concept in Zoology."; Mary P. Winsor, "The Creation of the Essentialism Story," *History and Philosophy of the Life Sciences* 28 (2006); Joeri Witteveen, "Naming and Contingency: the Type Method of Biological Taxonomy," *Biology and Philosophy* 30, no. 4 (2015).

[28] Henri Daudin, *Cuvier et Lamarck: les classes zoologiques et l'idée de série animale (1790–1830)*, 2 vols., Études d'histoire des Sciences Naturelles 2 (Paris: F. Alcan, 1926); Henri Daudin, *De Linné à Jussieu; méthodes de la classification et idée de série en botanique et en zoologie (1740–1790)*, Études d'histoire des Sciences Naturelles 1 (Paris: F. Alcan, 1926).

which concepts are explored in relation to natural philosophy and embedded in the pertinent social and cultural contexts. If we want to understand how and why systematics developed, and why its status within natural history has been a matter of discussion for almost two hundred years, we need both a deeper conceptual history and a social history of zoological systematics.

Goals and scope

I started this book hoping that a comprehensive scientific biography of Coenraad Jacob Temminck would provide a starting point for a discussion of the practices in Dutch zoological classification during his time. However, in the process of studying and analyzing Temminck's career, I have been forced to reconsider three much wider themes that were central to nineteenth-century natural history: the development of systematics as a discipline, the rise of a meritocracy in natural history and the status of systematics within natural history and natural philosophy. As a result, what started as an effort to understand the contradictions in the reviews of Temminck's work, has led me to open a Pandora's box and re-examine a series of questions that, until now, have been explored only partially. Even the question of what was actually involved in *natural history* during Temminck's time is unclear. The term was then, as it is now, generally used but seldom defined.

The very first question that needs addressing is: how did systematics develop in Temminck's lifetime? Did biological classification become a discipline within natural history? If so, what was Temminck's role—if any—in the process? In order to clarify this, I first had to identify the major issues that preoccupied naturalists concerned with classification: the search for a natural classification system, the standardization of rules, methods and definitions and, finally, their fundamental ideas about nature. What role did their idea of continuity, their understanding of the geographical distribution of animals and their concepts of species, genus, and type, play in their classifications? A particularly interesting question is whether naturalists, in their efforts to standardize systematics, were conscious of any process of discipline formation. For the analysis of this point, I have followed mainly—but not exclusively—many of Farber's and Stevens' leads and I have picked up Gordon McOuat's discussions of the concept of species, nomenclature and the authority to set rules.[29] Also, it was necessary to identify Temminck's role. In order to situate Temminck in the international scene I turned to the primary literature and archival sources.

[29] Gordon McOuat, "Cataloguing Power: Delineating 'Competent Naturalists' and the Meaning of Species in the British Museum," *The British Journal for the History of Science* 34, no. 1 (2001).

Two issues become almost immediately evident when delving into the primary literature. First, and rather discouragingly, most naturalists were silent about the philosophical foundation of their classifications. Temminck, for one, was very reticent when it came to explaining the theories supporting his systems of classification. Definitions of crucial concepts such as the species, genus or type are scattered through his books. His references to what constituted a *natural* system are equally difficult to follow as he never wrote a well-articulated chapter or section explaining his classifications. This fact alone deserves scrutiny. The second interesting fact that is evident from the primary literature is that these rather enigmatic naturalists were forced to clarify their views when in disagreement with each other. They did so mostly in written form in the introductory sections of their books and in the many journals that were coming into existence in the 1820s and 1830s. In particular, British journals offered an effective stage for the debates. For instance, the *Annals and Magazine of Natural History* and the *Transactions of the Linnean Society* included numerous articles and letters to the editor by naturalists refuting each other's views, more often than not in a rather belligerent tone. Apparently, the issues at stake were very dear to the naturalist's heart, including Temminck's. Whenever he found himself being challenged, Temminck was forced to articulate his arguments, to define concepts and to explain his methods. It is therefore in these debates between peers that we will find a wealth of interesting material to unravel the foundations of early nineteenth century systematics. The discussions with his peers allowed me to reconstruct Temminck's theoretical framework and answer some related questions: how did he understand the position of his area of expertise, zoological classification, within natural history? Did he propose original theories and methods, or did he build upon the work of others? The debates are useful for unravelling the conceptual issues that were being discussed among naturalists. In addition, the contemptuous tone of some of these debates hint at a change in leadership. Who was leading these debates and how was the scientific pecking order established? In other words, what qualified a naturalist as an authority? The question is embedded in a complex web of cultural, political and conceptual factors, that changed rapidly and locally.

The debates also help answer—at least, partly—some additional questions: What was the status of systematics in the Netherlands and in neighboring countries? Were there national traditions in classification, or were different approaches the result of each naturalist's personal preferences? The questions of who practiced systematics and where it was being carried out led me to explore the geography of systematics and the platforms used by naturalists to communicate and share their knowledge. Here, the

essays on ornithology by Farber and Endersby's exploration of the material practices of Victorian botany have been valuable points of departure.

Necessarily, because of the complexity of these questions and the lack of local historiography, I have had to discuss some of these points briefly, while I have treated others more in depth. In particular, I have given much attention to issues related to Temminck's classifications and to his role as founder and director of the Leiden museum, a role intimately linked to his international stature as a naturalist. Other intriguing questions await further research. There is much to explore concerning the link between the political, economic and technical transformations in most of the European countries during this period and the transformation of the natural sciences, for example. The exploration of the colonies, the processes of professionalization and specialization, the rise of national museums, the expansion of transportation, or the effect of technological advances are just a few aspects that need to be examined more closely.

Concerning the selection of works and naturalists here considered, I must admit that Temminck's activities and network have forced me to include certain authors while ignoring others who might perhaps seem more relevant. This may make the choices seem random or not representative enough, but fortunately, there is abundant literature on figures like Georges Cuvier, Lorenz Oken, Richard Owen or Alexander von Humboldt to compensate for these gaps. This book is primarily centered around Temminck and the debates he was involved in, which means that naturalists with whom he disagreed play a more prominent role, people like Louis P. Vieillot, Hugh Strickland, Nicholas A. Vigors, Frédéric Cuvier or William Swainson. I also explore how other naturalists reacted to Temminck's classifications, and why. By placing these men's ideas alongside Temminck's, I seek to provide a more meaningful portrait of Temminck. My goal is not to give a comprehensive history of zoological classification, nor to reconstruct the institutional history of 's Rijks Museum van Natuurlijke Historie, but to sketch Dutch systematics during the first half of the nineteenth century using Temminck's debates as a touchstone.

In short, this book is a further step along the trail blazed by authors like Paul Farber, Peter Stevens and Jim Endersby—to name but three—to contribute to the necessary background to understand the history of nineteenth-century systematics. Also, I hope this will be the starting point of a wider and ever-growing historiography of Dutch natural history.

A word of caution: on definitions

In the previous passages I have referred to *systematics*, *classification*, *discipline*, *naturalist* and *natural history*. However, these are not clearly defined terms—far from it—and their meaning has changed over time and from author to author. It is important, therefore, that I provide an explanation for my choice of words and their intended meaning in this book.

There is today a great deal of ambiguity surrounding the terms *taxonomy* and *systematics*, with various definitions available in the specialized literature. For example, Randall Schuch regards both terms as synonyms, while for Michael Simpson systematics encompasses taxonomy (the description, identification, naming and arrangement of organisms) and has as its primary goal the reconstruction of the evolutionary history of organisms.[30] Often, taxonomy is defined as the theory of classification and nomenclature, while systematics includes the arrangement of groups in an orderly, systematic fashion, based on the relationships between groups (today, based on evolutionary kinship).[31] I have avoided using the term *taxonomy* and have preferred *systematics* instead. The reason for this is simply that *taxonomy* was not a commonly used term in Temminck's time. *Taxonomie* was coined by Agustine P. de Candolle in 1813 in his *Théorie élémentaire de la botanique*, as a new term for *la Théorie des classifications*.[32] The term was sometimes used in textbooks. For example, the Dutch zoologist Jan van der Hoeven used *Taxonomia* in his handbook of zoology written mostly for students.[33] In general, the term *taxonomy* is virtually absent from the literature on zoological classification up to 1850.

In general, naturalists used the terms *système*, *arrangement*, *méthode* and *classification*, which were also ambiguous. Many zoologists used them as Georges Cuvier had defined them in 1816. He made the distinction between a system and a method: "système" applied to artificial classifications (convenient catalogues that did not necessarily reflect the true relations between organisms) while the "méthode" indicated a natural classification, made by careful comparison of the organisms following the principle of

[30] Randall T. Schuh and Andrew V. Z. Brower, *Biological Systematics*, 1 ed. (Ithaca, NY: Cornell University Press, 2009), 15; Michael G. Simpson, *Plant Systematics*, 2 ed. (Elsevier Science, 2010), 9-12.

[31] Alessandro Minelli and Giancarlo Contrafatto, eds., *Biological Science Fundamentals and Systematics*, vol. 2 (EOLSS Publications, 2009), 163; Mary P. Winsor, *Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum*, Science and Its Conceptual Foundations (Chicago: The University of Chicago Press, 1991), xii.

[32] Augustin Pyramus de Candolle, "Introduction," in *Théorie élémentaire de la botanique; ou, Exposition des principes de la classification naturelle et de l'art de décrire et d'étudier les végétaux* (Paris: Déterville, 1813), 19.

[33] Jan van der Hoeven, "Inleiding," in *Handboek der dierkunde, of grondbeginsels der natuurlyke geschiedenis van het dierenrijk*, vol. 1, (Delft: J. Allart, 1828), 28.

the subordination of characters.[34] The "méthode" thus resulted in seemingly natural classifications that reflected the true order of nature, and it was constructed not by division, but by synthesis.[35] Although nearly all naturalists were well aware of this distinction between natural and artificial classifications, the use of Cuvier's nomenclature was not universally adopted, and some authors even inverted it, resulting in misunderstandings and confusion.[36] Temminck was one of them. He used phrases like "système général d'ornithologie," "système de la nature" and "partie systématique de l'étude de la nature" for nearly all zoological classifications. As we will see, Temminck believed that the existing classifications were all artificial, and that only by prolonged and careful study following Cuvier's precepts would these classifications become natural. I will return to this point in chapter five. However, he referred to single-character classifications and to the Linnaean arrangement of birds as the "méthodes artificielles" or "classification méthodique," and to Linnaeus' followers, as "méthodistes."[37] On the other hand, Temminck used the term *système* to denote any classification, natural or artificial—the equivalent of *system* in everyday language, not in Cuvier's sense. In short, we can never be sure of the meaning of these terms if they are taken out of their original context.

In view of these ambiguities, which are a reflection of the conceptual confusion of the time, I have adopted the terms *systematics, system* and *classifications*, and I will indicate whether or not the classification was thought to be natural or artificial. Also, by using *systematics* and not *taxonomy* I want to avoid giving the impression that nineteenth century naturalists were not preoccupied with understanding the relationships between the groups of organisms they were describing, naming and ranking. On the contrary: it was their main concern. Similarly, I will use the terms *naturalist*, *zoologist*, *botanist* and sometimes, *systematist*, but generally not *scientist* or science. However, I translate the Dutch word *wetenschap* (which means both *knowledge* and *science*) as *science*, which seems more appropriate simply because *knowledge* is such an extremely broad concept.

Throughout the book, I also use the terms *discipline* and *field*, but I do so in a different sense than Farber's use of *discipline*.[38] Farber summarizes the activities of eighteenth

[34] Georges Cuvier, *Tableau élémentaire de l'histoire naturelle des animaux* (Paris: Baudouin, 1798), 19-21.
[35] See also Mayr, *The Growth of Biological Thought*, 190-93; Stevens, *Development of Biological Systematics*, 10-11.
[36] For example, William Sharp Macleay, "Preface," in *Horae Entomologicae or, Essays on the Annulose Animals*, vol. 1 (London: S. Bagster, 1819), viii-ix; Stevens, *Development of Biological Systematics*, 13.
[37] See, for example, Coenraad Jacob Temminck, "Introduction de la seconde édition," in *Manuel d'ornithologie, ou Tableau systématique des oiseaux qui se trouvent en Europe; précédé d'une analyse du système général d'ornithologie, et suivi d'une table alphabétique des espèces*, 2 ed., vol. 1 (Paris: H. Cousin, Edmond d'Ocagne, 1820), vii.
[38] Farber, *Emergence of Ornithology*.

century natural history as comprising four "different research traditions": nomenclature and systematics, the description of the life histories of individual species *à la* Buffon, comparative anatomy and physiology. While the last two evolved into separate disciplines, life histories and systematics "ramified into the specialized discipline of ornithology." Farber writes: "Morphologists and physiologists sought general laws regulating form and function, whereas ornithologists sought to classify and describe a particular group of animals."[39] In this way, Farber equates nineteenth century ornithology to "bird systematics" and considered it a scientific discipline. However, even when systematics dominated the practice of ornithology at that time, it was also the central task of entomology, mammalogy or carcinology, for instance. Naturalists were dealing with issues common to all of them: the chaotic nomenclature, and the search for a natural classification system and for standard methods. Even considering that the main occupation of ornithologists during the period covered by this book—and Farber's—was, indeed, systematics, books on birds also included detailed life histories, behavior, breeding information and other matters generally more appealing to the general public. All of this also falls under the umbrella of ornithology: it was a field including, but not exclusively occupied with, systematics. I will therefore treat ornithology as a field and systematics as a discipline. Here I define a discipline as a branch of science having its own set of goals, methods and techniques, a specific new language adequately describing the subject matter with unique terms and having a social structure: a community of practitioners, organizations like clubs and societies, platforms for publication like specialized journals and a place in the academic curricula. Taking this definition as a starting point, what was the situation of systematics towards 1850? Can we speak of a scientific discipline, even if it is still in the early stages of development? If so, did it evolve at different rates in different countries and for different domains?

Finally, the phrase *natural history* defies definition. Even during the relatively short period of fifty years covered by this book, *natural history* had an array of meanings, and it still has. Although I tackle the problem of its meaning in Temminck's time in chapter seven in a discussion of what fields and disciplines it included, I hope I will be forgiven for using, throughout this book, the term *natural history* in its broadest and most intuitive sense, in which it includes all branches of botany, zoology and geology.

[39] Farber, *Emergence of Ornithology*, 125.

Summary of chapters

This book consists of seven chapters in three parts, plus this introduction and some final remarks in the conclusions. In the first part we follow Temminck's life and career, starting from his parental home in Amsterdam until his last years as director of 's Rijks Museum van Natuurlijke Historie in Leiden. The second part of the book is about Temminck's writings and thought, in order to distill his theoretical framework and the concepts that were the foundation of his classifications, while in the third and final part I take a broader perspective as I examine the emergence of systematics within the tradition of natural history, while keeping the figure of Temminck as a touchstone for this discussion.

Part One starts at the beginning of Temminck's life. I have paid attention to Temminck's childhood and early years in chapter one because his love of birds was ignited at home, where he was surrounded by stuffed birds, aviaries and the fabulous stories of François Levaillant struggling up the Orange River in South Africa and chasing parrots in South America. In addition, the inheritance of his father's collection of natural history objects spurred Temminck towards zoological classification through the practice of ordering and cataloguing, which depended directly on his capacity to identify species. Then, collection catalogues became complements of existing—but in Temminck's view unsatisfactory—classifications, and later on, they turned into monographs that launched Temminck into the international arena of natural history. Temminck's path as a naturalist is described in chapters two and three. His career took off because of his well-received monographs and was advanced further thanks to his patrician background. He held a series of posts that, in the end, served him as stepping stones towards the highly regarded and coveted directorship of the brand new Rijks Museum van Natuurlijke Historie. The most important of these posts was that of director *ad interim* of the national cabinet of natural history, one of Louis Napoleon's pet projects. After five years in this post, Temminck had built up a reputation as a museum curator and an ornithologist. Along the way, though, he also made some enemies, such as the influential Martinus van Marum, the secretary of the Dutch Society for Sciences in Haarlem and director of Teylers museum. Chapter three deals with the establishment of 's Rijks Museum, his years as director and his efforts to put the museum on the international stage. The emergence of systematics was a major factor in all these events, one largely overlooked by historians. I also explore the tremendous effect that the political and economic changes in the Netherlands between 1820 and 1850 had on the museum finances and its scientific output, and consequently, on Temminck's status, as he was expected to produce more than he possibly could.

Part Two comprises the conceptual analysis of Temminck's zoological classification and his views of nature. In chapter four I discuss Temminck's understanding of the concepts of type, genus and species as they become clear from his law about the geographical distribution of mammals and birds. This analysis of his ideas on animal distribution also reveals his belief in the fixity of species and multiple creations. Cuvier's influence on Temminck becomes evident in this chapter. In chapter five I follow the arguments between Temminck and his fellow ornithologists, Louis Pierre Vieillot and Nicholas Vigors. The discussions revolved around the definition and delimitation of genera and species, the rules of zoological nomenclature and their different approaches to arrive at a natural system of classification. If anything, this chapter shows a rather chaotic state of affairs and a lack of understanding among naturalists, but also their increasing awareness of this fact, which led them to concentrate on standardizing practices and methods in zoological classification.

In Part Three, I place Temminck's career and his theories about the natural world within the wider context of nineteenth-century natural history. Chapter six includes a discussion of the democratization of natural history and the emergence of a scientific meritocracy with Britain in the lead, which had a great impact on Temminck's authoritative status. Furthermore, I sketch where and how the practices of classification took place. After looking at the arguments advanced by naturalists working in the field, in museums and in universities, I suggest that each type of location was occupied by a different discipline, which brought about conflicts and misunderstandings when naturalists themselves were not aware of this niche formation. Additionally, I discuss briefly how Temminck communicated and what platforms he used to publish his work, the multi-volume works he preferred rapidly becoming outdated. As a consequence, Temminck became increasingly isolated. Chapter seven starts with an inquiry on what *natural history* actually meant, before discussing the issue of the status of systematics within natural history, especially when contrasted with the highly regarded and relatively new discipline of comparative anatomy. I conclude that the inclusion or exclusion of philosophical arguments in systematics greatly affected its status, and that most naturalists were well aware of this. However, around 1850, since systematists had still failed to unveil the true order of nature and as half the world was still being explored, most of them opted for carrying on with descriptive natural history. They rejected natural philosophy while expecting that classifications alone would eventually provide the necessary explanations by the time their classification systems were completed. This rather passive attitude further diminished the status of systematics. Temminck's authority had practically vanished by the middle of the century.

The final section assembles the conclusions that can be drawn from these seven chapters, focusing on the question of the emergence of systematics as a discipline. All in all, this book presents an analysis of Temminck's role and significance and fills a gap in the historiography of Dutch natural history. In addition, it provides a study of the different approaches to zoological classification and, however incomplete, it enables us to re-examine the foundations and aims of systematics during the first half of the nineteenth century.

PART ONE

Birds, cabinets and museums

CHAPTER ONE

From catalogues to monographs

"They will not accept you, my appreciated Temminck, because you are not a scholar," said Louis Napoleon to Temminck when he was denied admittance to the Koninklijk Instituut van Wetenschappen, Letteren en Schoone Kunsten.[1] That must have been a very bitter pill to swallow, however royal. After all, the Koninklijk Instituut did not have such limitations when it came to admitting new members. Good relations, a high social position and even family ties were good enough as credentials for some of its members.[2] Somehow, when the Koninklijk Instituut was founded in 1808, Temminck did not qualify as a member. Probably, politics, personal antipathies and hidden agendas were at play. Nonetheless, Temminck succeeded in the following decades in securing for himself both an influential—and remunerated—position as director of a national institute, as well as the respect of his fellow naturalists. He even managed, in 1836, to become a member of the Koninklijk Instituut. How did he do all this?

Between 1805 and 1820, Temminck did indeed play both his social status and his knowledge as trump cards to ensure that "not being a scholar" would never again be an obstacle. However, two more factors must be added if we are to understand Temminck's career. The first is related to his understanding of a changing milieu. Temminck knew how to enhance his status in the changing political landscape of the Netherlands between 1795 and 1810 and he adapted accordingly. He understood that, if he wanted to pursue a career in natural history, he needed an official position and he worked relentlessly towards it.

The second factor of his success was the emergence of systematics as a subdiscipline within natural history. At the Dutch universities and academies the subject of *Natural*

[1] The Royal Netherlands Academy of Arts and Sciences. Susanna, "Levensschets van Temminck," 74. The Koninklijk Instituut van Wetenschappen, Letterkunde en Schoone Kunsten, now the Koninklijke Nederlandse Akademie van Wetenschappen (KNAW) was founded in May 1808 by Louis Napoleon.

[2] Klaas van Berkel, *De stem van de wetenschap. Geschiedenis van de Koninklijke Nederlandse Akademie van Wetenschappen*, vol. 1 (Amsterdam: Bert Bakker, 2011), 124-25.

History included comparative anatomy, physiology, botany and geology, while systematics played a minor role, except at the University of Groningen. However, the material requirements of each field in the form of collections of stuffed animals, anatomical preparations, botanical gardens or herbaria differed widely, and this determined where and by whom each discipline could be practiced. As Temminck quickly specialized as a systematist, his work was inextricably linked to the fate of these collections, where he could examine external characters and make comparisons within groups of animals. These collections were not at the universities. Also, the breaking up of natural history into subdisciplines resulted in specialized practitioners, some of them in the academic world, others as independent amateurs, and a few in natural history museums. Temminck had to ensure a post outside the universities and academies. He thus intentionally paved his way into a professional career where he could thrive as a non–academic working with a large natural history collection. He played his cards well and let no opportunity slip away. His efforts culminated in the foundation of 's Rijks Museum van Natuurlijke Historie, with himself at the helm. This was as much the result of his own efforts as the consequence of specialization. To start with, taking on the tasks that the directorate of such an institution involved, would pose an impossible burden for university professors. But in addition to the enormous amounts of work and time it entailed, taking care of a natural history collection—let alone arranging it and expanding it—required very specific skills and knowledge that were not taught at the universities, but that were learned from hands-on experience which, incidentally, is still very much the case today.

Interestingly, once in charge of 's Rijks Museum Temminck surrounded himself with university-trained naturalists, most of them brilliant young men with a doctor's degree. He also continued to expand his international circle of correspondents and travellers. Yet, he was not admitted to the Koninklijk Instituut until 1836, after sixteen years as director of 's Rijks Museum, several honorary titles (including an honorary doctorate from the University of Groningen) and with an outstanding scientific reputation in Europe. The definition of *qualified naturalist* changed during the first half of the century and it varied between institutes, ranging from prolific amateurs to museum directors. Temminck made sure that, in the end, he would belong to the last category.

Exotic birds on cupboards and plates

The Temminck family had enjoyed a prominent status within patrician society for generations. Some of them had been important members of the Amsterdam and Amersfoort political elite, including, for example, Egbert de Vry Temminck (1700–1785),

mayor of Amsterdam between 1749 and 1784 and a director of the Vereenigde Oost-Indische Compagnie (VOC) and the West-Indische Compagnie (WIC). Others were wealthy merchants, dealing in luxury goods like Spanish wool. Coenraad J. Temminck's grandfather, Coenraad Temminck (1687–1762) was mayor of the city of Amersfoort and his brother, Matthias Temminck (1734–1814), practiced law in Amsterdam and was a director of the VOC.[3] Through these ties with the VOC and the WIC, the family had occasionally been engaged in some kind of patronage of natural history. Egbert de Vry Temminck, for instance, who had an interest in botany and owned a private botanical garden in Haarlem,[4] helped Carl Peter Thunberg to enroll as a surgeon on board of the VOC ship *Schoonzigt* in 1771 for botanical research in the Indies.[5] Thunberg obtained letters of recommendation from De Vry Temminck, indispensable to enter the East Indies and Japan, areas strictly controlled by the VOC.[6]

Coenraad Jacob Temminck was born on March 31, 1778, son of Jacob Temminck (1748–1822), Amsterdam patrician and general-treasurer for the VOC, and of Aleida van Stamhorst (1751–1806). Through his contacts at the VOC and in Amsterdam, Jacob Temminck built one of the most renowned collections of natural history in the Netherlands. It included mainly birds, but also mammals, fossils, fish and several skeletons and even an aviary with living exotic birds, all situated at the family's home at the Heerengracht, in Amsterdam.[7] The cabinet—and the visitors it attracted—played a decisive role in Coenraad's early life and, later, in defining his career.

It was all very fashionable and a sign of good taste and wealth. For example, the VOC governor Arnoldus Ameshoff also owned a huge aviary: his pride and joy were the exotic species of water birds brought to him from all corners of the globe. Coenraad remembered the extravaganza of a dinner party at the Ameshoff's manor house *Amstelrust*, where they enjoyed some of his exotic birds served for dinner: "I remember attending a dinner as a child at M. Ameshoff's, who, in order to display the

[3] Johan Engelebert Elias, *De Vroedschap van Amsterdam, 1578–1795* (N. Israel, 1963), 785-89, 986. More information on the family can be found in Didericus Gijsbertus van Epen, ed. *Nederland's patriciaat 1868–1930*, vol. 5 ('s-Gravenhage: Centraal bureau voor genealogie en heraldiek, 1914).

[4] Bert C. Sliggers, "Henry Hope's vermakelijke buitenleven en de Haarlemmerhout," in *Paviljoen Welgelegen 1789–1989. Van buitenplaats van de bankier Hope tot zetel van de provincie Noord-Holland*, ed. F. W. A. Beelaerts van Blokland (Haarlem: Schuyt & Co, 1989), 28.

[5] Frederik J. L. van Dulm, *'Zonder eigen gewinne en glorie': mr. Iman Wilhelm Falck (1736–1785), gouverneur en directeur van Ceylon en onderhorigheden* (Verloren, 2012), 307; L. C. Rookmaaker, *The Zoological Exploration of Southern Africa, 1650–1790* (Rotterdam: A. Balkema, 1989), 148.

[6] Carl Peter Thunberg, *Reise durch einen Theil von Europa, Afrika und Asien, hauptsächlich in Japan, in den Jahren 1770 bis 1779*, 1 Auflage (Berlin: Haude und Spener, 1792), 68, 189.

[7] Gijzen, " 's Rijks museum," 32; Pieter Smit, A. P. M. Sanders, and J. P. F. van der Veer, eds., *Hendrik Engel's Alphabetical List of Dutch Zoological Cabinets and Menageries*, 2 ed. (Amsterdam: Rodopi, 1986), 321.

magnificence of his menagerie, served at his table not only *Pauxis*, *Hoccos* and various species of exotic pheasants, but also mandarin ducks from China and wood ducks from Louisiana, a feast worthy of the time of Heliogabalus."[8]

FIGURE 1.1. Portrait of Coenraad J. Temminck (1778–1858), by Jan Adam Kruseman, 1836.

The size and quality of the Temminck collection in Amsterdam attracted the attention of European naturalists. Many thought it worth travelling to Amsterdam just to study it. Naturalist and voyager Georg Forster praised not only the beauty and rarity of the specimens, but also the "inimitable perfection of the art of stuffing birds, attained

[8] *Pauxi* and *Hocco* are two genera of curassows, limited to the Americas. Coenraad Jacob Temminck, "Histoire naturelle générale des gallinacés," in *Histoire naturelle générale des pigeons et des gallinacés*, vol. 2 (Amsterdam: J. C. Sepp & fils, 1813), 458; see also Van Lynden-de Bruïne, *In vogelvlucht*, 13.

nowhere else."[9] Although none of the visitors nor Temminck himself mentioned who was actually responsible for mounting the specimens, the preservation skills needed for such a display are remarkable. Many specimens were used as models for the descriptions and illustrations of ornithology books, like Cornelis Nozeman and Christian Sepp's *Nederlandse Vogelen.*[10] The French explorer and naturalist François Levaillant, a friend of the family, also found models for his books among Jacob's birds, and he asked the artists Lebrecht Reinold and Jacques Barraband to visit Amsterdam and make drawings from Temminck's specimens.[11] The aviary was also worthy of praise. According to Levaillant, Jacob Temminck had managed not only to keep alive many exotic species of birds, but they also reproduced successfully in captivity.[12]

In 1790, Forster paid a visit to the Temmincks in Amsterdam and introduced Alexander von Humboldt to the Temminck family, as Humboldt himself fondly recalled in a letter to Temminck in 1857.[13] Coenraad Jacob was only twelve years old when Forster and Humboldt visited in 1790. He grew up in a house where visitors, collections, books and dinners revolved around ornithology. It is easy to imagine how conversations about exotic animals, strange countries and undaunted travelers may have ignited young Coenraad Temminck's fascination with natural history.

Very little is known about Coenraad Temminck's education. As a child, Coenraad received private education at home. He had a French–Swiss tutor, whom Temminck remembered with disdain.[14] There are no records of him attending school.[15] At seventeen, Coenraad Jacob started to work as one of the three auctioneers of ships and merchandise for the VOC, a post no doubt arranged by his father to gain entry for young Coenraad into the VOC.[16] However, in 1795 the VOC went bankrupt and the democratic Patriots

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[9] Georg Forster, *Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England und Frankreich* (Leipzig: Reclam, 1905); translated in Stresemann, *Ornithology from Aristotle to the Present*, 111.

[10] Cornelis Nozeman, Martinus Houttuyn, Christiaan Sepp et al., *Nederlandsche vogelen volgens hunne huishouding, aert en eigenschappen beschreeven. Door Cornelius Nozeman. Alle naer 't leeven geheel opnieuw en naeukeurig getekend, in 't koper gebragt, en natuurlijk gekoleurd door, en onder opzicht van, Christiaan Sepp*, 5 vols. (Amsterdam: Jan Christiaan Sepp, 1770–1829).

[11] For example, Barraband made several plates for Levaillant for his book on parrots (François Levaillant and Jacques Barraband, *Histoire naturelle des perroquets*, 2 vols. (Paris: Levrault, 1801–1805).

[12] François Levaillant, *Second voyage de F. Levaillant dans l'intérieur de l'Afrique par le Cap de Bonne-Espérance, pendant les années 1783, 84 et 85* (Paris: H. J. Jansen et compagnie, [1795 or 1796]), 135.

[13] Alexander von Humboldt to Coenraad Jacob Temminck, 29 March 1857, Naturalis Biodiversity Center Archives, Archive C. J. Temminck; Alexis J. P. Raat, "Alexander von Humboldt and Coenraad Jacob Temminck," *Zoologische Bijdragen* 21, no. 1 (1976): 31.

[14] Susanna, "Levensschets van Temminck," 49.

[15] *Gemeentelijke Archiefdienst Amsterdam* to Coenraad Jacob Temminck, 6 April 1798, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

[16] Raat, "Coenraad Jacob Temminck," 91; Van Lynden-de Bruïne, *In vogelvlucht*, 13.

(mostly members of bourgeoisie striving to democratize the country, opposed the rule of the stadtholder, William V Prince of Orange) took the lead. The Batavian Republic, proclaimed in January 1795—and in fact a client state of France or "sister-republic"—became the owner of the VOC. Three years after it was nationalized, the VOC ceased to exist. In April 1798, Temminck received a letter from the president of the Administrative Municipality of Amsterdam bluntly informing him that he was dismissed from his post in the VOC as auctioneer, together with many other "useless and unworthy local civil servants and clerks" who were to be replaced "by worthy and skillful patriots."[17] Through a letter of objection, these civil servants, who apparently had quite an influence in the Republic, turned the discharge around and were reinstated in their posts a month later. Temminck kept this job until the beginning of April 1812, although it was now an honorary post.[18]

Around 1800 Coenraad Jacob was in charge of his father's collection, even though Jacob Temminck would live for another twenty years.[19] From 1800 to 1806 the Temminck collection grew rapidly and the number of species doubled in just five years.[20] Coenraad took up the task of cataloguing the cabinet somewhere between 1800 and 1804. The title page of this handwritten list reads *Catalogue du Cabinet de C. J. Temminck*, indicating that by then, the collection had already passed from father to son. The first 450 species listed in the catalogue were already present in Temminck's father's collection, including some of Levaillant's specimens brought from southern Africa in 1784. The catalogue listed a total of 839 species.[21] The manuscript catalogue of Temminck's collection followed Buffon's classification for the birds and Audubert's for

[17] Administrative Municipality of Amsterdam to Temminck, 6 April 1798, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

[18] Records of this episode are kept in the Naturalis Biodiversity Center Archives, Archive C. J. Temminck. See also Van Lynden-de Bruïne, *In vogelvlucht*, 14; Holthuis, *Rijksmuseum*, 19.

[19] Van Lynden-de Bruïne, *In vogelvlucht*, 14.

[20] Erwin Stresemann, "Analyse von C. J. Temmincks "Catalogue systématique" (1807)," *Zoologische Mededelingen* 31, no. 29 (1953): 320-22; Holthuis, *Rijksmuseum*, 19. C. J. Temminck married Dionysia C. Cau, and in 1806 they (and the cabinet) moved from the Herengracht to another house in the same canal, no. 401 (Van Lynden-de Bruïne, *In vogelvlucht*, 14).

[21] A handwritten copy of the catalogue, in Coenraad's distinctive handwriting, is now kept in the archives of Naturalis. Justin Jansen dates this manuscript catalogue ca. 1803–1804, in "An Unpublished 'Catalogue du Cabinet de C. J. Temminck' (c. 1803–1804)," *Archives of Natural History* 44, no. 2 (2017). Jansen's dating is mainly based on Temminck's annotations on the margins, especially those that refer to Levaillant's works. However, these annotations may have been added to the manuscript while Temminck was preparing a new and revised version of the catalogue. Accompanying documents supporting this interpretation are kept at the Naturalis Biodiversity Center Archives. Furthermore, these margin annotations are too inconsistent to draw conclusions about dates. Sometimes the page numbers of Buffon's or Levaillant's books are given, while in other occasions, only the plates of that same work are noted down. In my opinion these notes therefore do not provide a reliable clock to date the manuscript.

the apes and lemurs (which are only introduced but not listed). Temminck actively pursued the acquisition of new species through purchase and exchange. With the decline and final dismantling of the VOC, he could not keep on adding specimens to his collection through his father's contacts within the VOC. Instead, Temminck contacted other collectors and naturalists. His excellent networking skills were to prove extremely useful. By the time his first publication appeared, in 1807, his name was already known in the world of collectors. An extensive and scientifically significant natural history cabinet was much more than an exuberant hobby and a source of information for naturalists. It was also considered a sign of culture and refinement. When Coenraad Jacob received the order of Chévalier de la Légion d'Honneur in 1802, at the age of twenty four, it may have been thanks to his cabinet. The order had been created that same year by consul Napoleon Bonaparte, and was meant to be—and still is—a recognition for civil and military merits, including excellence in a trade or a profession as well as having contributed to the welfare of others and the nation. A civilian may obtain such an honor if he has enhanced the reputation of the country by his work in the arts, the sciences or politics. As Temminck's cabinet ranked amongst the best in Europe, it is possible that the Légion d'Honneur was a recognition of his collection.[22]

Coenraad Temminck played a more active role than his father in the production of Cornelis Nozeman and Christian Sepp's *Nederlandsche Vogelen*. After Nozeman died in 1789, before the publication of the second volume, Martinus Houttuyn took over the work. By an unfortunate coincidence, Houttuyn in turn died, before the publication of the third volume, in 1797. Then Christiaan Sepp and his son, Jan Christiaan, asked Temminck for help with the fourth volume. In this volume, published in 1809, father and son Sepp refer to the cabinet of "the honorable mr. C. J. Temminck," who had not only allowed them to depict specimens from his excellent collection, so well-known throughout Europe, but had also provided them with the most accurate ornithological observations.[23] While the fourth volume included many birds from Temminck's collection, in the last volume, which appeared in 1829, almost all plates were made from Temminck's birds.[24]

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[22] Van Lynden-de Bruïne, *In vogelvlucht*, 16.

[23] Nozeman, Houttuyn, Sepp et al., *Nederlandsche vogelen volgens hunne huishouding*, vol. 4, 385.

[24] Nozeman, Houttuyn, Sepp et al., *Nederlandsche vogelen volgens hunne huishouding*, vol. 5, ii. The fifth volume followed Temminck's classification of birds as published in his *Manuel d'Ornithologie* (Coenraad Jacob Temminck, *Manuel d'ornithologie ou Tableau systématique des oiseaux qui se trouvent en Europe*, 1 ed. (Amsterdam: J. C. Sepp et fils, 1815).

FIGURE 1.2. Two specimens from Temminck's private collection, a scarlet macaw and a mandrill.

On April 3, 1804, Coenraad Temminck married Dionysia Catharina Cau (1779–1828), known as Caatje. She was as well-born as Coenraad. Her family was rich as well as influential, with ties with the political elite and the VOC. Her father, Iman Meijnard Cau (1755–1791), who had married the daughter of a VOC commander, was one of the forty eminent citizens, the Veertigraad of Delft, a group with the power to put forward names for the function of city mayor and similar offices. If the marriage had been arranged by the families, neither Caatje nor Temminck seemed to object. Caatje wrote in her journal on the day of their twentieth wedding anniversary: "I was up early and I remembered with joy the privilege of reliving today, once again, our wedding day."[25] In the intimacy of her journals, she sometimes referred to her husband as "mijn lieve Temminck" (my dear Temminck).[26] Caatje moved to the Heerengracht to live with her husband and parents-in-law. In 1806 the couple—and the collection—moved to a smaller house in the same canal. Their new house was filled to the brim with stuffed birds and mammals.

[25] Van Lynden-de Bruïne, *In vogelvlucht*, 26.

[26] Van Lynden-de Bruïne, *In vogelvlucht*, 47.

Specimens were stalled in the entrance, corridors and the attic, where visitors walked around admiring the cabinet, twice a week. [27]

Coenraad Temminck has been portrayed as a quiet, reserved man, for whom propriety, order and precision were of the utmost importance.[28] He preferred work above entertainment, nature above theaters and hunting above eating. He "led a sober life and was uncommonly neat and exceedingly precise about his clothes and surroundings."[29] Despite his patrician upbringing, Temminck disliked having a valet, who was not allowed to help him get dressed, not even when advanced age and illness kept him in his bed, when he always received visitors so well dressed as if he was ready to leave the house.[30] Temminck liked to keep his distance and had a curious way of suddenly interrupting a conversation to steer it towards a different subject.[31] He was not quick to give his own view unless it really mattered to him, but when he did, he did so politely. When affronted, he did not hesitate in his replies. Intelligent and quick, Temminck could also be condescending, even sarcastic. Compliments and honors were received with relative indifference, but then again, he seemed to be a master in hiding whatever went on inside him and he never revealed any religious or political feelings.[32]

Regarding his religious beliefs, Temminck was a Mennonite, or *Doopsgezinde*, member of a community that was considered in the Netherlands to be trustworthy and honorable, whose members mostly followed an austere life.[33] Indeed, as well as righteous, Temminck could be honest to a fault.[34] Even though Temminck seems to have been quite picky, his selected friends were friends for life, towards whom he acted generously and obligingly. His friends were always welcome to stay at his home, whether in Amsterdam or at his country house *Wildlust* in Lisse, for long periods of time. He always remained Spartan, but treated his guests as lavishly as if they were

[27] Witkamp, "Vier-en-twintig voorgangers," 194.

[28] Vrolik, "Levensbericht van Coenraad Jacob Temminck," 78. For descriptions of Temminck's character, see also Susanna, "Levensschets van Temminck"; Snellen van Vollenhoven, "Coenraad Jacob Temminck."

[29] Snellen van Vollenhoven, "Coenraad Jacob Temminck," 7.

[30] Susanna, "Levensschets van Temminck," 70.

[31] Snellen van Vollenhoven, "Coenraad Jacob Temminck," 7.

[32] Susanna, "Levensschets van Temminck," 70.

[33] There is a marginal note in a letter from Temminck to the Ministry of Home Affairs reading simply "Mennonite" (Coenraad Jacob Temminck to the Ministry of Home Affairs, 27 February 1819, National Archives of the Netherlands, The Hague, Binnenlandse Zaken, nummer toegang 2.04.01, inventarisnummer 4072). In this letter, Temminck requested to be excused from taking an oath—a guarantee for his honest dealing with the funds given to him to buy specimens for the Southern Universities. The minister agreed, and he was allowed to give a written affirmation instead.

[34] Holthuis, *Rijksmuseum*, 23.

attending a wedding.[35] Regarding his own family, the man portrayed in his wife's diaries was loving and caring. Caatje accompanied him everywhere, sharing with him hours of uncomfortable rides on Temminck's carriage during his tours around Europe, for months at a time. In return, Temminck made the sacrifice of attending concerts and soirées with her. The couple remained childless. Caatje died in November 1828, at fifty years of age. Two years later, Temminck married Catharina Nepveu (1785–1834), who sadly, died after four years of marriage. Temminck's third wife, Agneta Smissaert (1806–1865), was the daughter of a friend of Temminck, Marinus Smissaert, steward at the Royal Palace in Amsterdam. They had three sons between 1838 and 1841: Coenraad Jacob, Marinus and Willem Anne Temminck.[36]

François Levaillant and Bernhard Meyer

François Levaillant was probably the most influential person in kindling the love of young Temminck for natural history. Levaillant was a friend of the family and a frequent guest of Jacob Temminck. He had met Jacob Temminck around 1780 and was instantly most impressed with Temminck's collection, "an assembly of precious objects as I have never seen in France. Everything seemed to me extremely rare and exceptionally well preserved."[37]

Temminck's father admired Levaillant, so much so that he acted as Levaillant's patron by helping him to get to South Africa in a VOC ship in 1780. He gave Levaillant letters of introduction and sponsored the voyage. During the following three years, Levaillant collected about two thousand specimens of birds, as well as mammals, insects, plants and Hottentot artifacts. Several specimens went to Jacob Temminck's collection.[38] During Levaillant's voyages, Temminck kept in touch, mostly trying to steer Levaillant towards interesting collecting sites, like Madagascar. He arranged for Levaillant a passage on a VOC slave ship that was scheduled to make port in the Cape of Good Hope, where Levaillant could embark. Levaillant happily agreed at first, but after sensing the antipathy of the captain of the slave ship, who appeared to be very reluctant to take Levaillant with him, he decided to leave the trip for another time.[39]

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[35] Susanna, "Levensschets van Temminck," 71.

[36] Van Lynden-de Bruïne, *In vogelvlucht*, 21.

[37] François Levaillant, *Voyage de M. Le Vaillant dans l'intérieur de l'Afrique: par le Cap de Bonne-Espérance, dans les années 1780, 81, 82, 83, 84 & 85*, vol. 1 (Paris: Leroy, 1790), 1. See also Stresemann, *Ornithology from Aristotle to the Present*, 86, 111; Rookmaaker, *Zoological Exploration*, 259.

[38] Levaillant, *Voyage de M. Le Vaillant*, vol. 1, 1-2, 28.

[39] Levaillant, *Second voyage de F. Levaillant dans l'intérieur de l'Afrique par le Cap de Bonne-Espérance, pendant les années 1783, 84 et 85*, 361.

After his return to France, Levaillant published an account of his first and second voyages in 1790 and 1795. The books were vivid descriptions that had immediate success and were translated into many languages, including Dutch. In 1799, the first ornithological work of Levaillant, the *Histoire Naturelle des Oiseaux d'Afrique*, appeared in Paris, dedicated to Jacob Temminck—and according to Stresemann, paid for by Temminck, as well.[40]

Coenraad was between twelve and twenty-one years old when the fashionable books of Levaillant were published, written in a vibrant prose about many adventures and an exotic natural world, the kind of books that excited the imagination and aroused curiosity. Through the initial friendship with Jacob, Levaillant and Coenraad became friends as well. After the latter took over the care of the cabinet and started his own study of birds, Levaillant continued his gifts in the form of interesting specimens and valuable information, and he was allowed to illustrate birds from the Temminck cabinet in his works.[41] As Temminck learned and progressed, Levaillant recognized his potential in 1806: "M. Temminck, although still young, is a remarkable man, different from all those collectors who, loving only brilliant and beautifully plumaged species, accumulate at great expense collection upon collection, without any taste for scientific study."[42] Initially at least, Levaillant adopted the role of mentor. Temminck wrote: "I owe to Levaillant and his writings my first thoughts and my first steps in natural history; his works and his advice served me as guides in the practical study of this science, and I am pleased to admit that, on his return from Africa, he laid the first foundations of a collection which, passing from father to son, is today the most beautiful ornament of the Museum of the Netherlands."[43] In recognition, Temminck named two birds after him, *Indicator Levaillantii*, a honeyguide, and a species of snake bird, *Plotus Levaillantii*. Incidentally, in what might seem an absence of filial deference, Temminck made no other reference to his father nor his father's cabinet in his scientific writings than this meager sentence.

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[40] Stresemann, *Ornithology from Aristotle to the Present*, 88; Siegfried Huigen, *Knowledge and Colonialism: Eighteenth-century Travellers in South Africa* (Brill, 2009), 137-38.

[41] Coenraad Jacob Temminck, "Histoire naturelle générale des gallinacés," in *Histoire naturelle générale des pigeons et des gallinacés*, vol. 3, 640.

[42] François Levaillant, *Histoire naturelle des oiseaux d'Afrique*, vol. 5 (Paris: J. J. Fuchs, 1806), 31.

[43] Coenraad Jacob Temminck and Guillaume Michel Jerôme Meiffren Laugier de Chartrouse, *Nouveau recueil de planches coloriées d'oiseaux: pour servir de suite et de complément aux planches enluminées de Buffon*, vol. 5 (Paris: F. G. Levrault, 1838). Livraison 64, pl. 380. See also Rookmaaker, *Zoological Exploration*, 259. For the dates of publication of the livraisons, see Edward C. Dickinson, "Systematic Notes on Asian birds. 9. The "Nouveau recueil de planches coloriées" of Temminck & Laugier (1820–1839)," *Zoologische Verhandelingen* 335 (2001): 7-54.

FIGURE 1.3. Plate of *Plotus LeVaillantii* from Temminck and Laugier's *Nouveau recueil de planches coloriées d'oiseaux*, vol. 5, pl. 380 (1825).

Levaillant had yet another, even more valuable gift for Temminck: arsenic soap. Levaillant had learned how to prepare and stuff bird skins from Jean-Baptiste Bécoeur, a French pharmacist and naturalist from Metz and the inventor of the arsenic soap method. It was an excellent procedure for preserving skins of birds and mammals that protected them from voracious insects without damaging the skins. Although Bécoeur kept his formula secret and never published it, Levaillant had learnt it directly from him and Temminck learned it again from Levaillant.[44] Thanks to this very effective technique, Temminck's specimens aged much more gracefully and in a much better shape than others from this period, which either disintegrated after being treated with

[44] Temminck to Johann Karl Wilhelm Illiger, 4 May 1810, Museum für Naturkunde Berlin Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 85. See also L. C. Rookmaaker, P. A. Morris, I. E. Glenn et al., "The Ornithological Cabinet of Jean-Baptiste Bécoeur and the Secret of the Arsenical Soap," *Archives of Natural History* 33, no. 1 (2006).

salt and alum, ended bald after losing their feathers, rotted away from the inside out or were eaten away by vermin.[45] The formula also allowed Temminck (and others after him) to study all the details of bird plumages, as feathers retained their original colors and structure. Temminck's superb taxidermy skills soon opened doors towards a more professional office.

Levaillant's influence on Temminck was, however, limited to a passion for birds, their natural history and taxidermy. He did not provide Temminck with any scientific training. Levaillant, with his appealing prose, lacked a methodical or scientific approach to ornithology. He embellished his descriptions with invented details and he was accused of creating his own new species by making artifacts, gluing parts of different species together. The Swedish zoologist Carl Jakob Sundevall, for one, accused Levaillant—many years after the fact—of not only making many errors, but also of using the plates from other works to describe new species.[46] When Jules Verreaux, the French ornithologist, visited Temminck's cabinet in Amsterdam, Temminck showed him eight or nine of Levaillant's artifacts. Although Verreaux encouraged Temminck to publish about them, he declined, perhaps as a kind gesture to his father's long-time friend, but he gave permission to Verreaux to do so if he wished. Later, Verreaux confessed his fear of upsetting cabinet owners by publishing these findings.[47]

In the end, Levaillant's popularity faded and the last volume of the *Histoire naturelle des oiseaux d'Afrique* did not sell well. His friendship with Temminck also declined with time. In 1809, as Temminck's career began to take off, Levaillant complained about Temminck's attitude to his friend and associate, the artist Jean-Gabriel Prêtre:

> Are you still pleased with our *fino* T., as for me, I am not really happy? I have received a letter from Mr. Gosse from Geneva, who is not very pleased either, and neither is Mr. Boissiere with the exchanges he made with Temminck. It seems he is reprimanding everyone. You undoubtedly know that he is president of an Academy, director of a School of Art, advisor to the King and Knight of the Union. God's will has it that these honors have changed him a little.[48]

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[45] Farber, "Development of Taxidermy," 553.

[46] Carl Jakob Sundevall, "Kritisk framställning af fogelarterna uti äldre ornithologiska arbete," *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 2, no. 3 (1857).

[47] Edward Wilson to Hugh Strickland, 25 July 1849, in L. C. Rookmaaker, *Calendar of the Scientific Correspondence of Hugh Edwin Strickland* (University Museum of Zoology, Cambridge, 2010), 176.

[48] François Levaillant to Jean-Gabriel Prêtre, 15 January 1809, Staatsbibliothek zu Berlin, Manuscripts Department, Slg. Darmstaedter Afrika 1780: Levaillant, François. It seems that Prêtre did not necessarily agree with Levaillant, as he later worked with Temminck on the book of pigeons and gallinaceous birds. Nonetheless, Prêtre en Levaillant continued to correspond for several years. With "directeur d'une École

The apprentice–teacher relationship formed during Temminck's youth was replaced by an altogether different relation. Their friendship was strained partly by their different views of classification, but mostly by Temminck's growing self-confidence and, apparently, by a somewhat pompous attitude towards Levaillant.

Levaillant detested the binomial system of Carolus Linnaeus and preferred Buffon's narrative style, while Temminck not only adopted Linnaean nomenclature and classification methods, but also dedicated most of his life to the classification systems Levaillant disliked. In his publications Temminck attempted to raise ornithology to the level of a science and, as Paul Farber puts it, "held the fashionable bird art books of the period in contempt."[49] Temminck also condemned the making of artifacts: it impeded the advance of science and served only the ego of those who made them.[50] Although Temminck never explicitly criticized Levaillant's works or artifacts he was in all probability referring to them. Tension arose between the two men. Temminck relied on Levaillant for information on birds he worked on, and at times, he could be impatient if the information he needed was delayed. In 1812, Temminck was working on a monograph on pigeons and gallinaceous birds that appeared in installments. In June, he sent a list of five questions for his friend Levaillant. Judging from Levaillant's answer a month later, Temminck had been quite insistent. After giving Temminck the requested information, he complained about the fact that, while Temminck demanded prompt answers, Levaillant had been waiting for months for money that was owed to him: "you have to admit that you are a devil of a man."[51]

When Levaillant died in 1824, in poverty and without friends, no obituaries were published.[52] Temminck wrote a short notice hidden in a footnote, lamenting the harshness with which Levaillant's work had been judged—work full of interesting and necessary observations, which Temminck deemed very useful. He seemed disappointed by the indifference of ornithologists towards Levaillant's passing:

> Would it be for having expressed himself with too great frankness about writings of this kind, because of having enounced severe, perhaps often overly bitter criticism, that this learned ornithologist has been reduced in his old age to the barest minimum, without any kind of encouragement and without being able to pick the smallest fruit of his labors, while his compatriots receive rewards,

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de peinture," Levaillant meant the Koninklijke Kunst Museum (Royal Art Museum) where Temminck briefly was acting director while the director travelled abroad.

[49] Farber, *Emergence of Ornithology*, 90.

[50] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xxi.

[51] Levaillant to Temminck, 27 July 1812, Naturalis Biodiversity Center Archives, Archives C. J. Temminck.

[52] Rookmaaker, *Zoological Exploration*, 181.

> expressions of thanks and titles, awarded always for real merits and to famous men of whom France is proud.[53]

The second key figure in Temminck's formation was Bernhard Meyer, physician, dentist and naturalist from Offenbach, Germany. Meyer worked then as a dentist and owned an apothecary business, but he was mostly known for his contribution to the botanical work *Oekonomisch-technische Flora der Wetterau* (1799) together with Gottfried Gaertner and Johannes Scherbius, as well as for his superb collection of birds, nests and eggs. Temminck and Meyer probably met because of their collections, but Meyer may have been also a friend of Coenraad's father. In 1804, Temminck and his wife, Dionysia Catharina Cau (Caatje), stayed for six months in Offenbach as guests of Bernhard Meyer.[54] During his stay in Offenbach, Temminck also met the physician and naturalist Johann Philipp Achilles Leisler and, most likely, Johann Wolf. These meetings would later spur Temminck to engage on his own enterprises.

At the time of Temminck's visit, Meyer and Wolf were working on a manual of the birds of Germany, the *Naturgeschichte der Vögel Deutschlands in getreuen Abbildungen und Beschreibungen*, published in 1805 (the introduction is dated May 1804). This work could not be more different from those by Levaillant, with his elaborate descriptions and literary style. Meyer and Wolf set a list of rules to be followed in order to describe and figure the birds "with fidelity." First-hand observations and accurate descriptions and measurements were essential; Temminck had provided the authors with additional information on certain species.[55] The *Naturgeschichte der Vögel Deutschlands* included a systematic index and each species description consisted of a literature list, a morphological description, and remarks on distribution, nutrition, reproduction, usefulness, damage to man, enemies, how to hunt it, varieties and other comments. So it seems that in Offenbach, Temminck was introduced to the methodology of naming and classifying as it is to be found in Meyer's works, the scientific and practical skills he lacked at the time.[56] A few years later, Temminck drew his inspiration from these and other German works to write a treatise on European birds, his *Manuel d'Ornithologie,*

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[53] Temminck and Meiffren Laugier, *Nouveau recueil*, vol. 3, 295.

[54] Stresemann suggested the couple regarded the trip to Offenbach as a honeymoon in *Ornithology from Aristotle to the Present*, 115. However, at the beginning of the nineteenth century, it was customary for newlyweds to travel to visit friends and relatives that could not attend the wedding, and a honeymoon as we know it now did not become a practice in Europe until mid-1800s. Unfortunately, I could find no records of the preparations to visit Offenbach, nor the motives behind the choice.

[55] Johann Wolf and Bernhard Meyer, *Naturgeschichte der Vögel deutschlands in getreuen Abbildungen und Beschreibungen* (Nürnberg: J. F. Frauenholz, 1805–[1821]), 33, 38.

[56] Vrolik, "Levensbericht van Coenraad Jacob Temminck," 67; Susanna, "Levensschets van Temminck," 50.

first published in Amsterdam in 1815. Temminck noted in the introduction that his work was based on Meyer's classification of the *Naturgeschichte,* while he also used Illiger's *Prodromus Mammalium et Avium* (1811) as a guide.[57]

From listing to classifying

After his return from Offenbach, Temminck started updating and finishing the collection catalogue he had started around 1800, soon after taking charge of his father's collection.[58] That first catalogue gives a glimpse of young Temminck's perception of ornithology. In an opening section entitled *Sur la division des Oiseaux en Général*, he pointed out the problems he faced while working on the classification of his collection of birds. While some "ornithologists" based their descriptions on coloration, which created confusion in species in which juveniles have different patterns than the adults, others based their classifications on habits and nutrition, which yielded equally unsatisfactory results.[59] Using Buffon's system as a starting point, naturalists had improved the classification of birds, but with the increasing numbers of new species arriving from the tropics, the achievement of a "complete Natural History" of birds seemed to Temminck a goal for a very distant future. Buffon had suggested that naturalists should study birds methodically—one country at a time.[60] In Temminck's view, the road ahead was long and difficult, and such a work needed to combine classification with the observations from the field so as to describe each bird's life history—observations like those provided by Levaillant and Audubert.[61] He was looking for accuracy, totality, synthesis and structure in the systematic arrangement of birds.

Standardization preoccupied Temminck. After 1804, he applied himself to the manuscript catalogue with the specific purpose of publishing it. Apparently, he did so spurred by the many requests he received from interested and curious naturalists who wished to have a catalogue of his cabinet.[62] He therefore revised and updated his first catalogue, putting what he had learned in Offenbach into practice. Temminck revised

[57] Temminck, "Avant-propos," *Manuel d'ornithologie*, 2 ed., vol. 1, xxxi.

[58] The manuscript catalogue is the only remaining list of the Temminck's collection as it was at the turn of the century. It is known as "the heart book" for the heart-shaped paper glued on the front cover, reading quite simply "Catalogue," and on the title page, "Catalogue Cabinet Temminck," (Naturalis Biodiversity Center Archives, C. J. Temminck, n.d.).

[59] Temminck, "Catalogue Cabinet Temminck."

[60] Georges Louis Leclerc Buffon, "Plan de l'ouvrage," in *Histoire naturelle des oiseaux*, vol. 1 (Paris: Imprimerie royale, 1770), xxxv.

[61] Temminck, "Catalogue Cabinet Temminck."

[62] Coenraad Jacob Temminck, "Préface," in *Catalogue Systématique du Cabinet d'Ornithologie et de la collection de Quadrumanes* (Amsterdam: C. Sepp Jansz., 1807), iii.

and re-arranged the groups, abandoning Buffon's families and deciding instead to follow Latham, Illiger, Vieillot, Levaillant, Sonnini, Audubert and Edwards.[63] The species, each with its unique catalogue number, were listed by their French and Latin names. The manuscript catalogue included 839 species, but the finished new catalogue closes with number 1072. After each species entry, Temminck listed the references to the original descriptions and illustrations, as well as other publications. By the end of 1806, Temminck had finished the catalogue and the booklet, entitled *Catalogue Systématique du Cabinet d'Ornithologie et de la collection de Quadrumanes avec une courte description des oiseaux non-décrits suivi: d'une nôte d'oiseaux doubles et de quelques autres objets d'histoire naturelle offerts en échange*, appeared in Amsterdam in 1807.[64]

This new, improved *Catalogue* was not only a list of the specimens of his collection, but it included descriptions of a few species that were new for Temminck. But, at that time, his primary objective was more mundane—publicity. He wished to let amateurs, collectors of Natural History and European museum directors know, firstly, what specimens were exhibited in his cabinet and, secondly, which of his specimens were available for exchange.[65] He sought to increase his collection not by obtaining more specimens, but by obtaining new species. For this, he offered in exchange his duplicates, listed in an appendix at the end of the Catalogue, for species he did not possess.[66] He certainly succeeded in this. In 1810, Temminck explained to the German entomologist and zoologist Karl Illiger how his collection has been enriched by exchange after the publication of his *Catalogue*, thanks to the network he had been building and the trips he made around Europe. Unfortunately, he lost two important shipments of birds, one from Africa and the other from Celebes and Java, as the American ships that carried them were wrecked at sea.[67] Publishing a catalogue of his collections was, it seemed, yielding fruits.

The species new to Temminck were marked with an asterisk after their catalogue number and described in the special section *Caractères physiques des oiseaux non-decrits*, at the end of the book. Although he was following Linnaean principles in the catalogues, for some reason Temminck described the new species without giving them a Latin

[63] Temminck, *Catalogue Systématique*, v-vi.

[64] Jansen, "An Unpublished "Catalogue du Cabinet de C. J. Temminck" (c. 1803–1804)"; Stresemann, "Analyse."

[65] Temminck, *Catalogue Systématique*, iii.

[66] Temminck, *Catalogue Systématique*, iv; Coenraad Jacob Temminck, "Note des Oiseax doubles et de quelques autres objets d'Histoire Naturelle offerts en échange," in *Catalogue Systématique*.

[67] Coenraad Jacob Temminck to Johann Karl Wilhelm Illiger, 4 May 1810, Zoologische Museums der Humboldt-Universität Archives; Stresemann, "Briefwechsel von Temminck mit Hoffmannsegg und Illiger," 225.

binomial. With a few exceptions, most of Temminck's new species received only a French name. Why exactly he decided to do so, remains a mystery. Perhaps Temminck lacked the confidence at the time, or perhaps he planned to describe them later on—after confirmation from his peers. Whatever the reason, it was a naive thing to do: Louis Pierre Vieillot later did give the birds Latin names without acknowledging Temminck's names and effectively appropriating them. This started an hostility between them that culminated in 1817 with Temminck's sharp critique of Vieillot's work and thefts.

An example of what happened concerns a specimen of a cuckoo from Java that Temminck had in his collection, number 380, for which he could not find a reference in the existing literature. He decided to describe it as a new species in his new version of the catalogue, and named it *Coucou roux à bec rouge*, in French. And that was that, for a while. Ten years later, Vieillot described the same bird as a new species and gave it a proper Latin binomial: *Cuculus melanogaster*. The characters he used are the same as Temminck's, as was the place of origin of the new species, Java. However, the locality was erroneous, as this particular species occurs in Central and South America—a detail that led Temminck to miss previous descriptions of the cuckoo and that had also escaped Vieillot.[68] In fact, the cuckoo had been known to naturalists for almost half a century. It had been described before by Brisson as *Cuculus Cayanensis*, by Buffon as the *Coucou de Cayenne*, by Gmelin as *Cuculus cayanus* and by Latham as *Cayenne Cuckow*.[69] Probably, the erroneous locality for specimen no. 380 had misled Temminck in identifying the bird, an error that Vieillot simply duplicated. Vieillot's description was too similar to Temminck's to be a coincidence, and Temminck was quick to respond in 1817, sparing neither examples nor adjectives, in a booklet with the long and telling title *Observations sur la classification méthodique des oiseaux: et remarques sur l'Analyse d'une Nouvelle Ornithologie Élémentaire par L. P. Vieillot, auteur de divers ouvrages d'ornithologie, et*

[68] Gustav Hartlaub, "A Systematic Index to a Series of Descriptions of Birds, Published by C. J. Temminck in his 'Catalogue Systématique du Cabinet d'Ornithologie, etc.', of the year 1807," ed. William Jardine, vol. 2 (Edinburgh: W. H. Lizars, 1849), 1-7; Temminck, *Catalogue Systématique*, 58, 208; Louis Pierre Vieillot, "Le Coucou a ventre noir," in *Nouveau Dictionnaire d'Histoire Naturelle, appliquée aux arts, à l'agriculture, à l'économie rurale et domestique, à La médecine, etc. Par une société de naturalistes et d'agriculteurs*, ed. Charles Sigisbert Sonini (Paris: Deterville, 1817), 236-37. Van den Hoek Ostende, Dekker, and Keijl (in "Type-specimens of Birds, Non-Passerines," 147) are sure of the fact that Vieillot's description was based on Temminck's description, and therefore, on Temminck's specimen no. 380 (now RMNH.AVES.88261).

[69] Mathurin-Jacques Brisson, *Ornithologie, ou, Méthode contenant la division des oiseaux en ordres, sections, genres, especes & leurs variétés*, vol. 4 (Paris: J.-B. Bauche, 1760), 122, pl. VIII; Georges Louis Leclerc Buffon, *Histoire naturelle des oiseaux*, vol. 12 (Paris: Imprimerie royale, 1780), 81; Georges Louis Leclerc Buffon, Edme-Louis Daubenton, and Francois Nicolas Martinet, *Planches enluminées d'histoire naturelle*, vol. 3 (Paris: s.n.), pl. 211; John Latham, *A General Synopsis of Birds*, vol. 1 (London: Benj. White, 1781), 542; this species was also described by Carolus Linnaeus, *Caroli a Linné. Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 13 ed., vol. 1 (Leipzig: Georg. Emanuel. Beer, 1788), 428.

un des collaborateurs du Nouveau dictionnaire d'histoire naturelle. As we will see in the following chapters, these discussions on priority and nomenclature played a central role in the evolution of zoological classification, its standardization and its democratization.

The case of the cuckoo was, unfortunately for Temminck, not an isolated one. Without a proper Latin binomial, Temminck's descriptions were not valid according to the generally accepted rules at the time, and other ornithologists who did follow the Linnaean nomenclature rules soon became the authors of these new species. Some of them may have been unaware of Temminck's catalogue, while others proceeded on the sly without a reference to Temminck. This was a lesson Temminck did not forget—and that haunted him for a long time.

FIGURE 1.4. Temminck's specimen no. 380, *Coucou Roux à bec rouge*.

The manuscript catalogue and the notebooks Temminck wrote while preparing the final version of the *Catalogue Systématique* are testimonies of the evolution of Temminck's thought. One can follow the process that started with numbering collection objects and culminated in systematics. The main engine driving Temminck's pursuit of expertise was his cabinet. Arranging it, cataloguing the specimens, grouping males, females and juveniles by species and placing related species in the same group fueled his interest in systematics. By classifying instead of travelling, as Levaillant did, his thoughts were necessarily directed towards naming, ordering and arranging. Describing new species was a natural consequence of ordering, as he encountered species not mentioned in other works. All of Temminck's career after this point was directed

towards a better understanding of the methods and concepts of systematics. Encountering such a number of undescribed species was, together with the contrast between his knowledge and what was available in the form of publications, the main reason behind Temminck's desire to turn from collecting to publishing.

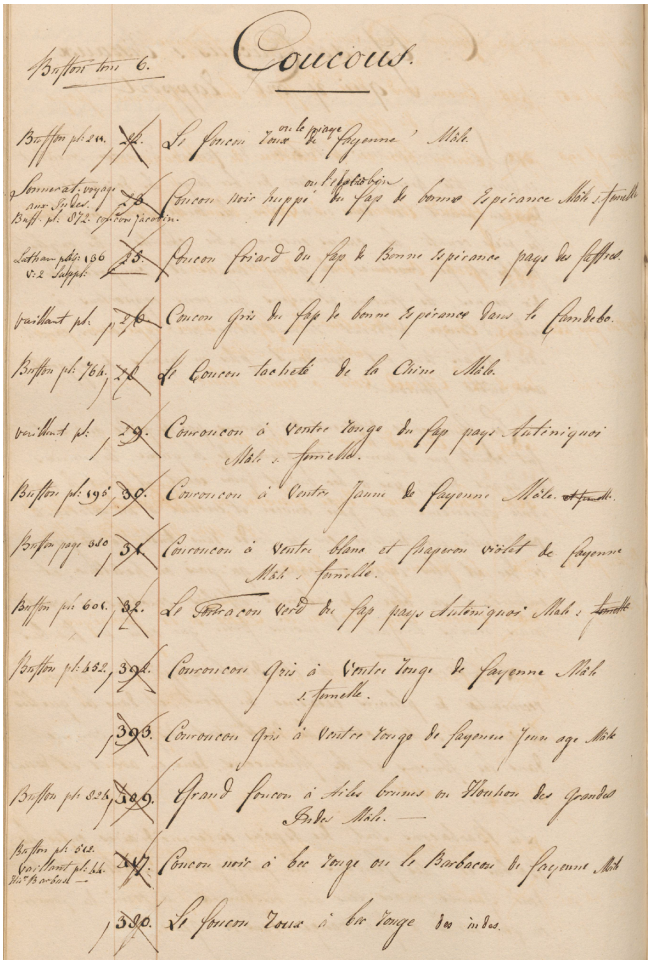

FIGURE 1.5. Temminck's first manuscript catalogue. Temminck could not find the species 380 (*Le Coucou Roux à bec rouge*) and 393 (*Coucou Gris à ventre rouge*) in the works known to him.

The exercise of ordering, naming and browsing through the existing literature led Temminck to the conclusion that one of his favorite groups of birds was in need of serious revamping. In 1804, influenced by what he had learned from Meyer and Leisler, Temminck started working on a monograph on the gallinaceous birds (game birds, fowl and poultry). He already announced it in the *Catalogue Systématique*: "its title will be

Histoire générale et complette [sic] *des Gallinacés* […] and in it, the Amateurs will find about eighty new species, most of them never mentioned before by any other author."[70] By 1806, the Swiss–French natural history painter Jean-Gabriel Prêtre, Levaillant's friend, had made some of the plates for this work.[71] Prêtre had worked for Vieillot, illustrating his *Histoire naturelle des oiseaux de l'Amérique septentrionale* (1807) and his *Histoire naturelle des plus beaux oiseaux chanteurs de la zone torride* (1805–1809), and it was probably Levaillant who introduced him to Temminck. The artist's credentials were more than satisfactory: Prêtre was, besides Levaillant's friend and collaborator, one of the natural history illustrators officially employed at the the Muséum National d'Histoire Naturelle in Paris.

In order to produce the monograph, Temminck traveled to Paris to meet Prêtre, accompanied by his wife Caatje. They arrived on June 29, 1807 and stayed there for a month.[72] Between visits to the Panthéon, the "museum Napoleon" and the opera, Temminck met two of his father's friends, Levaillant and Leschenault de la Tour. The latter made bird skins and notes from his voyage to Java available to Temminck for his planned book.[73] Levaillant thought that Temminck was the best suited person to take on a monograph on fowl, so he left the treatment of several beautiful species yet to be described to Temminck, someone who would spare no effort in the work.[74] Temminck had indeed collected as many specimens as he could for his cabinet and had travelled across Europe to visit as many collections as possible. This careful comparison of numerous specimens before publishing was, in Levaillant's view, what made Temminck the right person to write a monograph on fowl.[75] As will become clear later on, Levaillant was right, and Temminck's attention to minute detail would turn out to be his greatest strength.

Temminck and Caatje also visited the the Muséum National d'Histoire Naturelle, where Temminck could discuss the work on the plates with Prêtre. Also working in

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[70] Temminck, *Catalogue Systématique*, vi. I believe Temminck here used the word *Amateurs* in the sense of "enthusiasts," and not in the modern sense of dilettante or non-professional.

[71] Stresemann, *Ornithology from Aristotle to the Present*, 116.

[72] Van Lynden-de Bruïne (1922–2016), great-great grandchild of Coenraad J. Temminck, transcribed of the diaries of Temminck's first wife, Dionisia Catharina Cau, and published them in 2001, *In vogelvlucht door Europa: de reisjournalen van Dionysia Catharina Temminck-Cau, 1807–1824*. These captivating diaries were written between 1807 and 1819 when the couple travelled through Europe on several occasions. The original diaries are in the Temminck Family archives, A. M. van Lynden-de Bruïne private collection.

[73] Coenraad Jacob Temminck, "Introduction," in *Histoire naturelle générale des pigeons et des gallinacés*, vol. 1, 12. Leschenault de la Tour's birds were listed in Temminck's *Catalogue Systématique*. See Stresemann, "Analyse."

[74] François Levaillant, *Histoire naturelle des oiseaux d'Afrique*, vol. 6 (Paris: J. J. Fuchs, 1808), 118.

[75] Levaillant, *Histoire naturelle des oiseaux d'Afrique*, vol. 6, 118-19.

Paris was Mlle Pauline de Courcelles, a gifted aquarellist and disciple of Jacques Barraband who had illustrated several of Levaillant's books. Somehow, Temminck and de Courcelles met, and after this meeting Temminck's plans changed from publishing a two-volume monograph on gallinaceous birds to a work on the natural history of pigeons and gallinaceous birds, in a new collaboration between Temminck and de Courcelles.[76] Confident in his new partner, Temminck went on a tour to Switzerland and Italy before returning to the Netherlands, leaving de Courcelles supervising the engravings and printing of the part dedicated to pigeons. The first volume was dedicated to king Louis Napoleon and it included a *rapport* by Georges Cuvier and the Comte de Lacépède dated June 15, 1807. It is a letter of commendation, in which the famous naturalists testify to the artistic and technical quality of the plates by de Courcelles. The first installments appeared in 1808, but they were not exactly what Temminck had expected. After three years, the partnership broke amidst allegations of theft and piracy.

Between 1808 and 1811, fifteen installments on pigeons were published. While the Temmincks travelled, Pauline de Courcelles altered the installments of the *Histoire des Pigeons* in such a way that she appeared to be the sole author. De Courcelles—now married and named Mme Knip—had removed the index, Temminck's dedication to king Louis Napoleon and by the ninth installment about forty pages of text. She also gave the work a new title, *Les Pigeons par Madame Knip,* née Pauline de Courcelles, *premier peintre d'histoire naturelle de S. M. L'Impératrice-Reine Marie Louise, le texte par C. J. Themminck.* That Temminck's name appeared misspelled on the title page added insult to injury. Knip arranged that Temminck received a few copies with the original text and unaltered title, ensuring his ignorance of the theft while presenting her own version to the queen Marie Louise. As a result, two different sets of plates appeared: the one authored by Knip, and the original as intended by Temminck with the complete text and his index, the *Histoire naturelle générale des pigeons, par C. J. Temminck*. Of this second set, only twelve copies were printed.[77] Temminck discovered Knip's stunt when he travelled

[76] According to Stresemann, de Courcelles persuaded Temminck to work on pigeons, as she had some plates already made (Stresemann, *Ornithology from Aristotle to the Present*, 117). However, Dickinson et al. affirm that "Temminck recruited Mlle. Pauline de Courcelles to execute the paintings he needed for his work"; see Edward C. Dickinson, David Normand, Leslie K. Overstreet et al., "Histoire naturelle des pigeons or Les Pigeons: Coenraad Jacob Temminck versus Pauline Knip," *Archives of Natural History* 37 (2010): 208. However, as Temminck already announced a book on gallinaceous birds only, meeting de Courcelles in Paris did certainly affect Temminck's intentions. As Stresemann put it, pigeons interfered.

[77] The twelve copies from the original work included eight sets that de Courcelles herself sent to Temminck, plus four other copies. On the remaining copy from Temminck's own collection, kept at the Naturalis Biodiversity Center, the first page is entitled *Histoire naturelle des pigeons et gallinacés,* without date, and the second page reads *Histoire des Pigeons*, 1808. In the work Temminck included an *Introduction*

to Paris to prepare the next two volumes on gallinaceous birds, somewhere in 1811 or 1812. He was understandably infuriated. He tried to expose the deception and unmask the "ingrate" artist, with no luck. After all, Knip enjoyed the patronage of the queen:

> All means I employed to appeal against such an arbitrary act were without effect, and my voice could not rise against an intrigue supported by powerful protectors; the journalists refrained from placing my claims in their papers; even my response to the article by the new author in these newspapers was banned. [78]

With this, the collaboration ended. Temminck adopted a defensive strategy, writing to his friends and contacts and informing them of what had happened. If anyone wanted to purchase the Pigeons "en grand format," he could provide the original fifteen installments—at the exorbitant price of forty francs each—without the arbitrary changes of the other edition. Temminck admitted his defeat and, reluctantly, his naiveté: "the annoyance I have earned as a reward for my disinterestedness towards the Publishers must be placed among the familiar events of the day."[79] The trick earned Mme Knip the patronage of the Impératrice-reine Marie Louise and the title of *premier paintre*—much in the same way as Temminck's dedication of the same work to Louis Napoleon had helped him win his monarch's favors.

Temminck picked up his original idea of a monograph on fowl, combined it with what he had already written on pigeons and published the *Histoire naturelle générale des pigeons et des gallinacés*, which appeared between 1813 and 1815. It was a much more modest work than he had intended originally, in three volumes (the first one with the original text on pigeons) and with merely eleven engraved plates of anatomical features. Temminck did not include drawings of specimens, possibly because he wished to publish as quickly as possible. Quite unexpectedly, the conflict with Madame Knip actually worked to Temminck's advantage.

In the end, these three volumes were published in octavo without colored plates, cheaper and much more accessible to naturalists than the luxurious and costly folio books. Karl Illiger, director of the Zoological Museum in Berlin since 1810, tried to mitigate Temminck's frustration with the more humble re-edition of the Pigeons: "You must have been so annoyed [with what happened] that you had it reprinted. Anyway, I congratulate ourselves, poor ornithologists, to whom a sumptuous publication is out of

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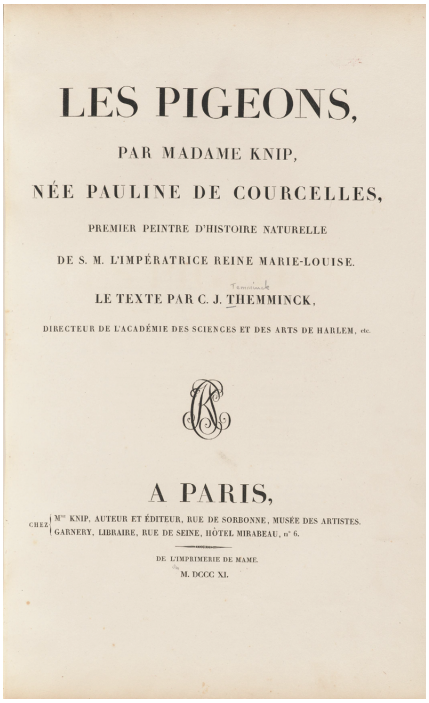
to both groups of birds, which re-appeared in 1813 on the *Histoire naturelle des pigeons et gallinacés*. See Dickinson, David, Overstreet et al., "Coenraad Jacob Temminck versus Pauline Knip" and Temminck's own version of the episode in Temminck, "Pigeons et gallinacés," vol. 3, 640-42.

[78] Temminck, "Pigeons et gallinacés," vol. 3, 641, 43.

[79] Temminck to Johann Centurius von Hoffmansegg, 29 July 1812, Zoologische Museums der Humboldt-Universität Archives; Stresemann, "Briefwechsel von Temminck mit Hoffmannsegg und Illiger," 258.

bounds, that as a result your undoubtedly valuable remarks on an interesting class [of birds] will now be accessible."[80] Indeed, the new monograph was received with great enthusiasm amongst naturalists and secured Temminck a reputation as an ornithologist.


LES PIGEONS,

PAR MADAME KNIP,

NÉE PAULINE DE COURCELLES,

PREMIER PEINTRE D'HISTOIRE NATURELLE

DE S. M. L'IMPÉRATRICE REINE MARIE-LOUISE.

LE TEXTE PAR C. J. TEMMINCK,

DIRECTEUR DE L'ACADÉMIE DES SCIENCES ET DES ARTS DE HARLEM, etc.

A PARIS,

CHEZ { Mme KNIP, AUTEUR ET ÉDITEUR, RUE DE SORBONNE, MUSÉE DES ARTISTES.
GARNERY, LIBRAIRE, RUE DE SEINE, HÔTEL MIRABEAU, n° 6.

DE L'IMPRIMERIE DE MAME.

M. DCCC XI.

FIGURE 1.6. Title page and plate no. 8 of Pauline de Courcelles' edition of Temminck's monograph on pigeons, *Les Pigeons par Madame Knip* (1811).

The first monographs

After 1813, with the publication of the *Histoire naturelle des pigeons et gallinacés*, Temminck's name began to figure next to Linnaeus', Cuvier's and Brisson's.[81] His peers agreed on praising Temminck's accurate definitions of genera, the clear treatment of the species and the unravelling of the synonymy, as the greatest merits of his work. The English naturalist William Swainson, for example, wrote in 1836: "M. Temminck's Monographs of the *Gallinaceous* Birds are clear and masterly, and should be taken as a pattern for all such dissertations. The description of the species, while they are free from

[80] Johann Karl Wilhelm Illiger to Temminck, 14 September 1812, Museum für Naturkunde Berlin Archives; Stresemann, "Briefwechsel von Temminck mit Hoffmannsegg und Illiger," 260.

[81] Farber, *Emergence of Ornithology*, 85-86.

the turgidity above alluded to, are scientific and accurate, while, in the *Synopsis*, each is technically characterized by a short specific diagnosis in Latin."[82]

To define and classify species was actually Temminck's only purpose in tackling such a project, although the introductory sections of the monograph are full of pious dedications and the pursuit of enlightenment through the observation of nature. Temminck also made numerous utilitarian remarks about pigeons and fowl.[83] In this, he was following the tradition of earlier works on natural history. Moral and aesthetic comments would remain a fundamental justification for writing natural history books until the second half of the nineteenth century.[84] Judging from Temminck's previous work and from his general disinclination for philosophical quests, however, the introduction seemed to be more an attempt to justify his particular interest in describing and classifying birds. Towards the end of the general introduction, after almost twenty pages of discourse, Temminck specifically stated that the prevailing disorder in these groups of birds needed to be revised, the genera needed to be reconsidered and the nomenclature disentangled. He did so with such a rigor and accuracy, miles away from the *Catalogue Systématique* and spurred by the lessons he took from Vieillot's plagiarism and Knip's theft, that Temminck's reputation took a giant leap forward, from cabinet owner to skilled ornithologist.

The second volume of this first monograph, the *Histoire naturelle des gallinacés*, was published in 1815, almost simultaneously with Temminck's following work entitled *Manuel d'ornithologie, ou tableau systématique des oiseaux qui se trouvent en Europe; précédé d'une analyse du système général d'ornithologie, et suivi d'une table alphabétique des espèces.* Inspired by previous books of ornithologists like John Latham, Karl Illiger and most of all, by Meyer and Wolf's *Naturgeschichte der Voögel Deutschlands* (1805) and *Taschenbuch der deutschen Vögelkunde* (1810), Temminck had worked for years on this handbook of European birds.[85] The *Manuel d'ornithologie* was the first comprehensive treatise of the avifauna of Europe. In it Temminck included all known species and descriptions of new ones, revised the synonymy and provided extensive references. Each species treatment was based only on actual specimens, all seen by him between 1807 and 1815 while travelling around Europe. These travels, as we will see below, had provided him with the information he required for this book, as well as with extremely useful contacts, some of whom would turn into lifelong friends.

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[82] William Swainson, *On the Natural History and Classification of Birds*, vol. 1, 205-06.

[83] Temminck, "Introduction," *Pigeons et gallinacés*, vol. 1, 3-16.

[84] Farber, *Emergence of Ornithology*, 137.

[85] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, viii.

The book was finished towards the end of 1814.[86] Temminck complained that, although many excellent works have been devoted to ornithology, none covered all European birds. During this period, the mania for exotic animals had led to numerous treatises on new species in detriment to the knowledge on European faunas. Levaillant also complained—not without irony, as he himself worked almost exclusively on tropical birds—about the way French naturalists had ignored their local avifauna and preferred exotic ornithology.[87] Temminck pointed out to the reader that European species seemed to be forgotten by naturalists:

> One goes to search in the regions of the torrid zone or to the ice of the poles to add to the numerous species already known, by means of which one augments the nomenclature catalogues without any goals useful to science. They are sterile acquisitions, that amateur curiosity collectors may esteem, but which will be, for a long time, foreign to the domain of science.[88]

Realizing that a complete treatise on European birds was still to be written, Temminck had decided to produce one because it would be of interest to amateurs and collectors and, he therefore provided "not only concise and precise descriptions of each species, but also of each variety, both sexual and age variations, as well as those that are accidental."[89] By the time Temminck wrote the *Avant-propos*, he had abandoned the aesthetic remarks of 1813. There were no religious dedications, no attempts to convince the reader of any moral gain from the study of nature. The description of the European birds was, in itself and by itself, sufficiently useful without needing any utilitarian or spiritual justification. In the *Avant-propos* Temminck substituted all aesthetic remarks by explanations of his views on nomenclature, the need to examine seasonal and age-related variation in birds and the need of reviewing existing genera, followed by an *Index Systématique* summarizing his classification system. Systematics was, it seems, coming of age.

Both monographs were enthusiastically received in continental Europe and in Britain, becoming in a few years reference works in ornithology. They were particularly praised for the accurate and exhaustive synonyms list, and Temminck's treatment of genera and his ability to delimit both genera and species with consistent use of characters formed a basis for other naturalists to build upon. According to William Swainson, "The best and *neatest* generic definitions are those of Temminck's *Manuel*: the

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[86] Temminck, "Dédication," *Manuel d'ornithologie*, 1 ed.

[87] Stresemann, *Ornithology from Aristotle to the Present*, 296.

[88] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, i-ii; translated in Farber, *Emergence of Ornithology*, 85.

[89] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, viii.

most verbose and over-labored, those of the *Species Avium* [Wagler's]. Even those of Illiger are too tedious."[90] The *Histoire naturelle des pigeons et gallinacés* and the *Manuel d'ornithologie* were routinely cited as references in practically every ensuing ornithological treatise of the following decades.[91]

Interestingly, in the *Avant-propos* of the *Manuel* Temminck had made a distinction between those "studying ornithology" and the "amateurs."[92] The remark is a reflection of the transition taking place during the first two decades of the nineteenth century: luxurious, fashionable books were still very much in vogue while monographs and more specialist works started to appear. Yet Temminck's monographs were not written to answer philosophical questions, such as searching for the laws governing nature. They were born out of the necessity of arranging and ordering a catalogue of the gallinaceous birds, or in the case of the *Manuel d'ornithologie*, to complete existing regional avifauna's. His goal seemed to be, at this stage of his career, to achieve exhaustive and integrated knowledge of birds—the same goal he already pursued with his manuscript catalogue.

Temminck's monographs were, in fact, a continuation of the traditional encyclopedic works, while he recognized the impossibility of including all birds in one work. As both publications and species names quickly multiplied, systematic arrangements differed from each other and the nomenclature became more and more complex to follow. The need arose for works that provided a good overview of existing names, compared published systems, carefully described species with no room for misinterpretation, with accurate illustrations made from real specimens. This gave rise to methodical questions, such as the definition of a genus, the best characters to use for a family or even the pursuit of a natural classification, which led naturalists into the philosophy of natural history.[93] Between 1800 and 1815, by cataloguing his cabinet, listing synonyms and creating new genera, Temminck joined those giving birth to the systematic arrangement of birds, or what we would now call taxonomists.

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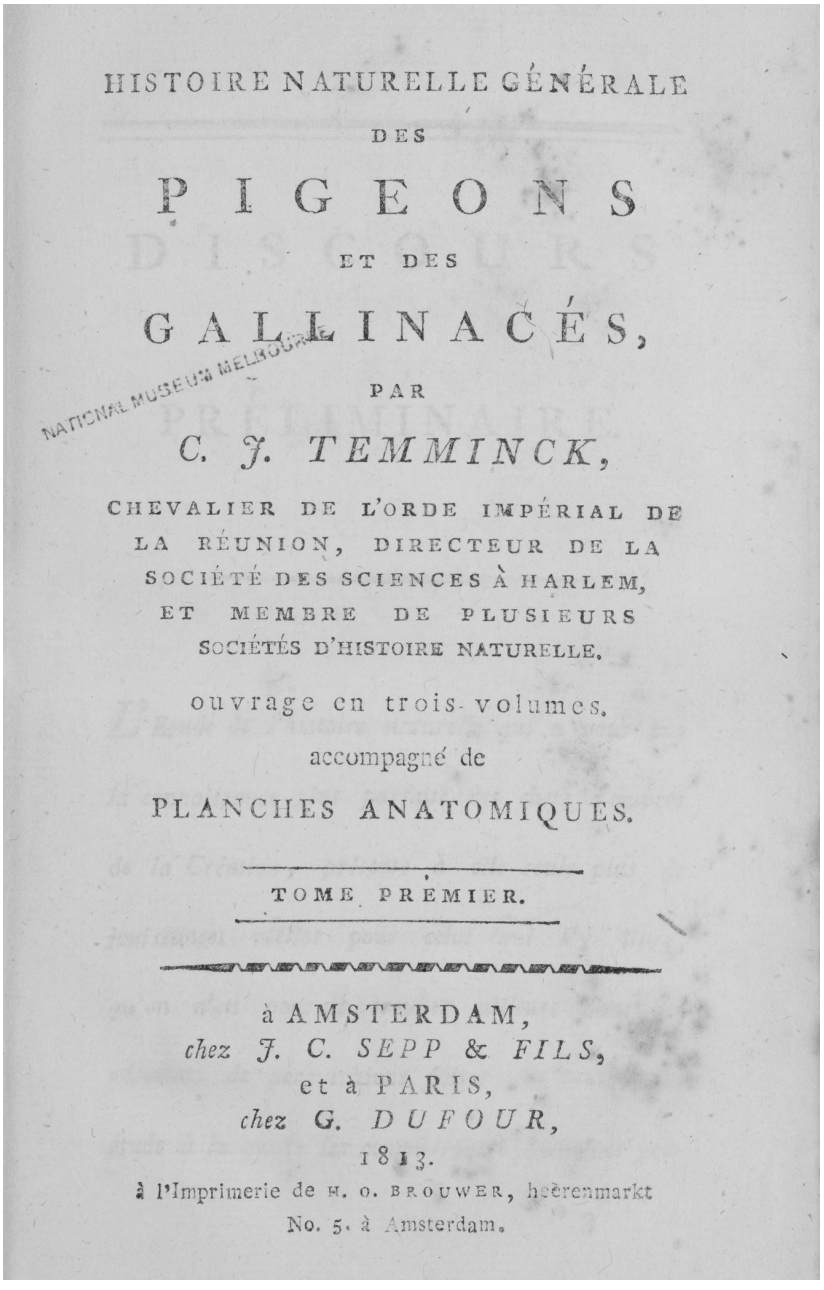
[90] Swainson, *Natural History and Classification of Birds*, vol. 1, 246.

[91] Examples of ornithological works based on Temminck's classifications are John Gould, *The Birds of Europe*, 5 vols. (London: R. and J. E. Taylor, 1837); William Jardine, *The Natural History of Game-birds* (Edinburgh: W. H. Lizars, 1834); John Latham, *A General History of Birds*, 10 vols. (Winchester: Jacob and Johnson, 1821–1828); Johann Andreas Naumann and Johann Friedrich Naumann, *Johann Andreas Naumann's Naturgeschichte der Vögel Deutschlands, nach einigen Erfahrungen entworfen* (Leipzig: G. Fleischer, 1820); William Swainson, *Zoological Illustrations, or, Original Figures and Descriptions of New, Rare, or Interesting Animals: Selected Chiefly from the Classes of Ornithology, Entomology, and Conchology, and Arranged on the Principles of Cuvier and other Modern Zoologists* (London: Baldwin, Cradock, and Joy, 1820).

[92] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, viii.

[93] See for example Farber, *Emergence of Ornithology*, chapter 8.



HISTOIRE NATURELLE GÉNÉRALE

DES

PIGEONS

ET DES

GALLINACÉS,

PAR

C. J. TEMMINCK,

CHEVALIER DE L'ORDE IMPÉRIAL DE LA RÉUNION, DIRECTEUR DE LA SOCIÉTÉ DES SCIENCES À HARLEM, ET MEMBRE DE PLUSIEURS SOCIÉTÉS D'HISTOIRE NATURELLE.

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chez G. DUFOUR,
1813.

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No. 5. à Amsterdam.

FIGURE 1.7. Title page of Temminck's *Histoire naturelle générale des pigeons et des gallinacés* (1813).

CHAPTER TWO

From collector to director

Appointments and politics

Temminck's successful *Manuel d'ornithologie* was dedicated to the directors and members of the Hollandsche Maatschappij der Wetenschappen (Holland Society of Sciences) in Haarlem, a "tribute to the association of dedicated scholars and protectors, whose work has the noble purpose of enlightening, protecting and encouraging the sciences with the light of their spirit."[1] Temminck knew the Society well. Ten years before the publication of the *Manuel,* Temminck had been chosen by co-optation to be one of the "directors" of the Hollandsche Maatschappij, on June 22, 1805.[2] It was a privilege and he used this position to present himself in his first publications, as "Directeur de l'Académie Royale des Sciences et des Arts de Haarlem."

De board of directors was a group of influential men, interested in science, who were in charge of the management and the finances of the society. According to Van Berkel, the directors held important posts in the government and city administrations, de VOC and the WIC, and formed a collective patronage of science—which, incidentally, raises the question of why Temminck's father, Coenraad Temminck, was never one of them.[3] The scientific work was carried out by "ordinary" members who made no financial contribution and had no influence on the Society's politics.[4] Members from foreign countries were also welcome: the Society had been internationally orientated since its foundation. The Society's meetings were a platform for scientific discussion, exchange of

[1] Temminck, "Dédication," *Manuel d'ornithologie*, 1 ed.

[2] Koninglijke Maatschappy der Wetenschappen te Haarlem, "Directeuren van de Koninglijke Maatschappy der Wetenschappen. Geschikt naar den tijd der verkiezing," *Natuurkundige Verhandelingen van de Koninglijke Maatschappy der Wetenschappen te Haarlem* 5, no. 1 (1809): xxxi. Temminck remained a Director at least until 1813. By 1820, the second edition of the *Manuel* did not include Temminck's title as Director.

[3] Van Berkel, *De stem van de wetenschap*, vol. 1, 34.

[4] This structure is still in use today, with 300 directors and more than 350 members. See, for instance, J. A. Bierens de Haan, *De Hollandsche Maatschappij der Wetenschappen, 1752—1952* (Haarlem: Tjeenk Willink & Zoon, 1952).

news and also a place where new questions arose. Scholars discussed these questions during their meetings in Haarlem and had at their disposal the Society's journal, *Natuurkundige Verhandelingen* for the publication of the minutes of their meetings and their scientific reports. Temminck owed his role as a director to his social position and to a generous economic contribution to the Society, although being known as a competent manager of natural history specimens may have been a contributing factor. The Society owned a cabinet of natural history, meant for study by the members. The director of the cabinet at the time of Temminck's appointment was Martinus van Marum (physician, chemist, inventor and natural historian, he was also the secretary of the Society and director of Teylers museum).[5]

The Haarlem Society had a well-established reputation in the Netherlands as a center of knowledge in general and of science in particular, ranking amongst the most active and sought after learned societies in the country.[6] King Louis Napoleon had tried in 1806 to merge the Hollandse Maatschappij der Wetenschappen, then under Martinus van Marum's direction, and all other Dutch scientific societies into a single organization, a Royal Institute for Science following the example of the Institut de France. When Louis Napoleon planned to dismiss the directors of the Haarlem Society from their duties, his project was blocked by the directors, and in 1808 Napoleon founded an entirely new society, the Koninklijke Instituut van Wetenschappen, Letteren en Schoone Kunsten, now the Koninklijke Nederlandse Akademie van Wetenschappen (KNAW).[7] It was a platform for exchange, networking and career-making for and by professors and scholars, and as we have seen, there was no place for Temminck.[8]

After his coronation, Louis Napoleon's immediate goals included surrounding himself with prominent gentlemen and thus winning the sympathy of Dutch society. He did so by, among other things, establishing in 1806 the Orde der Unie, a chivalric order for those who had proved their value for the nation and the king by their scientific,

[5] Martinus van Marum published a catalogue of the cabinet in 1806. It included 130 mounted mammals, 525 birds, 100 reptiles and amphibians, 50 snakes, almost 600 molluscs, 220 kinds of corals and sponges, 70 kinds of crustaceans and worms. It was a considerable collection, open to visitors. See J. A. Bierens de Haan, *De geschiedenis van een verdwenen Haarlemsch museum van natuurlijke historie: het Kabinet van naturaliën van de Hollandsche maatschappij der wetenschappen, 1759–1866* (Haarlem: De Erven F. Bohn N. V., 1941).

[6] Bierens de Haan, *De Hollandsche Maatschappij*; Martin Paul Michael Weiss, "The Masses and the Muses: A History of Teylers Museum in the Nineteenth Century" (PhD dissertation, Leiden University, 2013).

[7] Bert C. Sliggers, "Van individu tot instituut. De opkomst van institutionele verzamelingen," in *Het verdwenen museum*, ed. Bert C. Sliggers and Marijke H. Besselink, 9.

[8] See, for example, the role the Institute played in the career of Caspar G. Reinwardt, professor of chemistry and natural history at the Athenaeum Illustre (Amsterdam) and a close friend of Van Marum, in Weber, "Hybrid Ambitions."

artistic, academic or economic achievements.[9] Somehow, Temminck had drawn the king's attention: on August, , 1808, Temminck was appointed *Chambellan* of the king. This was an honorary title granted to nobility and outstanding civilians. After all, Temminck had seen fit to dedicate his *Histoire naturelle générale des pigeons* to the king, "Protecteur des Arts, par l'estime et le respect le plus profound."[10] Just two days later, Temminck was knighted *Ridder van de Orde der Unie* (Knight of the Order of the Union), and a week after being knighted, he was appointed director *ad interim* of Louis Napoleon's Koninklijk Kunst Museum until its new director, Cornelis Apostool, was ready to occupy the post.[11] The director's duties included the compilation of a catalogue of the museum's collection, which Temminck was instructed to continue. He remained in the Kunst Museum until January 1809, when Apostool became the formal Director and finished the catalogue.[12] In the course of only ten days, Temminck had received two honorary titles as king's advisor and as knight of the Order of the Union, immediately followed by the directorship *ad interim* of the Museum. Possibly, the titles were meant to facilitate—or maybe, to justify—Temminck's assignment at the Museum.

Louis Napoleon's choice for Temminck as deputy director may have been suggested by either Everhardus Temminck (1758–1837) or by Marinus Smissaert. Everhardus Temminck was Inspector-General of National Domains and on August 27, 1808, he also became Inspector of National Buildings. He had been in charge of the supervision of the Dutch Nationale Konst-Galerij, one of the collections that Louis Napoleon incorporated into the new Koninklijk Kunst Museum.[13] Marinus Smissaert (1773–1819) was also a Ridder of the Order of the Union and, since June 1808, steward at the Royal Palace in Amsterdam. He had been charged in July with supervising the move of the royal art collection of Louis Napoleon from Huis ten Bosch in The Hague to the Royal Palace on Dam Square in Amsterdam for the planned Koninklijk Museum.[14] Smissaert also

[9] Koninklijke Orde der Unie, "Beschrijving van de plegtigheden der algemeene vergadering van de Ridders der Unie, op den 4den van Herfst-maand des Jaars 1809," in *Gedenkschriften van de Koninklijke Orde der Unie, voor de jaren 1807, 1808 en 1809* (1810), 174.

[10] Coenraad Jacob Temminck, *Histoire naturelle générale des pigeons et des gallinacés*, 3 vols.

[11] Van Lynden-de Bruïne, *In vogelvlucht*, 16. Communication of the Royal Decree by Louis Napoleon to Coenraad J. Temminck, September 4, 1808, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

[12] Apostool was appointed director of the Koninklijk Museum in Amsterdam on Augustus 25, 1808 but did not effectively take the position until 1809. Ernst Moes and Eduard van Biema mistakenly reported that Egbert Temminck, *Inspecteur der Nationale Gebouwen*, was appointed director *ad interim* in *De Nationale Konste-Gallery en het Koninklijk Museum. Bijdrage tot de geschiedenis van het Rijksmuseum* (Amsterdam: F. Muller, 1909), 120.

[13] Moes and van Biema, *De Nationale Konste-Gallery*, 120. I have not been able to ascertain the relation between Everhardus Temminck and Coenraad Jacob; possibly, they were cousins. Everhardus was the son of Hendrik Temminck and Johanna Bern.

[14] Moes and van Biema, *De Nationale Konste-Gallery*, 114.

worked as a hunting officer for Louis Napoleon in Amstelland between 1807 and 1808, and since Temminck hunted regularly—and enthusiastically—, this may have been a common ground for them to meet.[15] Smissaert and his wife, Maria Feitama, *Dame du Palais* of queen Hortense, were both considered close friends by the Temminck's. Caatje described her as a "true friend."[16] Whether they knew each other before 1808, or whether the friendship only blossomed after Temminck's assignments at court, remains unclear. In any case, Temminck could very well use these kinds of assignations and titles to promote his career in natural history. The royal appointments served as stepping stones towards carving out his own niche as an exceedingly competent collections manager.

For Temminck, 1808 was a momentous year. In September 25, Temminck joined the Société Impériale des Naturalistes de Moscou as an ordinary member and in the same year he became a member of the Wetteranische Gesellschaft der gesamte Naturkunde in Hanau. These were just the first two of a long list of learned societies that Temminck would join. Between 1808 and 1850, he became a member of no fewer than thirty-eight different societies and academies, all dedicated, at least in part, to the study of natural history, from Washington to Saint Petersburg and from Cape Town to Batavia, including a considerable number of European academies.[17] As for many other amateur naturalists, networking was an essential element of Temminck's activities. He was well on his way.

Temminck retained his position as the king's advisor until July 1810, when the rule of Louis Napoleon ended and the Dutch territories were incorporated into Napoleonic France. Despite the volatile situation in Europe, Temminck and Caatje travelled between May and October 1811 to Germany and Switzerland. There are no records of any official engagement for Temminck until February 1812, when he obtained a job with the French government as "entreposeur principal des Tabacs pour le Département des Bouches de la Meuse," which, to use Holthuis' words, "considering the little amount of tobacco that reached the country, cannot have been very time consuming."[18]

Despite his engagements with the French government, Temminck did not hesitate to wave the Dutch flag after the fall of the French emperor in 1813. He wrote to Baron Cornelis R. T. Kraijenhof, military commander in Amsterdam (and Temminck's

[15] R. K. D. Nederland Instituut voor Kunstgeschiedenis, "Portret van Marinus Adriaan Perpetuus Smissaert (1773–1819)," https://rkd.nl/nl/explore/images/151688.

[16] Smissaert became Temminck's father-in-law when he married his daughter Anna Agneta Smissaert (1809–1865) in 1835, twenty-eight years younger than Temminck. Van Lynden-de Bruïne, *In vogelvlucht*, 21; P. C. Molhuysen and P. J. Blok, "Smissaert," in *Nieuw Nederlandsch Biografisch Woordenboek* (A. W. Sijthoff's, 1912), 1329.

[17] The original credentials are in the Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

[18] Holthuis, "Dutch Authors of von Siebold's Fauna Japonica," 693.

neighbor) and volunteered to serve as a cavalry captain to defend the nation's independence.[19] As Kraijenhoff delayed his answer, Temminck contacted his friend Anton Reinhard Falck, statesman under King Louis Napoleon and a close friend of Prince Willem I. In his letter to Falck, Temminck expressed his nationalist sentiments. He had served under Louis Napoleon and accepted distinctions from the French government "out of financial necessity, but this hasn't stopped me from being a Dutchman."[20] Whether Temminck really had any need for a remunerated job, is doubtful. In any case, with Falck's recommendation Temminck joined the regiment of Lieutenant-Colonel Willem François Boreel. After the return of the prince from England, Temminck returned to his birds. This chapter of Temminck's career was interrupted by the unstable political situation in Europe. After the return of Napoleon from Elba, Temminck volunteered again for military service. In 1815 he organized—and paid for, which makes his earlier claim of having found himself in financial straits rather questionable—a cavalry regiment, which was on active service and reached Paris.[21] Peace was established and the sovereign prince proclaimed himself King Willem I of the Netherlands in March 1815.

Towards the end of 1815 Temminck was appointed director *ad interim*, together with Martinus van Marum, of 's Lands Kabinet of Natuurlijke Historie, formerly Louis Napoleon's natural history collection in Amsterdam, the Cabinet du Roi. The collection consisted mainly of minerals, shells and insects, while the vertebrates were only a very small fraction of the whole.[22] 's Lands Kabinet had since 1808 been under the direction of Caspar G. C. Reinwardt. Reinwardt was appointed professor of natural history, chemistry and botany at the Athenaeum Illustre in Amsterdam in the summer of 1810; he was a member both of the Koninklijk Instituut and of the Haarlem Society, and he was also a good friend of Van Marum's.[23]

Temminck and Reinwardt had met each other a few years before, while Temminck worked on the *Histoire naturelle des pigeons et gallinacés* and the *Manuel d'ornithologie*. Temminck had consulted Reinwardt for details of bird anatomy – stuffed specimens consist only of bones and skins. Incidentally, Temminck had also relied on Sebald Justinus Brugmans , the professor of botany, chemistry, medicine and natural history, and head of the anatomical collection at the University of Leiden, for "nouveaux faits

[19] Van Lynden-de Bruïne, *In vogelvlucht*.
[20] Temminck to Anton Reinhard Falck, February 1813, Naturalis Biodiversity Center Archives, Archive C. J. Temminck; Holthuis, *Rijksmuseum*, 19.
[21] Holthuis, "Dutch Authors of von Siebold's Fauna Japonica," 694.
[22] For more information about the *Cabinet du Roi*, see Smit, Sanders, and van der Veer, *Hendrik Engel's Alphabetical List*, 164; Sliggers, "Van individu tot instituut," 9-10.
[23] Weber, "Hybrid Ambitions," 98-101.

anatomiques."[24] Temminck and Van Marum's appointments had been recommended by Reinwardt himself.

In December 1814, Reinwardt received a letter from Anton R. Falck—by then state secretary for the provisional Dutch government—asking him to accompany the commissioner-general, Cornelis Theodorus van Elout, to the Dutch East Indies. Falck offered Reinwardt a position as advisor to the colonial government, with the sweeping title of "Director for Agriculture, Arts and Sciences in the Island of Java and Dependencies." After the restoration of the Dutch colonial empire by the Treaty of London, the king and his government had turned their attention to the East Indies, intending to restore the connection with the colonies.[25] The government turned to Reinwardt and asked him to investigate the most pressing issues of science, agriculture and industry in the colonies.[26] Reinwardt accepted and in October 1815, before leaving for the colonies, he wrote to the minister of Home Affairs reccomending that Van Marum and Temminck replace him during his absence, both men of experience with collections, while Reinwardt was to remain director of 's Lands Kabinet. Regarding Temminck, Reinwardt presented him as Director of the Hollandsche Maatschappij, author of several works on natural history and as the owner of an excellent collection of birds and mammals.[27]

Temminck and Van Marum's tasks consisted in curating the objects, expanding the collection and supervising the renovation of the Trippenhuis, the building where the collection was to be moved from the Royal Palace in March 1816.[28] They were to be assisted by Anthony Johannes d'Ailly, who worked with the insect collection, and Joachim Sandra, for the mineralogy collection. Reindert Draak, keeper of the collection, assisted with the vertebrates and while doing so, learned taxidermy from Temminck.[29]

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[24] Temminck, "Introduction," *Pigeons et gallinacés*, vol. 1, 13.

[25] P. Smit, "The Rijksherbarium and the Scientific and Social Conditions which Influenced its Foundation," *Blumea* 25 (1979): 7.

[26] Weber, "Hybrid Ambitions," 112.

[27] Caspar G. C. Reinwardt to the minister of Home Affairs, 4 October 1815, National Archives of the Netherlands, The Hague, Binnenlandse Zaken (NL-HaNA, BiZa 1813–1848), nummer toegang 2.04.01, inventarisnummer 4032; J. A. Koolmees, "Caspar Georg Reinwardt (1773–1854)" (Master's thesis, Utrecht University, 1979), 46.

[28] Martinus van Marum to Reinwardt, 21 June 1816, NHA, 529-20b; Teunis Willem van Heiningen, *The Correspondence of C. G. C. Reinwardt*, Tools and Sources for the History of Science in the Netherlands, volume 2 (The Hague: Huygens Insitute for the History of the Netherlands, 2011), 143. However, Holthuis (*Rijksmuseum*, 14-15) states that the move to the Trippenhuis took place in 1814.

[29] Anthony Johannes d'Ailly (1793–1851) was a chemist from Amsterdam and the owner of a significant insect collection. Reindert (or Rijndert) Willebrordus Draak (1786–1866) worked as a taxidermist for the Hollandsche Maatschappij in Haarlem between 1818 to 1834, and built his own private collection (Sliggers, "Het Naturaliënkabinet van de Hollandsche Maatschappij," 117). In 1838, Draak became director of the Amsterdam zoo Natura Artis Magistra, until he was dismissed in 1840 after a series of

Reinwardt himself had recommended all these men to Falck. Van Marum took care of the finances and the insects, while Temminck was responsible for the rest of the collection.[30] This division of domains, however, was not enough to prevent a memorable clash between the two directors. Van Marum was too proud a figure to share command. But then again, so was Temminck.

FIGURE 2.1. Portrait of Martinus van Marum ca. 1826, by Charles Howard Hodges.

The direction of 's Lands Kabinet

Only four months after their appointment as deputy directors of 's Lands Cabinet van Natuurlijke Historie, Van Marum and Temminck were already quarreling. To start with, they disagreed about who was supposed to be in charge. While Van Marum claimed that Reinwardt had explicitly told him he was to be his successor, Temminck responded that he knew nothing at all about an agreement between Reinwardt and Van Marum.

conflicts with the board of Artis. See, for example, Rijksbureau voor Kunsthistorische Documentatie, "Directeuren van Artis. Reindert Draak, 1838–1840," http://artis.rkdmonographs.nl/directeuren; J. G. Nieuwendijk, *Zoo was Artis, zo is Artis* (Amsterdam: De Bussy, 1970).

[30] Temminck to the minister of Public Education, National Industry and Colonies, 23 March 1819, NL-HaNA, BiZa 1813-1848, 2.04.01, inv.nr. 4073; Koolmees, "Reinwardt," 47.

The discussion was not about winning control, as one might expect, but curiously enough, about avoiding it. Van Marum did not want the position—apparently, he had accepted only to please Reinwardt—and he would rather leave the management to Temminck. Temminck was not interested either. He had no desire to take over the minerals, fossils, mollusks and zoophytes. These should fall under Van Marum's administration and Temminck wanted to look only after the vertebrates. While Van Marum thought of this disagreement as very unpleasant, Temminck remained calm and invited Van Marum to settle the issue.[31] They may already have felt some antipathy towards each other previously (Temminck and Van Marum had met before at the Hollandsche Maatschappij) and during the few years they worked together, the animosity they felt towards each other only grew. The main problem between them was that they had very different ideas of what their appointments really implied.

It all started, it seems, with humidity. The Trippenhuis was the home of 's Lands Kabinet and the Koninklijke Kunst Museum, where Temminck had worked in 1808 as the temporary substitute for its director, Cornelis Apostool, as well as the headquarters of the Koninklijk Instituut van Wetenschappen. Apostool had invaded all the available space, including Reinwardt's former residence, with the collections of the Kunst Museum, even though the residence was in fact reserved for the collection of weights and measures of the First Class of the Koninklijke Instituut. He had filled Reinwardt's rooms with objects from the Kunst Museum and refused to clear them.[32] Temminck complained that the insect collection—expelled by Apostool from other rooms—had been tucked away in a space so damp that, without heating, "one could soon pick up mushrooms from the barrels."[33] Temminck found this unacceptable. Not without sarcasm, he wrote to Reinwardt: "one need not have the slightest fear of an exhibition equal to those of the Museum of Paris, Vienna or London, and something like that should someday be, I trust, part of your plan."[34] In the face of this situation, Van Marum and Temminck adopted completely opposite positions. Van Marum wrote to Reinwardt explaining that he had decided not to allow anyone in to visit the collection in order to avoid bad publicity and that, regarding expanding the collection, he would rather leave that to Reinwardt himself.[35]

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[31] Van Marum to Temminck, 7 February 1816, NHA, 529 Archive Martinus van Marum, 20b; Temminck to Van Marum, 14 February 1816, NHA, 529-20b; Van Heiningen, *The Correspondence of C. G. C. Reinwardt*, 31–32.

[32] Van Berkel, *De stem van de wetenschap*, vol. 1, 129.

[33] Temminck to Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813-1848, 2.04.01, inv.nr 4032; Koolmees, "Reinwardt" 48.

[34] Van Marum to Reinwardt, 15 April 1817, NHA, Archive Martinus van Marum 529, 20b; Coenraad J. Temminck to Caspar G. C. Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813-1848, 2.04.01, inv.nr 4032.

[35] Van Marum to Reinwardt, 15 April 1817, NHA, 529 Archive Martinus van Marum, 20b.

While Van Marum wanted to interfere as little as possible, Temminck had considerably more ambitious plans for *'s* Lands Kabinet. Van Marum claimed that Reinwardt's instructions were to keep the cabinet as it was until he returned, a claim that disconcerted and even offended Temminck. He did not know anything of such an arrangement. Temminck was convinced that his role should be much more than that of "simple subordinate supervisor or custodian" and that he had much more to offer while Reinwardt was away, namely nothing less than to look after Reinwardt's interests and to promote scientific research. For Temminck, holding the fort for a few years until Reinwardt's return would not do. He would not have accepted the position otherwise: being a mere guardian of the collection was "a waste of his time." Because of Van Marum, Temminck complained, he had to abandon some of his plans, as the man could not accept Temminck's actions because of his old-fashioned view of things."[36]

Apart from an antipathy towards each other, the two directors had very little in common. Van Marum was sixty-seven years old at the time, secretary of the Hollandsche Maatschappij of Haarlem and keeper of its natural history cabinet, as well as director of Teylers Museum. He had a brilliant career behind him and was a celebrated man of science in the Netherlands, spending much of his time in Haarlem. Temminck, in contrast, at thirty-nine, had no academic or official position. He did have enough financial means to work and publish independently and had built for himself an outstanding reputation—both as a collection keeper and as an ornithologist—but, as the direction of *'s* Lands Kabinet was a temporary assignment, he needed to make the best of his current assignation as deputy director if he ever wanted an official post. In short, he had his own agenda.

A year and a half before taking on the directorate of 's Lands Kabinet, in April 1814, Temminck suggested in a very brief letter to the state secretary Anton R. Falck the possibility of creating a national museum.[37] Temminck appealed to the general interest of the public and to the regeneration of the nation (Napoleon was imprisoned on Elba at that time). With the desire to be useful to his country, he wrote, he offered his private cabinet to be part of a national collection and thus, of a more general use to the prince and the country.[38] His timing was not accidental. After the re-establishment of independence, the Netherlands became a centralist monarchy. It was safe to assume that public institutions would be reinstated and that the government would see fit to create

[36] Temminck to the minister of Public Education, National Industry and Colonies, 23 March 1819, NL-HaNA, BiZa 1813-1848, 2.04.01, inv.nr 4073.
[37] The fathers of both Anton R. Falck and Coenraad J. Temminck worked for the VOC and their sons had been friends since their childhood years; see Susanna, "Levensschets van Temminck," 56.
[38] Temminck to Falck, 18 April 1814, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

new ones. In his letter to Falck, Temminck suggested he was the man for the direction of such a new museum: "Should our Sovereign, supported by favorable times, plan on establishing a Museum dedicated to the natural sciences, he might be inclined to entrust me with its direction," and offered his own collection as a contribution.[39] Falck responded to this proposal by pointing out that there was already a national collection, namely the Cabinet du Roi (which became 's Lands Kabinet less than a year after Temminck's letter), under the direction of Reinwardt. In view of this, Temminck elegantly recognized Reinwardt's qualifications, which "suffice to induce me to abandon my project" and admitted he had been under the incorrect impression that the Cabinet du Roi belonged to the city of Amsterdam. He notified Reinwardt about his plan and about Falck's answer, to avoid giving the impression that he was giving Reinwardt career advice, and left it at that—for the time being.[40]

In the following years, the different views of Van Marum and Temminck on what their role should be at 's Lands Kabinet increased the tension. They disagreed on the acquisition of new collections, on the scientific value of the objects and their curation, on who was to give orders to whom and on the use of every inch of available space. Actually, they disagreed on almost every decision that had to be taken at the museum.[41] Letters and complaints flew from them to both Reinwardt and Falck, who with patience and diplomacy tried to keep the peace. Van Marum accused Temminck of, among other things, plotting to take Reinwardt's position and to becoming himself the director of 's Lands Kabinet. Temminck emphatically denied this in a letter to the commissioner-general towards the end of 1816.[42]

At some point, both Van Marum and Reinwardt complained that Temminck was only looking after his own affairs and too occupied with his own cabinet and his publications.[43] They were both right. Remarkably, towards 1816 Temminck seemed to capitulate as deputy director and was mostly concerned with his own affairs. This is a description by his own hand on how he spent his time in October 1816, one year after his and Van Marum's appointment:

> I am the factotum of my numerous collections, sometimes general and sometimes soldier. I am the one who mounts all the birds, fish, and quadrupeds;

[39] Temminck to Falck, 18 April 1814, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.
[40] Temminck's reply to Falck's answer is written at the bottom of the draft of his letter to Falck, 18 April 1814, but without a date. Naturalis Biodiversity Center Archives, Archive C. J. Temminck.
[41] Temminck to the minister of Public Education, National Industry and Colonies, 3 March 1819, NL-HaNA, BiZa 1813-1848, 2.04.01, inv.nr. 4073; Koolmees, "Reinwardt," 46-51.
[42] Temminck to the commissioner-general of Education, Art and Sciences, exh. 4 December 1816, NL-HaNA, BiZa 1813-1848, 2.04.01, inv.nr. 4032B.
[43] Van Heiningen, *Correspondence of C. G. C. Reinwardt*, 184.

> in search of one or the other I vary my many trips, sometimes by the seashore, or beside our lakes, or near our swamps; all the many animal skins that I use for exchange or as presents for my friends are prepared by my own hands; in the winter I concentrate on mounting quadrupeds and exotic birds, which I receive dried and sometimes badly prepared; then I work at classifying and preserving my collections, and the evening is devoted either to my literary work or to my social duties. […] I still have not succeeded in getting a good assistant, because in our country there is absolutely no taste for the study of natural history. The only idol worshipped by my compatriots is gold; it is considered almost ridiculous for anyone to concern himself with science, except simply as a hobby and a relaxation from office work.[44]

Curiously, Temminck made no mention of his tasks at 's Lands Kabinet. Clearly, those were subordinate to his own plans and collection. In 1819, he even employed Reindert Draak, keeper at 's Lands Kabinet, as a concierge at his house at the Heerengracht. Reindert was to receive visitors of Temminck's private collection, once a week, as "poor Reindert is now married and his wife expecting, and he needs more than three guilders a week."[45] Reinwardt was not pleased with Temminck's charitable initiative which, he thought, took up too much of Reindert's time.[46]

Although excelling during the direction of 's Lands Kabinet would have been in Temminck's interest, the quarrels with Van Marum were apparently too much to bear. Towards the end of 1816, Temminck affirmed he had seen Van Marum only twice in six months and that even then, to avoid further escalation, Temminck had decided to "leave the field of honor."[47] Resourceful as ever, Temminck managed to take a long break and leave the country, probably with permission from the commissioner-general for Public Education, Ocker Repelaer van Driel. Temminck travelled, with Caatje, to Germany, Switzerland, Austria and Italy from September 1817 until August 1818. Van Marum was not pleased, but this time it seems that Temminck and Van Marum had agreed on the leave. [48] Besides, Temminck had received a new assignment from the government at the beginning of 1817: to enlarge and improve the zoological collections of the Southern

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[44] Temminck to Johann F. Naumann, 14 October 1816, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 106. Translated in Stresemann, *Ornithology from Aristotle to the Present*, 118-19.

[45] Temminck to Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4032B.

[46] Reinwardt to Van Marum, 29 October 1815, NHA, 529 Archive Martinus van Marum, 20b; Van Heiningen, *The Correspondence of C. G. C. Reinwardt*, 121.

[47] Temminck to Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4032B.

[48] Reinwardt to Van Marum, 12 December 1818, NHA, 529 Archive Martinus van Marum, 20b; Van Heiningen, *The Correspondence of C. G. C. Reinwardt*, 279–80. Reinwardt here referred to a letter he had received from Temminck dated March 10, 1818.

Universities (the Universities of Liège, Ghent, and Leuven).[49] In order to do this, Temminck needed to buy and exchange specimens abroad. However, the main goal of this long tour was one more to Temminck's heart: he was working on a second edition of his *Manuel d'ornithologie*, and he travelled in order to gather as much information as possible.[50] The leave also allowed Temminck to put some distance between himself and Van Marum.

Temminck had become curiously uninterested in 's Lands Kabinet. Perhaps years of frustration with Van Marum or the nature of the job itself made Temminck seek refuge in his own projects. Nonetheless, the post did help Temminck to fuel further his original notion that a national museum of monumental size should substitute all small collections, especially the university cabinets, binding them all together, following the models in Paris and London. It seems unlikely, however, that he was still pursuing the idea of becoming himself the director of such an institution. Falck's response to his first attempt in 1814 had after all made Temminck abandon the idea when confronted with Reinwardt's accomplishments. As we will see below, while he did lobby for his envisioned national museum, Temminck also put quite some effort into denying Van Marum's insinuations about his ambition to take over Reinwardt's position.

In the end, mostly thanks to the efforts of Reinwardt, Van Marum and Temminck remained grudgingly at their posts until the creation of the new national museum of natural history in 1820.

Building up a network

If there was anything Temminck could not do without, it was an extensive network of naturalists and collectors. He needed them to obtain information, books, specimens and access to private and public cabinets. In the Netherlands, Temminck's contacts included, among others, Joan Calkoen from Amsterdam, broker owner of a zoological cabinet containing mostly insects; the Sepp family, collectors and publishers; Anthony J. d'Ailly, the chemist who assisted Van Marum with the insect collection in 's Lands Kabinet; Theodorus van Swinderen, professor of natural history in Groningen; Arnoldus

[49] Nathalie Poot, Geert Vanpaemel, and Siska Waelkens, *Een Walvis in de Stad. De Collecties van de Leuvense Faculteit Wetenschappen* (Leuven University Press, 2014), 30. According to Poot et al., Temminck was charged with enlarging the collections of these Universities in 1818 (Anton R. Falck became minister of Education on March 19, 1818). However, Temminck mentions this appointment in a letter to Johann F. Naumann, 5 March 1817, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820 Gewechselt zwischen J. F. Naumann und C. J. Temminck," 111.

[50] Temminck to Naumann, 27 November 1817, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820 Gewechselt zwischen J. F. Naumann und C. J. Temminck," 119.

Ameshoff from Amsterdam—he of the culinary extravaganzas—; Johan Raye van Breukelerwaerd, cabinet owner and Temminck's neighbor, and the Van Lenneps, a family of merchants and politicians with a taste for natural history.[51] Few of them, however, attempted to describe new species or publish systematic works, as Temminck had done. To find fellow systematists, he looked outside the Netherlands. His correspondents were like-minded naturalists from Germany, Switzerland, Italy and France, who focused on bird classification and description.

As we have seen, Temminck's initial advertising campaign in his *Catalogue Systématique* for the exchange of doublets had worked out extremely well. Temminck was soon corresponding and exchanging specimens with quite a few European naturalists. Temminck built his network by the simple but effective means of writing letters and travelling. The latter provided the best results. Firstly, by visiting naturalists and collectors at their place of residence he could meet them—and examine their collections—in person. A few became his friends, some became his correspondents for years, and all of them kept him well-informed at one level or other. Secondly, when travelling he could also directly take care of the transport of exchanged specimens.

Temminck's aspiration was to build a complete collection with nearly all bird, mammal and fish species on earth. This was a continuous enterprise, especially taking into account the large numbers of new species that poured into Europe from the colonies. He exchanged specimens with nearly every other collector he knew. A third reason for Temminck to climb into his carriage was to study specimens first-hand in all private and public cabinets to which he could gain entry. Temminck took great pride in the fact that his research was only based on direct observation of original material.[52] He needed to examine material previously described by others, especially if he was to succeed in disentangling the nomenclature of the time. His careful treatment of synonymy was the foundation of his work and of his reputation as an expert ornithologist.

Temminck often stayed in Paris, at least once a year, where two of his younger sisters lived, Aletta Cornelia and Elisabeth Jacoba, known in the Temminck's family by their cheerful nicknames of Ceetje and Cootje.[53] In Paris Temminck usually arranged meetings with his publishers, kept an eye on the progress of his books and on his artists, Jean-Gabriel Prêtre and Madame Knip. He also visited his friends Levaillant and

[51] For more information on Dutch cabinets of natural history, see Smit, Sanders, and van der Veer, *Hendrik Engel's Alphabetical List*; Visser, "Het Rijksmuseum."
[52] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xxvii-xxviii.
[53] Elisabeth Jacoba (1783–1849) and Aletta Cornelia (1784–1848) Temminck, both unmarried. See Van Lynden-de Bruïne, *In vogelvlucht*, 12, 19.

Leschenault de la Tour, studied the magnificent collections at the Muséum d'Histoire Naturelle and met its keepers and professors, Georges Cuvier and Étienne Geoffroy Saint-Hilaire. On several occasions, Temminck and his wife were invited for dinner at Cuvier's house or, as Caatje often put it, at "Mrs Cuvier," where they also met other members of the family.[54] Besides trips to Paris, Temminck undertook longer tours through Europe, mostly in France, Germany, Switzerland and Northern Italy—for months at a time. On other occasions, his trips were shorter but he always planned visits to interesting cabinets, private or public, and never missed an opportunity to meet old friends and make new acquaintances, weaving a web of naturalists and collectors as he went. These meetings shaped his career.

During his first trip to Offenbach he met naturalists like Meyer, Leisler and Wolf, who taught him bird systematics, inspired him to plan a monograph on fowl and to publish the *Manuel d'ornithologie*. Later encounters were equally decisive for Temminck's career, like meeting Madame Knip or the promising young talents Heinrich Kuhl and Heinrich Boie in Germany. None of this, of course, would have been possible without independent means. Temminck travelled for long periods of time, even a year, regardless of whether or not he was employed. His social position and wealth allowed him to dedicate an inordinate amount of time to his own projects. While he stayed in Offenbach with Bernard Meyer for six months, he was at that time employed as a civil servant. As director of 's Lands Cabinet, he undertook an eleven-month tour through Europe starting in 1817. Although Temminck had a keen interest and considerable skills, his professional life would have been, in all probability, very different if he had not been born into a situation of privilege.

The tours were not without their downsides. Travelling by road was dangerous at times and always slow. Temminck boasted about having suffered no fewer than eighteen accidents with his carriage without ever being injured.[55] He had a specially adapted carriage for the transport of delicate natural history specimens—some still fresh, others reeking of decay—in which he spent days of uncomfortable journeys, accompanied by his wife most of the time.[56] Temminck was always concerned about the transport of mounted specimens and the damage they might suffer, especially if they

[54] Strangely enough, there seem to be no surviving letters between Temminck and Cuvier or Geoffroy Saint-Hilaire, although it is clear from the report included in the *Histoire Naturelle des Pigeons* (1813) as well as from Temminck's writings and Caatje's diaries, that they met several times, in the Muséum and at Cuvier's home. See Van Lynden-de Bruïne, *In vogelvlucht*, 220, 23, 62, 61; Dorinda Outram, *The Letters of Georges Cuvier: a Summary Calendar of Manuscript and Printed Materials Preserved in Europe, the United States of America, and Australasia* (Chalfont St. Giles, 1980).

[55] Susanna, "Levensschets van Temminck," 75, n. 9.

[56] Susanna, "Levensschets van Temminck," 74.

were his own: "I'm a little reluctant, frankly speaking, to risk my unique birds on a long journey during which they might be totally spoiled, or lose their freshness and purity."[57] Occasionally, lodges posed serious threats both to the travelers' health and their morale. Beds could be infested with fleas and bedbugs so that they had to resort to creative solutions. In Lausanne, Caatje made an improvised bed out of two chairs, which, according to her, worked quite well after three exhausting days in the carriage, and in Turin the couple slept their first three nights on the table.[58] In addition to the nightly discomforts, they had back luck in the daytime with a few of their guides and they often had to get out of their carriage and continue on foot, as the roads were too precarious.[59] Nothing seemed to dim Mrs. Temminck's cheerful disposition.

During the longer tours, Temminck and Caatje combined pleasure and work. They went on excursions (for instance, to the Mont Blanc), visited theaters and took sightseeing tours, including paying their respects at Conrad Gessner's tomb in urich and gasping at the sight of the Turin Shroud. These activities were efficiently planned between visits to naturalists, collectors, museums and universities. The result of Temminck's efforts and Caatje's patience was formidable. He knew practically everyone in Europe, taxidermists, dealers, cabinet owners, university professors or amateur naturalists. For example, he met Franco Andrea Bonelli, professor at the University of Turin and in charge of the university zoological collection, and the amateur entomologist and ornithologist Karl Friedrich August Meisner from Bern. Meisner was the author of a systematic catalogue of the birds of Switzerland present in the Bürgerbibliothek in Bern, containing many birds, a mineral collection, models of mountains, clothes from Haïti and some Roman artifacts, all "very curious."[60] Meisner's collection catalogue was quite similar in format and contents to that of Temminck.[61]

In Hanau, they paid a visit to Johann Leisler and his collection of birds, eggs and minerals, "qui est tres propre."[62] While in Frankfurt, Temminck bought Karl Illiger's work *Prodromus Systematis Mammalium et Avium*, which proved to be "of great service" for his classification of fowl.[63] Illiger had arranged sending to Temminck some

[57] Temminck to Naumann, 14 October 1816, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 106.
[58] Van Lynden-de Bruïne, *In vogelvlucht*, 68, 89.
[59] Van Lynden-de Bruïne, *In vogelvlucht*, 89.
[60] Van Lynden-de Bruïne, *In vogelvlucht*, 93.
[61] Friedrich Meisner, *Systematisches Verzeichniss der Vögel, welche die Schweiz entweder bewohnen, oder theils zu bestimmten, theils zu unbestimmten Zeiten besuchen, und sich auf der Gallerie der Bürger-Bibliothek in Bern ausgestopft befinden* (Bern: Hallerschen Buchhandlung, 1804).
[62] Van Lynden-de Bruïne, *In vogelvlucht*, 124.
[63] Temminck to Hoffmannsegg, 29 July 1812, Zoologische Museums der Humboldt-Universität Archives. Johann Karl Wilhelm Illiger studied under the entomologist Johann Hellwig, and later worked on the

specimens of the German naturalist—and founder of the Zoological Museum of Berlin in 1809—Johann Centurius Hoffmann, Graf von Hoffmannsegg.[64] However, that had not been an easy task and the dispatch had been delayed for months. Illiger thanked Temminck for his patience and apologized: "a collection like yours, remarkable by the number of species it contains and by the beauty of its specimens, makes it extremely difficult to find anything worthy of being added to it."[65] He finally found specimens matching Temminck's high standards amongst those collected in Brazil by Friedrich Wilhelm Sieber.[66] Unfortunately they had no opportunity to build a lasting friendship, as Illiger died in 1813, only thirty-eight years old. Temminck admired Illiger's work, and included Illiger's *Prodromus* in the list of works he had used as basis for his own classification system. As Temminck developed his own views on bird classification, he distanced himself from Illiger's methods and created his own system, but he always mentioned Illiger's *Prodromus* in his ornithological works.

Amongst Temminck's long-term correspondents was the German physician Philipp Jakob Cretzschmar, founder and second director of the Senckenberg Natural History Society. They corresponded for fifteen years. In 1816, Temminck started corresponding with Johann F. Naumann, a talented German engraver, a great ornithologist and a skilled taxidermist.[67] They would not personally meet until two years later, when Temminck visited him in Ziebigk in 1818. Naumann had made excellent plates for his father's work, Johann Andreas' *Naturgeschichte der Land- und Wasser-Vögel des nördlichen Deutschlands*. With these plates, he had captured Temminck's attention.[68] Apparently, the plates Temminck was receiving from Paris were inferior in quality to those of Naumann, so he tried to get him involved in the second edition of the *Manuel d'ornithologie*. He suggested a partnership to Naumann: Temminck would send Naumann any specimens he wished to have for his own projects and, in return, Naumann would sell the two hundred and odd engravings Naumann already had made

zoological collections of Johann C. Hoffmannsegg. See for example Stresemann, *Ornithology from Aristotle to the Present*, chap. 6.

[64] Johann K. W. Illiger to Temminck, 14 September 1812, Zoologische Museums der Humboldt-Universität Archives; Stresemann, "Briefwechsel von Temminck mit Hoffmannsegg und Illiger," 259-60.

[65] Illiger to Temminck, 14 September 1812, Zoologische Museums der Humboldt-Universität Archives.

[66] Illiger to Temminck, 14 September 1812, Zoologische Museums der Humboldt-Universität Archives. After this, Sieber and Temminck stayed in contact and exchanged a few letters. Sieber also collected a few specimens for 's Rijks Museum (Friedrich W. Sieber to Rijks Museum van Natuurlijke Historie, 5 March 1825, Naturalis Biodiversity Center Archives, Correspondence RMNH).

[67] For biographical details, see Stresemann, *Ornithology from Aristotle to the Present*, chap. 17.

[68] Stresemann, *Ornithology from Aristotle to the Present*, 306-08. Naumann and Naumann, *Naumann's Naturgeschichte*.

for his own book to Temminck, "au plus bas prix possible."[69] Temminck reasoned that they could both profit from the deal, as they were selling their books in different countries. By combining their knowledge and the plates, they could make sure they reached a larger audience.[70] Without a hint of modesty, Temminck told Naumann that his name would be part of the "most perfect work that exists on the natural history of European birds" (that is, Temminck's new edition of the *Manuel d'ornithologie*).[71] He was not merely exaggerating in order to convince Naumann, he genuinely believed that his book was the most exact, complete and rigorous available, especially regarding its descriptions and the synonymy. Unfortunately for Temminck, Naumann did not accept the proposition. He would not risk the copper plates being damaged by being used over and over again, and to make new plates of the same drawings and cutting the plate numbers out of the plates, was too much work. However, Naumann could make new engravings if Temminck sent him his specimens. To this proposal Temminck could not agree because he would not risk any damage to his rarest and most beautiful specimens. None would risk harm to their most precious possessions, plates or birds. In the end, the plates for Temminck's *Manuel* were made by Jean-Charles Werner, a natural history artist employed at the Paris Muséum.[72] Nevertheless, through the following years, Temminck and Naumann corresponded and exchanged information and opinions, specimens, plates and books.[73] The two men admired each other's work and their letters are full of sincere compliments to one another, going further than mere courtesy.

After 1815, with the success of his monographs, Temminck started working on a second edition of the *Manuel*. This, and his desire to leave the Trippenhuis and Van Marum behind, led him to plan another long voyage. When he was asked to collect specimens for the universities of the Southern Netherlands, Temminck quickly seized the opportunity and arranged with the commissioner-general of Education, Ocker Repelaer van Driel, to travel to Germany, Switzerland and Italy, where he already had the necessary contacts to acquire new specimens and gather information for his book. Caatje, of course, accompanied him. They started this tour in October 1817 and went

[69] Temminck to Naumann, 23 July 1816, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 101.

[70] Naumann sold his books only in German-speaking countries and they were not available in France, Italy, the Netherlands or England, where Temminck's *Manuel*—in French—was distributed, but Temminck's work was not available in Germany or Switzerland; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820."

[71] Temminck to Naumann, 23 July 1816, Naumann-Museum Archives.

[72] Temminck to Naumann, 28 August 1816, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 102-05.

[73] Temminck to Naumann, 18 May 1817, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 114.

south, towards Antwerp and Brussels, where he met Van Driel and Jan-Willem Janssens, former governor of the Cape of Good Hope and a natural history enthusiast. After all, political contacts were as important as scientific ones for Temminck to secure new assignments and official positions.

Their stay in Germany was the most profitable—scientifically speaking. Prince Maximilian Wied-Neuwied had returned from Brazil the year before with many interesting specimens. A visit to the prince led to a long-lasting relation and an intensive exchange of specimens. The Temminck's stayed as guests of the Meyer's each time they passed near Offenbach, from where they visited Frankfurt a couple of times. Temminck also had the opportunity to meet another guest of Meyer, the young German zoologist and curator of the zoological collection of Heidelberg University, Heinrich Boie. Just the year before, Boie, a former law student who proved to be an excellent zoologist, had published a twenty-nine page review of Temminck's *Manuel* in the *Heidelbergische Jahrbücher der Litteratur*, which included quite a few critical notes. Apparently, the article was well written and even better argued, so that Temminck not only accepted the criticism, but praised Boie for it and the two men started to correspond, meeting at the Meyers in August 1818.[74] Having proved what he was worth, Boie was recruited by Temminck in 1821, by then director of the museum in Leiden, to become the curator of the vertebrate collection and later on, in 1823, he would also become a member of the Natuurkundige Commissie voor Nederlands Indië (the Natural Science Committee for the Dutch East Indies, founded in 1820 to explore, chart and collect its fauna and flora). In Heidelberg Temminck also visited the German anatomist and physiologist Friedrich Tiedemann, professor of anatomy, zoology and physiology at the university. Tiedemann had a splendid collection of anatomical and zoological specimens, which he donated to the university after his appointment and which served as the basis of a new museum of natural history.

Temminck established another important contact during this trip with the physician, explorer and naturalist Martin Hinrich Carl Lichtenstein, with whom Temminck had a long-lasting friendship, judging from their letters—they corresponded for nearly forty years.[75] Lichtenstein had been professor of zoology at the University of Berlin since 1811 and was appointed director of the Berlin Zoological Museum in 1813 after Illiger's death. When in Berlin, Temminck also had the opportunity to meet Heinrich Kuhl, who

[74] Heinrich Boie, "Manuel d'ornithologie, ou tableau systèmatique des oiseaux qui se trouvent en Europe par C. J. Temminck," *Heidelbergische Jahrbücher der Literatur*, no. 25-26 (1816). Temminck acknowledged Boie's contribution in the second edition of the *Manuel d'ornithologie*, x. Later on, Heinrich Boie would become curator at 's Rijks Museum under Temminck's direction, and a member of the Natuurkundige Commissie, like Kuhl and Van Hasselt.

[75] Stresemann, "Aus C. J. Temmincks Briefen an H. Lichtenstein."

was also on tour visiting several natural history museums in Germany.[76] Kuhl, very young and already a gifted naturalist, had studied natural history at the Hohe Landesschule of Hanau and afterwards enlisted as student at the University of Groningen in 1816.

FIGURE 2.2. *Left*: Male type specimen of the Lichtenstein's sandgrouse from Temminck's cabinet. *Right*: Plate accompanying the description of Lichtenstein's sandgrouse (*Pterocles Lichtensteinii*), in Temminck and Laugier's *Nouveau recueil de planches coloriées d'oiseaux*, Vol. 5, Pl. Col. 355 (1838).

Kuhl made such an impression on Temminck that, a few years later, he helped him obtain a position in the Netherlands. Temminck took a special interest in Kuhl, inviting him to spend two months with him in 1819 in his country retreat *Wildlust* in Lisse.[77] Temminck thought highly of him: "The young Kuhl of Hanau, recently employed in one of our universities, will accompany me and assist me this year; he is a young man of whom I have a high opinion, and I want to arrange to send him some day to make trips to the little-known areas of our colonies in the Indies."[78] Indeed, to travel to the tropics was Kuhl's dream, and few years after they met, Temminck recommended Kuhl to be

[76] Klaver, *Inseparable Friends*, 13.

[77] Temminck to Naumann, 19 April 1819, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 129.

[78] Temminck to Naumann, 5 March 1817, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 111.

recruited as one of the first members of the Natuurkundige Commissie—as Boie's predecessor.

It was also during this 1817–1818 tour that Temminck finally visited Naumann in Ziegbik, after two years of corresponding. At that time he also met Blasius Merrem, professor of political economy and botany at the University of Marburg and a notable jack-of-all-trades: he was also an ornithologist, a herpetologist and a mathematician. In Switzerland, Temminck and Caatje carried on with their rounds of visits. They called on Friedrich Meisner in Bern, who showed them the museum again.[79] They spent the winter in Lausanne, where Temminck's father now lived with his three sisters—Ceetje and Cootje, joined by Suze. After the new year, they moved on to Italy to meet Franco Andrea Bonelli again, in Turin. The museum of zoology and comparative anatomy of the University had improved much since their last visit, all thanks to Bonelli's efforts, and this time, Caatje was shocked by the sight of a stuffed human being, once the servant of the prince of Borghese. Although she had seen mummies and other embalmed human bodies before, she was astonished to see a human prepared as a specimen and exhibited besides the stuffed birds.[80] The Temmincks returned to the Netherlands in August, 1818, after almost a year of travelling, and Coenraad resumed both his preparations for the *Manuel d'Ornithologie*, and his post at 's Lands Cabinet.

Bonelli and Temminck remained friends and in 1824, as a token of his appreciation, Temminck named an eagle after Bonelli, *Falco Bonelli*, which has been known ever since as Bonelli's eagle. Temminck had seen specimens of this eagle in the forests outside Paris and in the North of France, as well as a specimen from professor Bonelli's collection, a drawing of which was later published in Temminck's *Nouveau recueil de planches coloriées d'oiseaux*.[81] Bonelli had his portrait painted proudly displaying on his right that particular specimen, which is still held by the Museo Regionale di Scienze Naturali in Turin. But this time, Louis Pierre Vieillot—the French ornithologist who had appropriated Temminck's new species from the *Catalogue Systématique*—protested to the ornithological community: he had, after all, described that same eagle just two years before Temminck. First, Vieillot presented it during a lecture to the Société Linnéenne de Paris on August 22, 1822, and later he published its description in the *Tableau*

[79] Van Lynden-de Bruïne, *In vogelvlucht*, 145.
[80] Van Lynden-de Bruïne, *In vogelvlucht*, 163.
[81] Temminck and Laugier, "Aigle Bonelli. *Falco Bonelli* Temm.," in *Nouveau recueil*, vol. 1, 100, Pl. 288 (livr. 49). For the dates of publication of each livraison, see Dickinson, " 'Nouveau recueil de planches coloriées' of Temminck & Laugier."

encycopédique et méthodique des trois règnes de la nature.[82] A correction (and the text of Vieillot's letters of reclamation) was published in the *Bulletin des Sciences Naturelles* in 1828. Vieillot was now the recognized author of the discovery; the bird retained its vernacular epithet of *Bonelli's eagle*, and Vieillot's Latin binomial, *Aquila fasciata*, was, after some time, accepted.[83] In his description, Temminck failed to mention that Vieillot had been the first to recognize the new species, a fact that, according to Vieillot, Temminck knew perfectly well: "[the specimen] had been reported to me by Mr. Dupont the elder, who received it from Mr. Bonelli, asking me whether I considered it to be a new species, and it was only after my decision that it was sent to Mr. Temminck. Do not believe that I attach great importance to being the first to discover a new species; but I must avoid being taken for an author who appropriates the facts of others by changing the names, a means employed very often by certain savants."[84] It was a case of the pot calling the kettle black; however, Vieillot was indeed the first to describe this species.

There was yet a third party involved: someone else had described the species too. In a maneuver far from elegant, Temminck wrote in a footnote: "A miniature lithograph of a specimen younger than the one of plate 288 has been published recently in a new work on the birds of prey in Europe, under the name of Intermediate Eagle; the author undoubtedly did not know that we had mentioned this bird under the name indicated above."[85] Indeed, Pierre Boitard had described the same specimens Vieillot and Temminck had seen, as *Aquila intermedia* in his *Monographie des Oiseaux de Proie d'Europe* in 1824.[86] But Temminck failed to report the author and the title of this new work on European raptors. It appears that Temminck, annoyed by Boitard's decision to name the bird anyway, decided to exclude any proper reference to the *Monographie des Oiseaux de Proie*. If Temminck was ignorant of Vieillot's description, he was obviously aware of that of Boitard, but with this footnote Temminck claimed authorship for himself. Almost ten years after the reinstatement of Vieillot's authorship, Temminck still persisted in calling the bird "*Falco bonelli* Temm.," ignoring both Vieillot and Boitard's descriptions as well as Lesson's rectification.[87] Needless to say, these kind of stunts did not exactly win him the sympathy of his peers.

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[82] Louis Pierre Vieillot, "L'Aigle à queue barrée. 9. A. Fasciata," in *Tableau encyclopédique et méthodique des trois règnes de la nature. Ornithologie*, ed. Pierre Joseph Bonnaterre (Paris: Mme veuve Agasse, 1823), vol. 3, 1192.

[83] René-Primevère Lesson, "Réclamation de M. Vieillot, relative au Manuel d'Ornithologie," *Bulletin des sciences naturelles et de géologie* 15 (1828); Giorgio Aimassi, "The Original Description of Bonelli's Eagle *Aquila fasciata* Vieillot (Aves: Accipitridae)," *Zoological Bibliography* 4, no. December (2015).

[84] Lesson, "Réclamation de M. Vieillot, relative au Manuel d'Ornithologie," 142-43.

[85] Temminck and Laugier, "Aigle Bonelli," in *Nouveau recueil*, vol. 1, 100.

[86] Pierre Boitard, *Histoire naturelle des oiseaux de proie d'Europe* (Paris: Parmantier, 1824).

[87] Temminck, *Manuel d'ornithologie,* 2 ed., vol. 3, 19.

FIGURE 2.3. *Left*: Portrait of Franco Andrea Bonelli (1784–1830), by Biscarra Giovanni Battista, 1830. *Right*: Plate of *Falco Bonelli* for *L'oiseaux d'Europe*, to accompany Temminck's second edition of *Manuel d'Ornithologie*. The lithograph by J. C. Werner was clearly based on Bonelli's specimen depicted on his portrait.

Temminck's tours were tailored to amplify his network, but sometimes his perpetual quest for new and interesting species determined the route. Just as he had made sure to meet Prince Maximilian Wied-Neuwied right after his return from Brazil in 1817, in Genova Temminck visited the former soldier and explorer Alberto Ferrero della Marmora and his Sardinian birds. Temminck was also a regular guest of the museum of natural history in Vienna to study, amongst others, the specimens collected by the naturalist and explorer Johann Natterer, who had just arrived from Spain.[88] On other occasions, Temminck undertook shorter trips for other specific purposes. In 1819, for example, Temminck went to London together with Kuhl and Lichtenstein for the auction of the famous William Bullock collection, including more than three-thousand

[88] Stresemann, *Ornithology from Aristotle to the Present*, 119.

birds, which took place from April 29 till June 11.[89] There he could lay his hands on several specimens carefully selected to fill gaps in his cabinet. In all, Temminck acquired 536 birds, keeping the most interesting ones for his private cabinet.[90] The rest was meant for the academic collections of the Southern Universities, as he had been instructed by the Dutch government.

During the auction, Temminck met Guillaume Michel Jérôme Meiffren Laugier Baron de Chartrouse, a politician, collector and naturalist from Arles. Kuhl and the baron had met a few months before, when Kuhl went to Paris to study the collections of the Muséum.[91] Laugier had a considerable collection of birds in his hotel in Paris, and had been drawn to the auction in the hope of enlarging it. The baron, who gracefully described himself as "un adorateur inutile de la science," was also the mastermind of an enticing project for which he decided to try to enroll both Lichtenstein and Temminck.[92] He wished to publish a series of bird plates as a continuation of Buffon's *Planches enluminées d'histoire naturelle*, supplementing it with new species. He needed the expertise of recognized ornithologists and while in London, he spoke to Temminck and Lichtenstein about it. Somewhere between the summer and March of the following year, Temminck and the baron reached an agreement and by the spring of 1820, Temminck had prepared an Index with the species to be included in the work. Lichtenstein did not participate in the enterprise.

Temminck and the baron signed the official contract on April 24, 1820. It was stipulated that the work would consist of monthly *livraisons* of six plates each—at nine francs per *livraison*. The species would be chosen by both. Temminck was responsible for "the scientific part" while Laugier took over the management, finances, notarial and editorial matters. Benefits and costs were to be equally divided between them. The artists chosen for the plates were Nicolas Huet II, or the Younger, son of Jean-Baptiste Huet and the grandson of the Nicolas Huet the Elder, and Jean-Gabriel Prêtre, both artists at the Múseum in Paris.[93] In total, the *Nouveau recueil de planches coloriées* comprised 600 plates, published in 102 *livraisons* between 1820 and 1839.[94]

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[89] Frank D. Steinheimer, "Martin Hinrich Carl Lichtenstein and his Ornithological Purchases at the Auction of William Bullock's Museum in 1819," *Archives of Natural History* 35 (2008), 90.

[90] Steinheimer, "Lichtenstein and his Ornithological Purchases at the Auction of William Bullock's Museum,"90, 93; Stresemann, *Ornithology from Aristotle to the Present*, 121.

[91] Stresemann, "Origines des 'Planches Coloriées'," 34.

[92] Laugier de Chartrouse to Lichtenstein, 26 December 1819, Museum für Naturkunde Berlin Archives; Stresemann, "Origines des 'Planches Coloriées'," 35.

[93] *Contract "Planches coloriées" Temminck, C. J. en Meiffren Laugier, G. M. J. Baron de Chartrouse*, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

[94] For the exact publication dates of the livraisons, see Dickinson, " 'Nouveau recueil de planches coloriées' of Temminck & Laugier."

FIGURE 2.4. *Left*: Plate of *Psittacus Huetii*, named in dedication to Nicolas Huet II. Lithograph by Nicolas Huet. *Right*: Plate of *Psittacus Pretrei*, named after the artist Jean-Gabriel Prêtre as "hommage au peintre habile." Lithograph by Jean-Gabriel Prêtre. In Temminck and Laugier's *Nouveau recueil de planches coloriées d'oiseaux*, Vol. 4, Pl. Col. 491 and 492 (1838).

For the work, Temminck often stayed in Paris, sometimes for long periods of time, where he enjoyed the freedom of working in the Muséum with the permission of Cuvier and the other "Messieurs du Jardin du Roi." He took on the task of relabeling some of the specimens with the names most in use at the time, and while at it, he corrected the labels according to his own views: "all the names of Illiger have been adopted and all new names of Vieillot crossed out."[95] It seems that Temminck's zealous attitude and arrogance made him a difficult partner to work with. In April 1821, Meiffren Lauger complained to his friend Lichtenstein: "Temminck n'est ce pas le même." Apparently, while Temminck accepted no criticism on his part of the work, the baron had to put up with Temminck's fault finding on the administrative side, which was, as they had

[95] Temminck to Lichtenstein, 20 May 1820; Museum für Naturkunde Berlin Archives; Stresemann, "Origines des 'Planches Coloriées'," 39.

agreed, the domain of Laugier. [96] Nonetheless, their partnership survived and the work was published as scheduled, with minor changes.

Collections for the universities

Temminck had been charged by the government with enlarging the university collections in Leuven, Ghent and Liège in early 1817, on top of his duties at *'s* Lands Kabinet. This was not an appointment Temminck had been looking forward to. His attitude regarding these university collections reveals much of Temminck's ideas on what natural history collections should be used for, by whom, and where.

Temminck's instructions were to build three similar collections by purchasing—or otherwise acquiring—identifying and labeling specimens, and sending them to the professors Franz Joseph Adelmann in Leuven, Henri-Maurice Gaede in Liège and François-Pierre Cassel in Ghent. Temminck was in charge of the finances and was responsible to the Ministry regarding every invoice and transaction. To do this, Temminck made use of his extensive network and trotted through Europe visiting nearly every natural history cabinet there was to visit. He actively chased specimens by asking for duplicates at other museums, like the Muséum in Paris, as well as purchasing them in London at the auction of Bullock's collection.[97]

After his return from the 1817–1818 tour, Temminck sent two chests with natural history specimens to the University of Leuven for Professor Adelmann. When the specimens arrived in Leuven, the professor found they had "beaucoup de défauts," missing eyes and feathers. Temminck argued, laconically, that the university was in need of "didactic material" and that was what he had provided. In view of Adelmann's complains, Temminck suggested to the minister to send the specimens to Liège and restitute a third of the money to Leuven. Falck, now minister of Education, Arts and Sciences, sided with Temminck and swept aside Adelmann's protests, arguing that it was not unusual that feathers were lost during transportation. The specimens stayed in Leuven and to his exasperation Adelmann never received anything else from Temminck.[98] For the University of Liège, Temminck adopted a similar approach. He wanted to send them the birds from the Achtienhoven collection, which was, according to Temminck, of lesser importance. It included many misidentified specimens, which

[96] Laugier de Chartrouse to Lichtenstein, 18 April 1819, Museum für Naturkunde Berlin Archives; Stresemann, "Origines des 'Planches Coloriées'," 46.
[97] Temminck to the Ministry of Home Affairs, 27 February 1819, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4072.
[98] Nathalie Poot, Geert Vanpaemel, and Siska Waelkens, *Een walvis in de stad. De collecties van de Leuvense Faculteit Wetenschappen* (Leuven University Press, 2014), 30.

only increased confusion and therefore had no place in 's Lands Kabinet.[99] Not surprisingly, this resulted in yet another fight with Van Marum, who intended to keep the collection in Amsterdam. Temminck consulted the Achtienhoven family regarding their wishes, and they "could not recall that there ever was an instruction that the collection should be sent to Amsterdam."[100] After Temminck declared he was in charge of the vertebrates, he was again given a free hand by the minister of Education to deal with this task as he saw fit and that ended the dispute.[101]

Apparently, Temminck regarded his assignment to assemble the university collections as a burden and a waste of his time: "In charge of organizing the cabinets for the Universities of Ghent, Liège, and Leuven, I was forced to spend a considerable time on this task, which was why I could not work for myself; now that the organization of this part comes to an end, I eagerly resume the thread of my previous relations..."[102] Once more, official duties seem to be, for Temminck, less important than his own projects, which gives us an idea of his sense of entitlement—a consequence of his social status and upbringing. It even seems that Temminck resented university professors: "I have no students at my service as the distinguished professors do; all at once Generalissimo and soldier of my collection, I have to do everything myself."[103] Temminck's lack of interest reveals something more than a rather phlegmatic attitude. It is a reflection of his understanding of the function of natural history collections at the universities and it has its roots in the splitting of natural history into different subjects. The universities were focusing mainly on comparative anatomy. They were compelled to do so. Since 1815, after the implementation of a reform of the Dutch education system, each faculty of mathematics and natural science was required by law to include in its curriculum "natural history of animals and minerals, which should include, regarding zoology, *anatomia comparata.*"[104] The universities were also instructed to have their own didactic collections for the natural history of animals as well as for comparative anatomy. Temminck expected that the purpose of these cabinets was to provide

[99] Temminck to the Ministry of Home Affairs, 17 February 1819; NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4072; Koolmees, "Reinwardt," 48. J. B. J. Achtienhoven (1751–1801) was an art dealer from Amsterdam and the owner of a natural history cabinet of birds, mammals, insects and shells (Smit, Sanders, and Van der Veer, *Hendrik Engel's Alphabetical List*, 1).

[100] Temminck to the minister of Public Education, National Industry and Colonies, 23 March 1819, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4073.

[101] Ministry of Education to Temminck, 7 March 1819, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4072.

[102] Temminck to Naumann, 5 March 1817, Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 111.

[103] Temminck to Lichtenstein, 18 September 1818; Stresemann, "Aus C. J. Temmincks Briefen an H. Lichtenstein," 225.

[104] *Besluit regelende het hooger onderwijs in het Koningrijk der Nederlanden: 2 Augustus 1815*, (Koninkrijk der Nederlanden, 1815), Art. 63, Art. 193.

examples of the rare and the exceptional. The professors, Temminck argued, were not in the least interested in creating all-embracing collections—covering the entire spectrum of nature—but were to use the collections only for purposes of illustration in their lessons.[105] In his view, specimens of inferior quality would do perfectly well for a didactic collection. After all, researchers and students did not only look at the collections: specimens and preparations were handled for direct examination.[106]

On the other hand, systematics required perfectly preserved specimens if one were to succeed in finding useful external characters to classify them, while comparative anatomy needed intact specimens, not stuffed ones that had had their internal organs removed. Consequently, Temminck advised making "double collections," one for comparative anatomy, one for systematics. Accordingly, he requested Reinwardt to send him from Java two specimens of each fish species Reinwardt collected: one preserved in spirit for "anatomy," and one to be mounted for "reference," prepared in such a way as to preserve the external characters.[107]

Different disciplines required different collections. Natural history was slowly developing from an all-embracing discipline into a cluster of different subjects, each with its own practices and methods, some of which were object-based disciplines. Each of them was being practiced in a different setting and by different persons: systematics was mostly practiced outside the universities and, within the Dutch universities, relegated to a secondary position. In Leiden, Sebald J. Brugmans particularly disliked systematics. He was the professor of botany, chemistry, medicine and natural history. To study nature, Brugmans argued, it was pointless to divide it into artificial units, "nature knows no system, no divisions, no classes nor species."[108] His lessons were mostly on comparative anatomy, which he regarded as "the only solid foundation for the Systematic and Philosophic understanding of the Animal Kingdom."[109] As the University of Leiden lacked the funds to expand the existing collection, Brugmans assembled a cabinet of natural history of his own, one that he could use in his lessons for illustration. His private cabinet reflected his views on nature: it consisted of anatomical samples, a few stuffed specimens, a huge collection of human skulls and a pathology collection—one of the finest in Europe, according to Georges Cuvier.[110]

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[105] Temminck to Reinwardt, 25 November 1816; NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4032B.
[106] Huistra, Hieke, *The Afterlife of the Leiden Anatomical Collections: Hands On, Hands Off*. The History of Medicine in Context Series (London: Routledge, 2019), chap. 1, 2.
[107] Temminck to Reinwardt, 25 November 1816; NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4032B.
[108] Quoted by Hans de Jonge, *Het vergeten fenomeen Sebald J. Brugmans 1763–1819, verzamelaar tussen koning, keizer en universiteit* (Leiden: Museum Boerhaave, 2001), 19.
[109] Quoted by De Jonge, *Het vergeten fenomeen*, 19.
[110] De Jonge, *Het vergeten fenomeen*, 24. Leiden University purchased part of his collection after Brugmans' death in 1819, for the substantial sum of *f*34.000.

Temminck had worked with no enthusiasm whatsoever in providing collections for the Southern Universities. These collections were being compiled for teaching and practicing comparative anatomy, and he therefore provided the universities with less perfect specimens and incomplete series. That Temminck cared so little for the university collections did not imply that he dismissed comparative anatomy. For him, as for Brugmans, it was a subject that "shed light" on the Linnaean system, helping to perfect it. He admired Cuvier and his work, and used it as a starting point from which systematics could be further developed towards the natural system. Temminck even called it "the bright Light of Comparative Anatomy" that shone to reveal the truth and to enrich the natural sciences.

Temminck understood that comparative anatomy could be useful in the general outlines of classification, but it was by the examination of external characters, together with information on life histories and geographical distribution, that he could perfect and polish a system based solely on anatomical features. For Temminck, the two subjects were complementary. In fact, when Temminck heard about Reinwardt's growing interest in Zoology, he tried to steer Reinwardt towards anatomical research, advising him to leave aside "meticulous methodic comparisons" because by combining Reinwardt's anatomical research with his own on external characters they could finally solve some puzzling issues in zoology. What Temminck was suggesting to Reinwardt by dividing their fields of study, was an association: if Reinwardt focused on comparative anatomy while Temminck continued with his work, they could achieve a deeper understanding of these "puzzling" issues. Unfortunately, Temminck did not elaborate on what these issues were. The fact that Temminck did not use terms like systematics or classification seems to testify to the fuzziness surrounding these emerging disciplines at the time, but he did have an awareness of the fact that different approaches were possible and that they might lead to different results.[111]

Reinwardt, in contrast to Temminck, regarded classification and description of stuffed animals as a poor approach to the study of nature. In this, Van Marum might have agreed. When writing about the collection at the Hollandsche Maatschappij in Haarlem, he considered enlarging the collection and turning it into a "more scientific collection of comparative anatomy, in which he [Van Marum] had developed a great interest and some practice at the Anatomical School of Prof. Camper."[112] This is not surprising, as he had been a student of the brilliant and famous physician Petrus

[111] Temminck to Reinwardt, 25 November 1816; NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4032B.

[112] "Van Marum's betrekking tot de Hollandsche Maatschappij der Wetenschappen, etc.," NHA, 529 Archive Martinus van Marum, nr. 9; quoted by Sliggers, "Het Naturaliënkabinet van de Hollandsche Maatschappij," 102.

Camper in Groningen. The "collection of stuffed animals" was, apparently, of less scientific value in Van Marum's eyes.

In the Netherlands, systematists like Temminck were found mainly outside the universities. Because of their preference for comparative anatomy, universities were bound to build collections rich in anatomical preparations, instead of systematically arranged cabinets of stuffed specimens, with the sole exception of the University of Groningen.

A peculiar man of many interests, Theodorus van Swinderen became professor of natural history at the University of Groningen in 1814, a post he occupied until his death at 66 years of age.[113] Because of him, zoological systematics was an important part of the curriculum in natural history. So much so, that he also created a museum of natural history at the university especially for the display of the systematic order in nature. The academic collection was meant firstly as a didactic collection, but it soon became Van Swinderen's pet-project until it grew into a considerable museum open to students and to the public once a week: on Saturdays for students, on Wednesdays for the general public.[114] For years he earnestly collected, bought and exchanged material, with the help of two of his students, Johan Conrad van Hasselt and Heinrich Kuhl—the talented young naturalist from Hanau—until, by the early 1820s the museum was renowned in Europe. Kuhl arranged it according to the most recent insights in classification, including those of Temminck and Illiger, and both students' careers were furthered by their experience in Van Swinderen's museum.[115] For Van Swinderen it was of the utmost importance that the manner of arranging the objects of the museum reflected classification: "I always show the museum to visitors in such a way that they see the collection in this Systematic arrangement."[116]

It was thanks to Van Swinderen that Temminck finally received an academic title. In 1819, after his success with the *Manuel d'ornithologie*, Van Swinderen recommended both Kuhl and Temminck for the title of *Matheseos Magister, Philosophiae Naturalis Doctor, honoris causa*.[117] The recommendation was accepted by the Faculty of Mathematics and

[113] Theodorus van Swinderen was doctor of mathematics, physics, literature and law. He actively worked for the improvement of public education, created the museum of natural history in Groningen and applied himself to the preservation of various historical monuments in Groningen, amongst other things.
[114] Theodorus van Swinderen, *Index rerum naturalium quae conservantur in Museo Academico Groningano. Naamlijst der voorwerpen van natuurlijke historie welke bewaard worden in het Akademisch Museum te Groningen* (Groningen: J. Oomkens, Akademie-drukker, 1822), VI, XVII.
[115] Klaver, *Inseparable Friends*.
[116] Van Swinderen, *Index rerum naturalium*, XI; see also IJnte Botke, *Theodorus van Swinderen (1784–1851), hoogleraar en schoolopziener. Gedenktekens door en voor hem gesticht* (Groningen: Universiteitsmuseum Groningen, 1990), 65, 67, 72.
[117] Klaver, *Inseparable Friends*, 15.

Natural Science as well as by the University Senate and both received the title on August 6, 1819.[118] A doctor's title *honoris causa* from the University of Groningen and not from, say, Leiden, reflects the enthusiasm of Van Swinderen for Temminck's work, both as the owner and manager of one of the best cabinets in Europe, and as the author of a systematic work such as the *Manuel d'Ornithologie*. Van Swinderen was one of the few university professors teaching systematics at a university, if not the only one. He wrote: "I have set as my main goal the benefit of students, and therefore I have spared no effort to gather as many genera as I could in the short period of six years (because before then, there was nothing here), to give the students a systematic overview of the whole science, which is, in my view, the first goal of academic studies."[119] Interestingly, he did not add to this academic cabinet anatomical or pathological samples, which were so essential to the University of Leiden and to Brugmans' collection. Temminck's ties with the University of Groningen remained strong after 1819, and once director of 's Rijks Museum van Natuurlijke Historie, Temminck succeeded in employing several students of Van Swinderen, including Kuhl and Van Hasselt.

Meanwhile, at the Athenaeum Illustre in Amsterdam, Reinwardt's lessons on natural history focused on chemistry and botany, mainly as applied sciences. Systematics was a tool for botanists rather than a goal in itself. While Brugmans' main interests were anatomy and pathology, Reinwardt's approach to natural history was more Humboldtian as well as utilitarian. He argued that the only way to really learn about nature was by working in the field, observing and comparing, finding the links between cause and effect. Before departing for Java, Reinwardt focused mainly on economic botany and agriculture, but when he returned after six years in the colonies his interest had shifted to the study of processes, of cause and effect, and of the interactions among organisms and their environment.[120]

When Reinwardt became professor of natural history in Leiden, his inaugural lecture of 1823 was a declaration of what natural history should be. He claimed that studying specimens outside of their environment was clearly insufficient to truly understand nature. This could only be achieved by studying natural processes in the field. Nothing should be studied on its own, in isolation, as everything in Nature exists only in interaction and cooperation and none of its elements is isolated from the whole.[121] He even compared, rather unkindly, the naturalist who never travelled with stagnant water:

[118] Klaver, *Inseparable Friends*, 16.

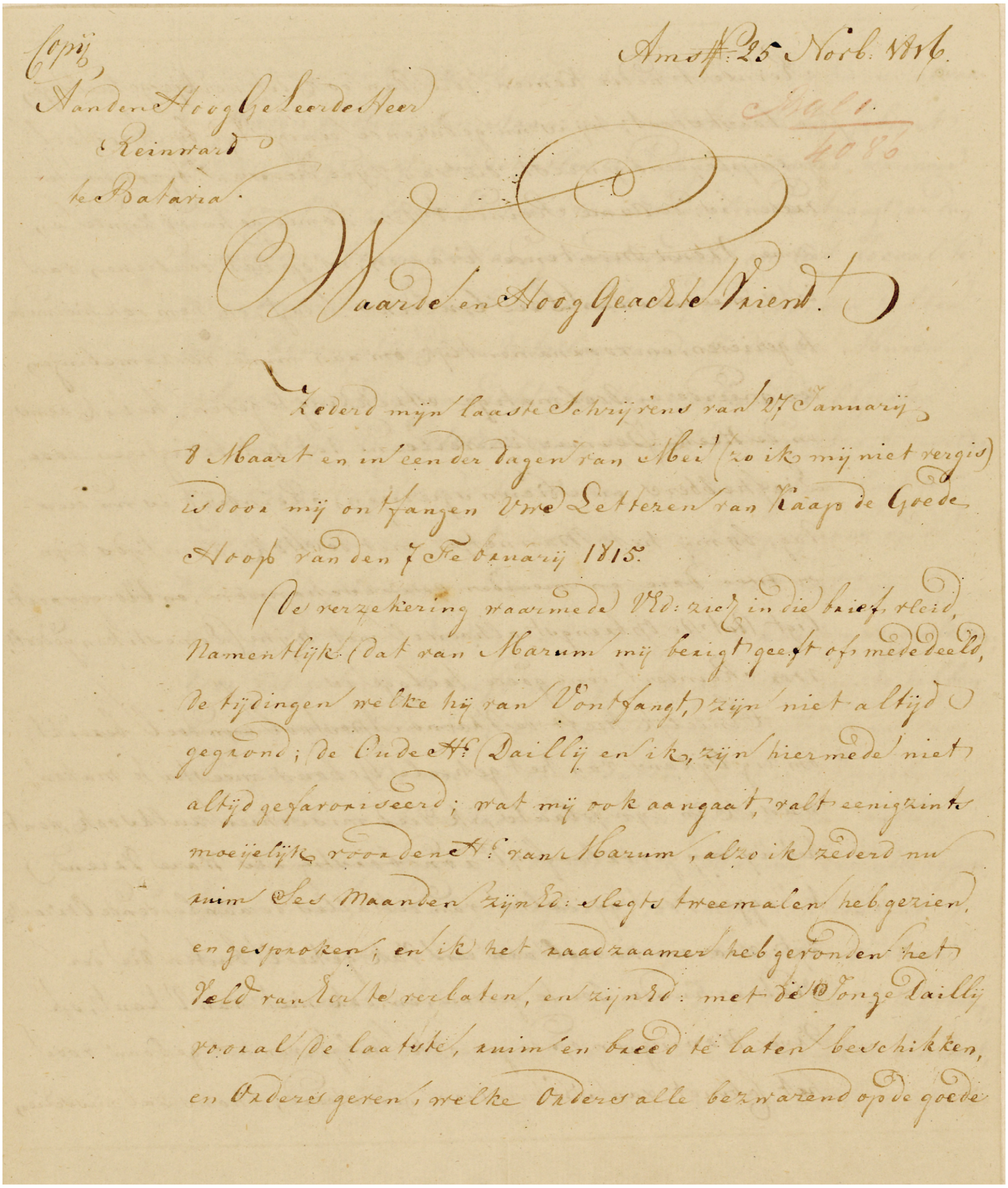
[119] See, for example, Heinrich Kuhl and Johan Conrad van Hasselt, *Beiträge zur Zoologie und vergleichenden Anatomie* (Frankfurt am Main: Verlag der Hermannschen Buchhandlung, 1820).

[120] Weber, "Hybrid Ambitions," 187-92.

[121] Weber, "Hybrid Ambitions," 29.

"In the same way as filth accumulates in stagnant water, one can notice a certain impurity, lowness and narrowness of judgement in those who are studying Nature but never have gone beyond the boundaries of their native country or of any particular place," and these shortcomings eventually resulted in "innumerable errors and trivialities" in their understanding of nature's workings and structure.[122] Therefore, Reinwardt considered the study of objects outside their natural environment "a common shortcoming, spreading through the entire field of Natural History."[123] Without really having the terminology for it, Reinwardt was sketching new disciplines within natural history: ecology, biogeography and geobiology. Certainly, these fields were very different from Temminck's in their methods, geography and goals. Providentially, Temminck was in Paris at the time of Reinwardt's inaugural lecture.

[122] Caspar Georg Carl Reinwardt, *Redevoering van C. G. C. Reinwardt, over hetgeen het onderzoek van Indië tot uitbreiding der natuurlijke historie heeft toegebragt. Gehouden den 3 mei 1823, bij het plegtig aanvaarden van het gewoon hoogleeraarsambt in de scheikunde, kruidkunde en natuurlijke historie aan de Hoogeschool te Leyden* (Amsterdam: J. van der Hey, 1823), 23.
[123] Reinwardt, *Redevoering van C. G. C. Reinwardt*, 29.



Copij

Amst. 25 Novb. 1816.

Aan den Hoog Geleerde Heer
Reinwardt
te Batavia.

4080

Waarde en Hoog Geachte Vriend!

Zedert mijn laaste Schrijvens van 27 Januarij, 8 Maart en in een der dagen van Mei (zo ik mij niet vergis) is door mij ontfangen Uwe Letteren van Kaap de Goede Hoop van den 7 Februarij 1815.

De verzekering waarmede UEd: zich in die brief, vleid, Namentlijk (dat van Marum mij berigt geeft of mededeeld, de tijdingen welke hij van U ontfangt,) zijn niet altijd gegrond; de Oude Hr. (Daillij en ik, zijn hiermede niet altijd gefavoriseerd; wat mij ook aangaat, valt eenigzints moeijelijk voor den Hr. van Marum, alzo ik zedert nu ruim Ses Maanden zijn Ed: slegts tweemalen heb gezien, en gesproken; en ik het raadzaamer heb gevonden het Veld van Eer te verlaten, en zijn Ed: met de Jonge Daillij vooral de laatste, ruim en breed te laten beschikken, en Orderes geven, welke Orderes alle bezwarend op de goede

FIGURE 2.5. Copy of a letter from Temminck to Reinwardt dated 25 November 1816, sent by Temminck to the commissioner-general of Education, Arts and Sciences, Ocker Repelaer van Driel.

CHAPTER THREE

National museum, national expeditions

The concept of a national museum

Temminck proposed the idea of a National Museum of Natural History for the first time in 1814 to Anton R. Falck, at that time state secretary. Before his appointment at 's Lands Kabinet, Temminck had dreams of a museum that would serve to put the Netherlands, still in the process of solidifying its independence and sovereignty, on the European map. Temminck's proposal seemed to be fueled mainly by his patriotic feelings and by his ambition of becoming the museum's director, which he tried to achieve by using as a carrot the distinction of his own cabinet, offered as part of his envisioned museum. As a matter of fact, systematics also played a role in Temminck's motivation.

The concept was, of course, not an original one. National history museums were appearing all over Europe during the first decades of the nineteenth century. A few years before Temminck's suggestion to Falck, in 1809 or 1810, Count Hoffmannsegg had recommended the establishment of a collection of natural history to the German State Councilor Wilhelm von Humboldt, proposing Karl Illiger as its curator. Hoffmannsegg's collection would serve to support this proposition. The King accepted and Illiger became the first director of the Zoological Museum of Berlin in March 1810—the Museum für Naturkunde or Humboldt-Museum. It was part of the University of Berlin, and Illiger also became professor of natural history.[1] Temminck had been in touch with both German gentlemen since 1810 and it is therefore possible that the foundation of the Berlin Museum inspired Temminck with the idea of a Dutch national museum, with himself as its director. Similarly, in 1819 Baron Gustaf Paykull, entomologist, ornithologist and marshal of the Court, convinced the King of Sweden to found a national natural history museum in Stockholm, the Naturhistoriska Riksmuseet, with the donation of his private zoological collection as part of the deal. It is not too far-fetched to assume that the foundation of this museum also fed Temminck's vision.

[1] Stresemann, *Ornithology from Aristotle to the Present*, 103.

Temminck's first suggestion was not accepted at the time, for the simple reason that Falck saw 's Lands Kabinet, under Reinwardt's direction, as the national collection of natural history. Although Temminck acknowledged Reinwardt's position, he did not share Falck's vision of 's Lands Kabinet. After a few years of working with the collection—and arguing with Van Marum—and after being commissioned to build collections for the southern universities, Temminck saw so many shortcomings in the organization of the Dutch academic cabinets that his belief in the need of a central museum grew stronger. Between 1814 and 1816, his arguments shifted from a patriotic sentiment to a deeper understanding of the function a national museum should have in the natural sciences and, particularly, in systematics.

Around 1816 Temminck had formed a clear idea of what such a national museum would look like and described it in a letter to Reinwardt. Temminck saw how the university professors were competing with each other for specimens chosen to illustrate lessons in anatomy and pathology. Temminck even went so far as to declare that some professors were just taking advantage of the favorable situation they were enjoying in the Netherlands and were using the specimens for "ostentation."[2] What universities should do instead, he claimed, was to build collections with examples of genera of European animals, either fresh or kept in denatured alcohol (also called methylated spirit or *spiritus* in Dutch), to be used for dissections and comparative anatomy. Some other non-European genera could be added to this basic setting. However, Temminck believed that, complementing the didactic collections, there should be a National Museum to function as a reference collection:

> Also, a National Museum could be founded, which, with its duplicate specimens and as a result of the care of its directors, could serve to enlarge the University collections. It should be built in such a manner as to serve as a source of information for those who desire to increase their knowledge in the different subjects of Natural Science, by means of comparison.[3]

As the focus of the academic cabinets lay mostly in comparative anatomy and physiology, rich in preparations of organs and pathological specimens, these collections were unsuited for systematics. Temminck imagined a new kind of institution, separate from academic management, that would serve as a repository for universities, independent researchers and the general public. As examples, Temminck referred to the

[2] Temminck was referring here to the reform of the Dutch education system of August 1815 (*Besluit regelende het hooger onderwijs in het koningrijk der Nederlanden: 2 Augustus 1815*), introduced in the previous chapter. With this reform, the King was giving the Universities the means to have their own cabinets of natural history.

[3] Temminck to Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4032B.

Muséum in Paris and the Egyptian Hall in London.[4] This time, however, Temminck did not put himself forward as a candidate to direct such a museum, at least, not directly. In charge of this National Museum, there would be "directors"—in plural.[5] Temminck may have had the Paris Muséum in mind, where twelve professors of equal rank worked on different subjects. After all, Temminck did try to steer Reinwardt towards studying comparative anatomy, as an area research complementary to Temminck's own systematics.

Although Temminck sent this description of the ideal national museum to Reinwardt, he also made sure to send a copy of this particular letter—all sixteen pages of it—to the commissioner-general of Education, Arts and Sciences, Ocker Repelaer van Driel. Temminck's main reason for sending this copy was, he wrote, to dismiss the circulating rumors about his wish to replace Reinwardt. Temminck hoped that his letter to Reinwardt would thus prove to the commissioner the falsehood of the accusation that Temminck was seeking to dethrone Reinwardt as director of 's Lands Kabinet.[6]

That particular letter for Reinwardt included, besides his ideas for a new national museum, details on his ichthyological research, accounts of his quarrels with Van Marum and Apostool, instructions on how to collect fishes and marine invertebrates, and some news about the collections for the southern universities. He also counselled Reinwardt about how to proceed if he wished to study zoology, as he should focus on comparative anatomy. This long missive, unusually chaotic for Temminck, was ready to be sent to Batavia as a proof of Temminck's commitment and loyalty to Reinwardt. However, rather conveniently, it also helped convey his ideal plan for a national museum indirectly to Repelaer van Driel. At that time, just as in 1814, Temminck's proposal fell on deaf ears.

There was yet another advocate of a national museum for natural history. In March 1817, Brugmans wrote to Falck suggesting the creation of a central, academic museum, open to the public. By reorganizing and expanding the existing collection at Leiden University they could create, without too much expense, a museum "in accordance with the value of our collection, the splendor of our University and with the current state of science."[7] Apparently, Brugmans' expansion plans were well received, and although there was no intention yet to transform the Leiden collection into a national museum,

[4] Commissioned by William Bullock as a museum for his private collection, it was erected in Piccadilly, London, in 1812.

[5] Temminck to Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4032B.

[6] Temminck to the commissioner-general of Education, Art and Science, exh. 4 December 1816, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4032B.

[7] Sebald J. Brugmans to Anton R. Falck, 31 March 1817, UBL-AC2, 70; Dreier, "Voor Museum en Vaderland," 19-20.

the government paid the generous amount of ƒ57,390 guilders to expand the University cabinet—a small fortune, the equivalent of roughly €415,000 in today's money.[8] The University of Leiden had already been favored in 1815, when it was chosen to house the Stadhouders Cabinet (the cabinet of the Stadholder) when Brugmans brought part of it back from Paris. This collection had been gathered during the second half of the eighteenth century by William V, Prince of Orange and last Stadholder of the Dutch Republic. The French confiscated the Cabinet and took it to Paris, to be stored at the Muséum d'Histoire Naturelle. After the downfall of Napoleon, the son of the Stadholder became King Willem I, and he requested Brugmans to travel to France and retrieve it.[9] Although the mission was not without its difficulties—Cuvier and Lamarck opposed it and Alexander von Humboldt ended up as mediator between the parties—Brugmans succeeded in taking back at least part of the original material.[10] Once it had arrived in the Netherlands, the King ordered that the Cabinet was to be given to the University of Leiden, as testimony of his ambition to let science grow and thrive.[11] The fact that Willem I did not use his father's Cabinet to enlarge the collection of 's Lands Kabinet may be an indication of the King's sympathies and gratitude towards Brugmans, for his efforts in Paris.

Somehow, the idea of a central, national museum started to take root. The King was, after all, determined to raise the prestige of his new country by boosting its cultural institutions. During the summer of 1819, Falck—now minister of Education, Industry and Colonies—was considering the future of the collection at the University of Leiden and asked Temminck's advice on the matter. After a few initial conversations, Temminck wrote to Falck, upset and expressing opposition to Brugmans' ambitious plans of turning the Leiden University cabinet into a national museum. His arguments revolved about three main points. First, Temminck believed that "qui trop embrasse mal étreint."[12] The Leiden cabinet was acceptable for didactic purposes, but to convert it into a national museum required whoever was in charge to master all the different fields of natural history, give lectures, manage the collections, have taxidermy and curatorial

[8] Trustees Policy note, 23 May 1818, UBL-AC2, 71 II; Dreier, "Voor Museum en Vaderland," 20. The purchasing power of the guilder in today's euros has been calculated with the online tool of the International Institute of Social History, "Value of the guilder / euro. Comparing the purchasing power of the guilder from 1450 to any other year," http://www.iisg.nl/hpw/calculate.php.

[9] Florence F. J. M. Pieters, "Het schatrijke naturaliënkabinet van Stadhouder Willem V onder directoraat van topverzamelaar Arnout Vosmaer," in *Het verdwenen museum*, ed. Bert C. Sliggers and Marijke H. Besselink.

[10] Pieters, "Naturaliënkabinet van Stadhouder Willem V," 39-40; Raat, "Humboldt and Temminck," 21.

[11] Copy of the Royal Decree of 3 November 1815, UBL-AC2, 69 I.

[12] Temminck to Falck, 17 July 1819, NL-HaNA, Collectie 048 Falck, 2.21.006.48, inv.nr. 85; H. T. Colenbrander, ed. *Gedenkschriften van Anton Reinhardt Falck* ('s Gravenhage: Martinus Nijhoff, 1913), 413.

skills and fulfill all the official duties. Put like that, it was nothing short of an herculean task. Second, giving more prominence to the University of Leiden would only exacerbate the rivalry with other universities, as all were required by law to have their own collections. The competition between the professors and the lack of skills amongst them were such that Temminck called these academic collections "towers of Babel." Third, and perhaps more importantly, Temminck argued that a national museum—or, as he always put it, a "national monument"—should be centralized and independent of academic management.[13] Only then could such a museum be of service to all universities and to "the learned practitioner of diverse fields." For this, even the city chosen as the location for the museum, Brussels or Amsterdam, should reflect the national character of the institution.[14] In other words, if the academic museum of the University of Leiden should become the new national museum, it would be to the detriment of the other universities, the practitioners of natural history, and the quality of the collection itself.

Regarding the directorship of his ideal national museum, Temminck did not explicitly propose anyone in that particular letter, not even himself. Temminck suspected that Brugmans intended to merge the Leiden cabinet with 's Lands Kabinet, which would put in peril Reinwardt's position. By stating that "Reinwardt was in no way to be employed as a subordinate or substitute after his return from Java," Temminck implied Reinwardt should remain director.[15]

Concerning Brugmans, Temminck criticized his skills as a collection manager, arguing that the Leiden cabinet was poorly curated and that Brugmans did not have the necessary knowledge or experience to keep it in top form. Temminck did not put himself forward, but he clearly stated he had plans for himself and his collection, because he added, resolutely, that "if a national museum is not founded, or if its establishment seems altogether defective, no one can blame me if I decide to pursue my passion for expanding my knowledge in another country."[16] Temminck thus threatened that he would leave the Netherlands, collection and all, if a national museum was not realized, or if it was unsatisfactory. He was wary of further discussions and competition with both Brugmans and Van Marum who, Temminck suspected, would stop at nothing to get him out of the way.[17]

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[13] Temminck to Reinwardt, 25 November 1816, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4032B; Temminck to Falck, 17 July 1819, NL-HaNA, Falck, 2.21.006.48, inv.nr. 85.
[14] Temminck to Falck, 17 July 1819, NL-HaNA, Falck, 2.21.006.48, inv.nr. 85.
[15] Temminck to Falck, 17 July 1819, NL-HaNA, Falck, 2.21.006.48, inv.nr. 85.
[16] Temminck to Falck, 17 July 1819, NL-HaNA, Falck, 2.21.006.48, inv.nr. 85.
[17] Temminck to Falck, 17 July 1819, NL-HaNA, Falck, 2.21.006.48, inv.nr. 85.

Temminck sensed that, as he lacked both an academic education and a good relation with Brugmans and Van Marum, there would be no place for him in a national museum based at the University of Leiden. He was worried about the future of his private cabinet: he would not let it become a part of Brugmans' museum, even if it meant that he had to move to another country.

Neither Brugmans nor Temminck considered 's Lands Kabinet suitable to become the national museum, as it was too small and incomplete, and contained mostly invertebrates and minerals. Even after the purchase of Reinwardt's private collection—which consisted mainly of anatomical samples and skeletons, but also insects, minerals and a few other specimens—it would remain fragmentary and lack the grand character that both gentlemen deemed necessary for a national institute.[18] Besides, the Trippenhuis, where the Kabinet was housed, did not allow for expansion: it also housed the ever-growing art collection of Apolstool's Kunst Museum and the instrument collection of the Koninklijk Instituut. Therefore, the most logical thing seemed to be to merge 's Lands Kabinet with other existing collections. For Brugmans, that should be the Leiden University cabinet, already enlarged with the old Stadholder's Cabinet and at that moment one of the biggest academic cabinets in the country. Temminck objected to 's Lands Kabinet becoming an academic collection: it should be part of an independent institution under ministerial administration. The role reserved for Reinwardt, still the director of 's Lands Kabinet and professor at the Athenaeum Illustre in Amsterdam, was another matter for debate. In any case, Temminck felt the obligation, as director *ad interim* of 's Lands Kabinet and because of his friendship with Reinwardt, to strongly oppose Brugmans' plan to unite 's Lands Museum with the academic cabinet in Leiden.[19]

Fate, however, intervened. The day after Temminck finished his letter to Falck, Brugmans felt unwell after a long day working in the garden. Unexpectedly, he passed away four days later, on July 22, 1819. He was only fifty-six years old. His death was attributed to a colic—according to Brugmans' colleagues, it was the result of drinking too much beer after eating fruit.[20] Brugmans' sudden death was immediately followed by conjectures about a successor. Reinwardt seemed to be the most likely man for the job. Although Reinwardt was still in Java, Van Marum wasted no time and informed him of Brugmans death and told him—in the same paragraph—that an invitation for

[18] Temminck and Van Marum were commissioned to produce a catalogue and a valuation of the collection of Reinwardt, who sold it to the government because, in his view, a director of a national collection should not also own one privately; Gijzen, " 's Rijks museum," 31.
[19] Temminck to Falck, 17 July 1819, NL-HaNA, Falck, 2.21.006.48, inv.nr. 85.
[20] Van Marum to Reinwardt, 15 August 1819; NHA, 529 Archive Martinus van Marum, nr. 20b; van Heiningen, *Correspondence of C. G. C. Reinwardt*, 325.

him to accept the professorship in Leiden was on its way to Java.[21] For Reinwardt, this was not only unexpected, but also unwanted. His own plans were altogether different. He wished to stay longer in Java, to finish his writings and publish the results of his research. He was perfectly satisfied with his current position in Amsterdam and saw a professorship in Leiden as a daunting prospect.[22] After a few months and several letters from an insistent Van Marum, he accepted the position in Leiden and became professor at the University of Leiden and director of the Botanical Garden. With Reinwardt's new appointments, the proposals on the table for a national museum changed.[23]

By the end of 1819 the need for a national museum was no longer questioned, but it seems that Temminck's objections to Brugmans persisted in Falck's mind. He kept the letter Temminck sent him in July 1819, which Falck noted should be taken "cum grano salis," but it had been "the seed encapsulating the now fulfilled ideal for the great museum of natural history."[24] Ultimately, Falck gave preference to a National Museum instead of an academic collection, although in the end it would not be completely independent of the Universities, as Temminck wished.

Falck's plans included the fusion of the cabinets from the University of Leiden and 's Lands Kabinet, as well as Temminck's private collection, which Temminck himself had offered five years before, in 1814. Although Falck conceded a divorce of the museum directorship from the university professorship, he wished to entrust a final say in the management to the University Board of Trustees (de Heren Curatoren). The board would act as supervisors as well as intermediaries between the Ministry and the director of the museum. This was not a satisfactory arrangement for Temminck, who predicted problems whenever there was a disagreement, or regarding budgetary questions, not to mention, heaven forbid, risking unsupervised professors using the collection for didactic purposes.[25]

At this point, Reinwardt and Temminck were both candidates for the directorship of the museum. Not surprisingly, Temminck—although he thought more highly of Reinwardt than he did of Brugmans—still argued that the burden of the museum management was incompatible with a full professorship: "It seems to me that a Director of the Botanical Gardens, charged with the professorship of chemistry, botany, mineralogy, comparative anatomy and all subjects of zoology, has an infinite amount of

[21] Van Marum to Reinwardt, 15 August 1819; NHA, 529 Archive Martinus van Marum nr. 20b.
[22] Reinwardt to Van Marum, June 3, 1820, NHA, 529 Archive Martinus van Marum nr 20b; see also Weber, "Hybrid Ambitions," 166-17.
[23] Van Heiningen, *Correspondence of C. G. C. Reinwardt*.
[24] Colenbrander, *Gedenkschriften van Anton Reinhardt Falck*, 277.
[25] Gijzen, " 's Rijks museum," 6-7.

work to do."[26] Besides, Temminck insisted that an independent director would prevent competition with professors of other universities. Putting himself forward as the best candidate, Temminck added that "twenty years of experience" had taught him that a wide network of collectors and museums was much more effective than funds when it came to expanding a collection.[27] On top of this, Temminck assured Falck that he could never part with his collection, which was the basis of his research and the fruit of many years of work and worries.[28] In other words, if Temminck did not get the job, he would not donate his collection to the national museum.

Six months later, Falck announced his final proposal to the King, having reached an agreement with Temminck: his private collection ("the richest of Europe") would be part of the new museum provided that he—or his widow after him—receive a life annuity of three thousand guilders per year plus a modest yearly salary of another two thousand as Director of the museum, the equivalent of about €45,000 per year.[29] Falck's arguments in favor of this proposition were in fact exactly the same as Temminck's. Firstly, neither the Leiden University collection, 's Lands Kabinet, nor the merger of both could match other European museums, like those in Paris and Vienna. Secondly, it was impossible for a university professor to take on the amount of work the direction of the museum required. Thirdly and finally, a new museum would serve as a central repository to provide the universities with didactic material, thus preventing rivalry between universities. As the King was very keen to match France, Austria, and every other country in Europe in all possible domains, Falck insisted on the attractive nature of Temminck's proposition and its benefits for the country, its King, its commercial interests and its colonies. For financial and practical reasons, Falck suggested Leiden as the place to establish the new museum.[30] Five days later, 's Rijks Museum van Natuurlijke Historie was born by royal decree. It met almost all of Temminck's conditions—all but two.

[26] Temminck to Falck, 29 October 1819, NL-HaNA, Algemeen Rijksarchief (ARA), nummer toegang 2.14.03, inventarisnummer 5; Gijzen, " 's Rijks museum," 8.
[27] Temminck to Falck, 29 October 1819, NL-HaNA, ARA, 2.14.03, inv.nr. 5.
[28] Temminck to Falck, 7 January 1820, NL-HaNA, ARA, 2.14.03, inv.nr. 5; Gijzen, " 's Rijks museum," 8-9.
[29] Falck to King Willem I, 4 Augustus 1820, NL-HaNA, ARA, 2.14.03, inv.nr. 5; Gijzen, " 's Rijks museum," 10. For comparison, Caspar G. C. Reinwardt received €24,000 per year while working in Java, which, according to Andreas Weber, "far exceeded his salary as professor at the Athenaeum Illustre in Amsterdam." (Weber, "Hybrid Ambitions," 122). The purchasing power of the guilder in today's Euros has been calculated with the online tool of the International Institute of Social History, "Value of the guilder / euro."
[30] Falck to King Willem I, 4 Augustus 1820, NL-HaNA, ARA, 2.14.03, inv.nr. 5.

The birth of 's Rijks Museum van Natuurlijke Historie

The Royal Decree no. 75 of Augustus 9, 1820, ordained the foundation of 's Rijks Museum van Natuurlijke Historie with Temminck as its director. The collection should consist of Temminck's cabinet, 's Lands Kabinet and that of the University of Leiden, and it should be used for academic education and to provide specimens for the universities.[31] With this decree, the new museum was placed under the responsibility of the Leiden University trustees and its role was determined to be mainly for educational purposes—two measures Temminck had explicitly disapproved of.

The decree was very short and left many delicate issues open to discussion. The trustees, for example, were alarmed by the thought of the dispersal of Brugmans' collection over other universities. When the University of Leiden acquired the professor's collection it was stipulated that under no circumstance should it be given, partly or entirely, to another university.[32] Furthermore, their own role and that of Temminck's were also left undefined. After four months of negotiations, Falck issued a ministerial decree in December 1820 clarifying the composition and role of the collections, as well as the relation of the director and the trustees. With this decree, Falck found a formula to please—or at least, appease—both Temminck and the trustees.

One of the most striking rulings of the decree entailed a divorce of the comparative anatomy collections from the rest of the natural history specimens. 's Rijks Museum collection consisted of zoological specimens (excluding human remains), skeletons, fossils and minerals, but "no pathological nor physiological preparations of animal organs should be part of it."[33] These anatomical and pathological preparations were to be donated to the cabinet of Physiology of the University of Leiden, under the care of Gerard Sandifort, a former student of Brugmans and professor of anatomy and medicine in Leiden. Other objects originally from Brugmans' collection, like the skeletons and stuffed animals, were placed in 's Rijks Museum and the director was not allowed to hand them out to any other institution.[34] Falck gave special directions to the professors in *Anatomia Comparata*: although they would have free access to the museum objects, they were not allowed to take them outside the museum rooms. Any specimen needed for their lessons should be retrieved and placed back only by Museum staff. Those

[31] Royal Decree no. 75, 9 August 1820, NL-HaNA, ARA, 2.14.03, Naturalis Biodiversity Center Archives; Gijzen, " 's Rijks museum," 12-14.
[32] C. M. van Dam to the Leiden University, 14 October 1819, UBL-AC2, 70; Gijzen, " 's Rijks museum," 34.
[33] "Extract uit het Register der Handelingen en Resolutien van den Minister, voor het Publieke Onderwijs, de Nationale Nijverheid en de Kolonien, No. 30 Den 31 December 1820", in Gijzen, " 's Rijks museum," 17.
[34] Temminck, "Uit het Kabinet van Wijlen Professor Brugmans," a catalogue of the specimens transferred from the Brugmans collection to 's Rijks Museum, Naturalis Biodiversity Archives, Archive C. J. Temminck, NAT_ARC_TEM_02460, NAT_ARC_TEM_02460-64.

professors who wished to study specimens for a longer period of time, could borrow them. Similarly, students of natural history were granted access to the objects.[35] There were, therefore, actual restrictions when it came to using the collection for teaching comparative anatomy but not to research. In this way, Temminck was reassured that the museum collection was not to be used for lessons of comparative anatomy.

Regarding the relation of the director with the trustees, Temminck found himself in a position he did not relish. The director was in charge of the finances, the curation and the redistribution of duplicate specimens, but the final responsibility lay with the trustees. This meant he had to answer to them and to consult them if he wanted to introduce any relevant change in management. Temminck had to report back to the trustees regarding staff, funding and changes in the collection. The Ministry of Education was also to receive a copy of these reports and other documents.[36] Temminck's relation with the University would prove a challenging one in the coming years.

In the Netherlands, the reactions to the new museum varied, depending on people's interests. The Koninklijk Instituut van Wetenschappen, for instance, wrote a letter to the King reminding him that 's Lands Kabinet had been created for the Institute's First Class members interested in natural sciences and mathematics. With the move of the collection out of Amsterdam to Leiden, the Koninklijk Instituut feared losing access to the natural history specimens.[37] As their objections remained unanswered, Gerardus Vrolik, secretary and Member of the First Class—and also a former pupil of Brugmans—even tried to stop the impending transfer of 's Lands Kabinet from the Trippenhuis to Leiden in September 1820.[38]

The University of Leiden was satisfied. Its collection was to remain in Leiden and to become a national museum, under the supervision of their trustees, very much like Brugmans had envisioned.[39] However, after Brugmans' death, there was yet another contender in Leiden for the position of director. Paulus Godfried van Hoorn had been Brugmans' student and, later on, his friend and housemate. He had a doctorate in

[35] "Extract uit het Register der Handelingen en Resolutien van den Minister, voor het Publieke Onderwijs, de Nationale Nijverheid en de Kolonien, No. 30 Den 31 December 1820," in Gijzen, " 's Rijks museum," 17; Huistra, *Afterlife of the Leiden Anatomical Collections*, 63.

[36] Gijzen, " 's Rijks museum," 17-20.

[37] Secretaris Eerste Klasse van het Koninklijk Nedederlands Instituut to the minister of Public Education, National Industry and Colonies, 15 September 1820, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr. 4100; Koolmees, "Reinwardt," 50.

[38] Van Marum to Reinwardt, 17 September 1820, NHA, 529 Archive Martinus van Marum nr. 20b; Van Heiningen, *Correspondence of C. G. C. Reinwardt*, 444.

[39] Curatoren van Hogeschool Leiden to the minister of Public Education, National Industry and Colonies, 2 September 1820, NL-HaNA, BiZa 1813–1848, 2.04.01, inv.nr 4100; Koolmees, "Reinwardt," 50.

medicine and became assistant director of Brugmans at the Leiden University cabinet.[40] Van Hoorn specialized in geology and mineralogy. As Brugmans' assistant, he had expected to succeed him at the University Cabinet. When this cabinet was to be merged with the Temminck and Amsterdam collections, Van Hoorn was offered work under Temminck as assistant director, just as he had been under Brugmans. However, Van Hoorn would not agree. He claimed the position as Director of the Mineralogy department, and stated that "my doctorate, and the position I have otherwise enjoyed in Society, prevent me from accepting a subordinate position."[41] Van Hoorn's doctorate was, in his view, proof of his abilities and the passport to a higher status in an official institution. The fact that Temminck had an honorary doctorate from Groningen University was seemingly not enough. Temminck was challenged again for not having an academic background, which apparently was regarded as a handicap in Dutch scientific circles around 1820. Van Hoorn threatened to resign. After deliberation with the minister and the Board of Trustees, he accepted the position of curator of the Mineralogy department.[42] Unfortunately, Van Hoorn's position at 's Rijks Museum turned out to be the most unsatisfactory arrangement for everyone.

Van Marum, who had initially wished the director's post to go to Reinwardt, changed his mind from the moment Reinwardt accepted the position of successor to Brugmans in Leiden. Although Van Marum could not help noting that Temminck had been very selfish, he recognized the impossible burden for Reinwardt of a double assignment, as professor and director.[43] Both Van Marum and Reinwardt did see the advantages of merging 's Lands Kabinet with the cabinet of the University of Leiden. In the end, Van Marum wrote to Minister Falck, acknowledging the positive role of a national museum of natural history for the Netherlands, a museum that would equal or surpass the most important museums in Europe, and conveyed his wish to contribute in any way possible.[44]

Despite Van Marum's positive attitude, the creation of a centralized museum was potentially detrimental to the collection of the Hollandsche Maatschappij in Haarlem, still under Van Marum's rule. He realized that, as the new Rijks Museum had the funds and facilities for expansion, it would soon surpass the collection in Haarlem so that

[40] P. F. van Hoorn, "Levensberigten der in dit jaar afgestorvene medeleden. Levensberigt van Dr. Paulus Godfried van Hoorn," *Jaarboek van de Maatschappij der Nederlandse Letterkunde*, no. 1-9 (1851).
[41] Godfried van Hoorn to Temminck, 24 Augustus 1821, Naturalis Biodiversity Center Archives, Archive C. J. Temminck; Holthuis, *Rijksmuseum*, 27.
[42] Holthuis, *Rijksmuseum*, 27.
[43] Van Marum to Reinwardt, 8 September 1820, and 7 July 1821, NHA, 529 Archive Martinus van Marum nr. 20b; Van Heiningen, *Correspondence of C. G. C. Reinwardt*, 341, 434.
[44] Van Marum to Falck, 8 September 1820, NHA, 529 Archive Martinus van Marum nr. 7; Weiss, "The Masses and the Muses," 22.

visitors who had seen the Leiden museum would not consider it worth their time to visit the Haarlem collection as well.[45] Van Marum decided not to compete with Leiden. Instead, he thought of giving the Haarlem cabinet a new focus that would make it useful as well as unique. He suggested the cabinet concentrate its efforts on the indigenous fauna of the Netherlands, a subject that had always interested the Hollandsche Maatschappij. The collection would be reorganized and expanded with a collection of Dutch fish—prepared by none other than Temminck's pupil and former concierge, Reindert Draak—and a collection of insects, a generous donation from professor Van Swinderen.[46] The new policy, even though it was a clever move, was not implemented with enough energy to achieve Van Marum's goals and the cabinet remained fragmentary.[47]

While everyone was pulling and campaigning for the post of director of 's Rijks Museum, Reinwardt was in Java, depending for information on the arrival of letters from friends and officials, and he remained on the sideline of the discussions regarding both his professorship in Leiden and the foundation of the new museum. Reinwardt professed he was satisfied with the outcome: "It is a true pleasure to me that Mr. Temminck has been appointed museum director and that I can stay out of the war against moths and larder beetles."[48] The director of the museum was not only head of the institution, but he was also charged with the safety and curation of the objects, fulfilling the double role of administrator and collection manager. Reinwardt was not willing to take on these roles on top of the professorship at university. He surely did not desire to be a collection manager, but he did resent Temminck's negligence when it came to informing him regarding his new appointment and the purchase of Temminck's collection for the museum.[49] Although Reinwardt accepted the professorship in Leiden, he was worried about leaving unfinished his research and publications, the results of his stay in the colonies.[50] He was allowed to remain longer in the Dutch East Indies to complete his projects, and he finally returned to the Netherlands in 1822.

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[45] Sliggers, "Het Naturaliënkabinet van de Hollandsche Maatschappij."

[46] Sliggers, "Het Naturaliënkabinet van de Hollandsche Maatschappij," 67.

[47] Bierens de Haan, *De geschiedenis van een verdwenen Haarlemsch museum*, 50-52; Sliggers, "Het Naturaliënkabinet van de Hollandsche Maatschappij," 68.

[48] Reinwardt to Van Marum, 1 January 1822, NHA, 529 Archive Martinus van Marum nr. 20b; Koolmees, "Reinwardt," 50. Reinwardt referred here to common pests of natural history specimens, the larvae of moths and larder beetles that can cause great damage to the collections.

[49] Reinwardt to Van Marum, 25 March 1822, NHA, 529 Archive Martinus van Marum nr. 20b; Van Heiningen, *Correspondence of C. G. C. Reinwardt*, 448.

[50] Reinwardt to G. A. G. Ph. Baron van der Capellen tot Berkenwoude, 6 January 1820, in Willem Hendrik de Vriese, *Ons streven naar waren roem. Eenige woorden van dankbare herinnering bij het afsterven van den Hoogleeraar C. G. C. Reinwardt, gericht tot de kweekelingen van Leydens Hoogeschool, op 13 Maart 1854* (Leiden: C. C. van der Hoek, 1854), chap. 5.

By the end of 1820, Temminck was settled as director of the 's Rijks Museum van Natuurlijke Historie, a wish he had harbored for more than six years. He was forty-two years old and finally holding an official position, one that he had created for himself over the course of a decade.

The Natuurkundige Commissie

A national museum of stature needed a collection of stature. The three original collections that were to form the basis of the Leiden museum (the Leiden University cabinet, 's Lands Kabinet and Temminck's private collection) were impressive, but nowhere near what was needed to catapult the museum to the heights of those in the neighboring countries. The Dutch government was painfully aware of this, and the very first attempts at remedying this were made by Reinwardt. But although he had collected natural history objects from the Dutch East Indies for 's Lands Kabinet, his role was not supposed to be that of a collector.

Reinwardt had been sent to Java in 1815 as Director of Agriculture, Arts and Science in Java and Neighboring Islands. He had been handed a list of detailed instructions, including a never-ending list of questions to which the government needed answers, and promptly. Reinwardt was supposed to calculate the extension of cultivated land, forests and wilderness; survey waterbodies; make an inventory of the different peoples in the region, including locals, Chinese, Europeans and their offspring; survey the existence of coal, iron, tin and sulphur mines; investigate whether it was possible to produce wood for ship-building; find out how much rice, coffee, sugar, pepper, cardamom and other spices were produced in a an average year; whether coconuts were used for food, for producing oil or for distilling alcoholic drinks; find out what animals were edible; check if animal horns were of good quality; and inquire what children learned at school, to list but a few. It was a mind-boggling list of questions. It was also an uncomfortable reflection of how little the Dutch government knew about these territories at that time.

Reinwardt, undaunted, took it on all the same. He advised the colonial government, undertook survey explorations throughout the archipelago, collected all kinds of natural history objects, conducted botanical investigations, cultivated various potentially beneficial plants, organized the school system, set up a medical committee, and founded 's Lands Plantentuin (the National Botanical Garden) in Buitenzorg in 1817, among other things. Despite all this resolute activity, it was no more than a drop in the ocean. On top of everything, by a series of most unfortunate coincidences four of Reinwardt's

precious shipments with specimens were lost at sea.[51] The material that did reach the Netherlands was to be kept at *'s* Lands Kabinet, under the care of Temminck and Van Marum, as instructed by Falck. Incidentally, in 1817, with the issue of a national museum still unresolved, Brugmans protested against this arrangement, arguing that the University of Leiden should also benefit from the material arriving from Java.[52]

Soon it became obvious that Reinwardt could never comply on his own with all the instructions he received. Sending reinforcements to Java for scientific research in the field of natural history seemed a sensible idea, especially since France and Britain had been able to explore and describe the archipelago just a few years before—this was an arms race. During the French and British interregnum (between 1806 and the Treaty of London in 1815) the archipelago had been explored by naturalists like Alfred Duvaucel (Georges Cuvier's stepson) and Louis Theodore Leschenault de la Tour. Thomas Horsfield, Alexander Hare and Joseph Arnold had also been active during the lieutenant-governorship of Sir Thomas Bingley Stamford Raffles in Java, between 1811 and 1816. The collected specimens were mostly sent to the Muséum in Paris and to Joseph Banks in London. The results of their efforts were splendid, both in terms of the gathered collections and in the description of many new species. For instance, some of Leschenault's birds collected in Java were described by Georges Cuvier, and Horsfield published his *Zoological Researches in Java and the Neighbouring Islands* in 1824 using these collections.[53]

When the Netherlands regained control of the East Indies, the King wished to catch up with the neighboring countries, and it is not inconceivable that Temminck played a role in emphasizing the need for more natural history objects via the agency of his friend Falck. According to Holthuis, the idea of formally organizing an expedition to Java was mainly instigated by Temminck.[54] Either way, at the beginning of 1819 the Dutch government had not only decided to send more explorers to Java, it had also chosen the men for the job: Heinrich Kuhl, from Hanau, and Johan Conrad van Hasselt, a student of Van Swinderen in Groningen. Temminck knew them both well. Kuhl, while in Amsterdam with Temminck, received a letter from Minister Falck to inform him that he

[51] Willem Hendrik de Vriese, *Reis naar het oostelijk gedeelte van den Indischen Archipel in het jaar 1821 door Caspar Georg Carl Reinwardt* (Amsterdam: Frederik Muller, 1858); Weber, "Hybrid Ambitions"; Smit, "Rijksherbarium." Lists of some the objects collected and sent by Reinwardt to 's Lands Cabinet—and later, to 's Rijks Museum—are kept in the Naturalis Biodiversity Archives, NAT_ARC_TEM_02275, NAT_ARC_TEM_02306.

[52] Brugmans to the Trustees of the Leiden University, 26 September 1817, UBL-AC2, 70; Dreier, "Voor Museum en Vaderland," 41.

[53] Smit, "Rijksherbarium," 8; Justin J. F. J. Jansen, "The Ornithology of the Baudin Expedition (1800–1804)." (PhD dissertation, Leiden University, 2018), 186.

[54] Holthuis, *Rijksmuseum*, 21.

had been chosen to travel to the East Indies by order of the Dutch government. Kuhl was thrilled, the message felt "like an electric shock." He had been recommended for the job to the King, most likely, by Van Swinderen and Temminck.[55]

FIGURE 3.1. Engraved portrait of Heinrich Kuhl (1797–1821), by Friedrich Fleischmann.

Temminck and Kuhl had met a few years earlier in Berlin, while both were visiting Lichtenstein. Kuhl had also met Van Swinderen in Hanau, and made such a good impression that Van Swinderen invited him to study in Groningen. Kuhl gladly accepted the offer and Kuhl and Van Hasselt started work with Van Swinderen and Temminck. The gentlemen were dazzled by the young naturalists' skills and intelligence, so they recommended them to the King.[56] For their new adventure, they would be trained in Paris, London, Groningen and Leiden, all paid for by the Dutch government and under Temminck's wing. This was a once-in-a-lifetime opportunity,

[55] Sirks, "Indisch natuuronderzoek," 101-02.
[56] Klaver, *Inseparable Friends*, 9; M. Greshoff, "Kuhl en Van Hasselt. Eene episode in het Nederlandsch-Indisch natuuronderzoek," *Album der natuur* 52, no. 1 (1903).

one that made their peers quite envious. Boie wrote to Naumann: "At the moment Kuhl is receiving money from the Dutch Government, to last for a year from Michaelmas, so that he can go to Paris and London and then leave for the East Indies—lucky man! If only Heaven will preserve his cheerfulness and his health his name will be eternally celebrated!"[57] Alas, Heaven did not, and Kuhl died after only nine months in Java.

By Royal Decree, Kuhl, Van Hasselt, the artist Gerrit Laurentius Keultjes and the taxidermist and illustrator Gerrit van Raalten became officially the first four members of the Natuurkundige Commissie voor Nederlands Indië in May 1819. The royal decree stated that, after Reinwardt's return, the King "wished to promote more and more the knowledge of the natural composition of the products of our possessions in the East Indies," and accordingly, Kuhl and Van Hasselt were "to expand the scientific knowledge of the products of Nature in those countries."[58]

Compared with Reinwardt's instructions, this was deceptively simple. The Commission was not meant to succeed Reinwardt, nor to aid him in his duties. In fact, it was to succeed Horsfield, Diard and Leschenault de la Tour: it was conceived for the specific purpose of collecting, describing and studying the natural history of the Indies. The Royal Decree clearly instructed that all collected material should be deposited in 's Rijks Museum, the creation of which had already been decided, although it had not yet been established (in July, Temminck and Falck were still discussing the terms).[59]

The museum finally came into being in August 1820, less than four months after the Commission was instituted. Although the explorers were employed by the minister of Public Education, National Industry and Colonies—and the material was collected under his management—Temminck from the very beginning played a decisive role in all the events, including the instructions given to the naturalists, their appointments and the policies regarding the Commission. He steered it, as far as he could, making it an instrument for the museum and for the practice of systematics—at least, during its first decade. But the material from the commission, the specimens as well as the manuscripts, arrived in the Netherlands only intermittently and with great difficulties, as material was lost in shipwrecks and often shipped with years, even decades, of delay.[60] Most naturalists kept their field notes in Java and passed them on to their successors. But Java was not a safe place for precious manuscripts. Aware of this, the governor-general at the

[57] Heinrich Boie to Naumann, 6 March 1819; Naumann-Museum Archives; Stresemann and Thomsen, "Ornithologen-Briefe aus den Jahren 1816 bis 1820," 15; translated in Stresemann, *Ornithology from Aristotle to the Present*, 128.

[58] Royal Decree no. 10, 2 May 1820, NL-HaNA, Rijksmuseum van Natuurlijke Historie te Leiden (RMNH), nummer toegang 3.12.17, inv.nr. 1; Veth, "Overzicht van hetgeen," 21.

[59] Royal Decree nr 10, 2 May 1820, NL-HaNA, RMNH, 3.12.17, inv.nr. 1.

[60] Greshoff, "Kuhl en Van Hasselt," 86; Veth, "Overzicht van hetgeen," chap. 8.

time, Baron Godert A. Gerard Philip van der Capellen, ordered Van Raalten to make copies of Kuhl and Van Hasselt's field notes and drawings. These copies also remained in Java and were only found in 1838 when the house where Diard had lived was demolished, more than fifteen years after Van Hasselt's death.[61] The specimens, on the other hand, had been sent to Temminck, but arrived at the Leiden museum with hardly any accompanying written information.

In 1827, in order to centralize the management of the whole enterprise, a second Commission was established. The minister appointed Carl Ludwig Blume, who had been Reinwardt's student, Reinwardt and Temminck as supervisors. Amongst other things, they were in charge of the appointments and travel schedules. More importantly, they should make sure that material was being shipped to the Netherlands on time, and, if the explorers were able to return home, the three gentlemen were to organize the publication of any discoveries they made.[62]

In view of the slow progress made in the 1820s in processing the materials from the Dutch East Indies, the three men instigated the publication of a work in which at least some of the results would be finally presented, aided by the curators of the Leiden museum. However, in order to accomplish this, they needed government support, which they received in the form of a Royal Decree no. 101, on February 10, 1839.[63] The decree made the work possible, but it also limited its range, determined the language in which it was to be written and put a limit to the available funds. So while the government funded this new enterprise, it also specified that it should consist of twenty-six parts, and no more.[64] Temminck was designated chief editor, while Reinwardt, Blume and zoologist Jan van der Hoeven became members of the editorial board. Both the funding available and the number of parts proved to be insufficient, so Temminck, with some creativity, managed to get three extra issues published on top of the planned twenty-six, naming them 24 *bis*, 24 *bis* continued, and 26 *bis*.[65] The full title became V*erhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen. Uitgegeven op last van den Koning door C. J. Temminck* (Dissertations on the Natural History of the Netherlands Overseas Possessions. Published by order of the King, by C. J. Temminck). It took nine years to complete the project. By 1844, three volumes had

[61] Greshoff, "Kuhl en Van Hasselt," 86.
[62] Veth, "Overzicht van hetgeen," 90-91.
[63] A. M. Husson and Lipke Bijdeley Holthuis, "The dates of publication of 'Verhandelingen over de natuurlijke Geschiedenis der Nederlandsche overzeesche Bezittingen' edited by C. J. Temminck," *Zoologische Mededelingen* 34, no. 2 (1955).
[64] Royal Decree no. 101, 10 February 1839, NL-HaNA, RMNH, 3.12.17, inv.nr. 1; Veth, "Overzicht van hetgeen," 72; Husson and Holthuis, "The dates of publication of 'Verhandelingen'," 18.
[65] Royal Decree no. 57, 15 April 1843, NL-HaNA, RMNH, 3.12.17, inv.nr. 1; Husson and Holthuis, "The dates of publication of 'Verhandelingen'," 20-21.

been published: *Zoologie* by Salomon Müller, Hermann Schlegel and Willem de Haan, *Botanie* by Pieter Willem Korthals, and *Land- en Volkenkunde* by Salomon Müller (dealing with geography and ethnography). In all, the twenty-nine issues appeared between 1839 and 1847.

Although the Natuurkundige Commissie had been founded independently from 's Rijks Museum and fell directly under government control, its budget, the training of its members and the reports of its progress were in fact managed by Temminck, as appears from his annual reports of the museum addressed to the Ministry of Education, and after 1827, by the second commission. Nevertheless, once in Java, the explorers depended on the governor-general of the colonies, a post, it seems, not easy to hold for a long period of time. The first governor-general the commission encountered was Godert Alexander Gerard Philip van der Capellen, who after ten years in office was replaced in 1826 by Hendrik Merkus de Kock. Kock left after just a few months, and was succeeded by Leonard P. J. du Bus de Gisignies until 1830. The following governors lasted an average of three years in the post, with the exception of Jan Jacob Rochussen, who stayed for six years.

During the thirty years of activity of the commission, ten different governors succeeded each other, most of them in the post for less than four years, and each with his own views and different levels of influence. But then, the members of the commission themselves were on average on the job for even shorter periods of time. Most died in the field from disease, accident or even murder, resulting in an equally high rate of succession. The first party was one of the most unfortunate. Kuhl lasted only nine months in the tropics until he died of a liver infection, Keultjes followed him two days later and Van Hasselt died of dysentery two years after.[66] Van Raalten died in 1829 of tropical fevers, malaria took Boie after two years and Heinrich Christian Macklot, who proved more resistant to tropical diseases than his colleagues, traveled and worked for eight years until he was killed in a Chinese insurrection in Krawang, during which Macklot's and Boie's manuscripts were burned.[67] Either the young naturalists suffered from particularly weak constitutions or were ill-prepared for staying in the tropics. Some were simply unlucky. In any case, this relay race in the colonial government and in the commission led to many misunderstandings, and to lack of support, lack of money, and at some point, accommodation.[68] To complicate matters even more, war broke out. During the Java War (or the Diponegoro War, which raged between 1825 and 1830), things really became unpleasant for the colonial government, and the

[66] Klaver, *Inseparable Friends*; Veth, "Overzicht van hetgeen," chap. 3-4.
[67] Veth, "Overzicht van hetgeen," 56, 72.
[68] Sirks, "Indisch natuuronderzoek," chap. 4; Veth, "Overzicht van hetgeen," p. 3-13.

Natuurkundige Commissie was, understandably, relegated to a very low position in the scale of official priorities. Du Bus de Gisignies, who had taken over the post of governor-general in 1826, not only denied payment and facilities to the commission but even, at some point, advised its members to pack and go home.[69]

A decade after the commission's establishment, the colonial government began to interfere not only in the finances and practicalities of daily life, but also in the subjects it should be concerned with. In 1830, the Dutch botanist Pieter Willem Korthals was selected to be the next member. He had been employed in 's Rijks Herbarium, under the direction of Blume. After a long period of living and working in the Dutch East Indies, Blume possessed a huge plant collection, including many specimens from the commission.[70] The herbarium, located in Brussels, was established in 1829 at Blume's urging, who then donated his collection to the new institute. Korthals' appointment had much more to do with the colonial government's desire to better exploit Javanese resources than with the museum or the herbarium.

After the Java War, the Dutch government abandoned its liberal policies and with a new governor at the helm, Johannes van den Bosch, the colony had to become a more profitable—and more docile—dominion of the Dutch Empire. Among other things, a new cultivation system (*Cultuurstelsel*) was officially put into place, designed to increase the export of crops to Europe and with it, the economic profit for the Netherlands. Naturally, the colonial authorities were eager to evaluate the system's efficiency and to explore how to implement it in remote areas.[71] It is in this context that Korthals was appointed a member of the commission. Daniel Jacob van Ewijck, civil servant of Education, Art and Science at the Ministry of Home Affairs, interfered by providing direct instructions for Korthals.[72] He conveyed in no uncertain terms that Korthals' botanical work should not be concerned solely with systematic research:

> His botanical investigations shall not, in any way, be restricted to the description of their morphology, nor to the determination and distinction of genera and species of plants, but, as Mr. Korthals' mission is meant to be of immediate use for the region, for the Netherlands, and for the relation between the two, they

[69] Heinrich Boie to Temminck, 11 November 1826, quoted in Veth, "Overzicht van hetgeen," 115.
[70] Smit, "Rijksherbarium," 5-11; Weber, "Hybrid Ambitions," 195-200.
[71] Maarten Manse, "Kennis is macht: de veelzijdige expedities van botanicus Pieter Willem Korthals (1807–1892)," *Studium* 6, no. 1 (2013): 42; H. W. van den Doel, *Het rijk van Insulinde. Opkomst en ondergang van een Nederlandse kolonie* (Amsterdam: Prometheus, 1996), 48-50.
[72] Daniel J. van Ewijck to Temminck, 20 Augustus 1830, NL-HaNA, RMNH, 3.12.17, inv.nr. 4; Dreier, "Voor Museum en Vaderland," 56.

> shall have as their goal to achieve a more general, useful and fruitful knowledge of plants. [73]

Not a word about the museum, the herbarium or their collections. Not surprisingly, Temminck resented this. Amongst Temminck's papers there is a bundle of seven pages with his thoughts and questions on these instructions, and he was clearly not pleased about the meddling of the colonial government. He scribbled: "Why is Korthals not allowed to work according to his instructions? Why are his reports concerning Economy or Agriculture still unanswered? Why the deliberate burden to engage in anything other than collecting? Are [they] to be of service to the Indian Government?"[74]

Towards 1830, things began to change. All the setbacks, loss of lives, lack of funds, and changes in the political stage had weakened the initial drive of the enterprise. The Natuurkundige Commissie as Temminck had envisioned it, in the spirit of the French and British earlier explorations of their colonies, was being transformed into an instrument for the colonial government, which was pushing it towards a role not unlike Reinwardt's in 1815 as Director of Agriculture, Arts and Science. Nonetheless, in its thirty years of activity, the Commission amassed a wealth of specimens, drawings, maps and field notes for the museum and the herbarium—and more than one headache for Temminck. Of the eighteen members of the Commission, only six survived. Infections, diseases, rhinoceroses, Chinese revolts... all took their toll. Specimens were lost in shipwrecks, manuscripts were burnt in disturbances, and most of the young men's ambitions were never realized. In 1850, the commission was dissolved.[75] The relation between colonial policies, the Natuurkundige Commissie, and the Leiden museum and its collections needs to be studied more in depth, but the material advanced here already suggests a growing tension between the colonial government's goals—mainly, to make the colonies as profitable as possible—and the museum's goals. Similarly, the situation concerning the native, Chinese and Dutch communities in Java (their role in the activities of the commission and their relation with the colonial government) are conspicuously absent from most official documents and manuscripts concerning the

[73] Van Ewijck to Temminck, 10 November 1830, NL-HaNA, RMNH, 3.12.17, inv.nr. 4; Dreier, "Voor Museum en Vaderland," 56.

[74] Temminck's notes, Naturalis Biodiversity Center Archives, Archive C. J. Temminck, NAT_ARC_TEM_00453.

[75] For more information on the Natuurkundige Commissie, see Fransen, Holthuis, and Adema, "Type-catalogue of Decapod Crustacea," app. II; Gerlof Fokko Mees, "Vogelkundig onderzoek op Nieuw-Guinea in 1828. Terugblik op de ornithologische resultaten van de reis van Zr. Ms. Korvet Triton naar de zuid-west kust van Nieuw-Guinea," *Zoologische Bijdragen* 40, no. 1-64 (1994); Mörzer Bruyns, *Met de Triton en Iris naar de zuidwestkust van Nieuw Guinea*; Sirks, "Indisch natuuronderzoek," chap. 4; Stresemann, *Ornithology from Aristotle to the Present*, chap. 8; Veth, "Overzicht van hetgeen," p. 3-13.

commission and the Leiden museum. But then again, a more comprehensive history of the Natuurkundige Commissie has yet to be written.

FIGURE 3.2. Original drawing by Gerrit van Raalten, made between 1820 and 1823 in Timor.

Temminck's directorate

The relatively short period between 1815 and 1820 had been a critical and agitated one for Temminck, but once the museum had been established things seemed to settle down for a few years. But his bliss was short-lived. Soon, an economic crisis and a change in policy slowed down the growth of 's Rijks Museum and as a result it hindered Temminck's work, that of his curators, and the advance and status of systematics in the Netherlands. A shift in the priorities of the government translated immediately into a lack of funds for the museum, and it threatened the status and even the *raison d'être* of both the museum and systematics. Similarly, the awkward relation between the museum and Leiden University did not particularly help the museum. From the very beginning and despite the fact that the royal decree of August 1820 stated that the museum was to be part of Leiden University and that it was chiefly meant for

educational purposes, Temminck soon found ways to bypass or even ignore these restrictions. He now finally had the prestige, means and collections at his disposal to put natural history collections into the service of systematics, but his stiff opposition to letting third parties into the museum management did nothing but isolate 's Rijks Museum. In fact, little had changed in Temminck's big picture since 1814: his goals and ambitions for the museum and his focus on the collection as a means to practice systematics remained the same. His directorship reflected his views on science in general, on systematics in particular, and was inevitably intertwined with the struggles of national politics. Temminck's directorate is best understood when all three of these factors are considered.

After its establishment, the museum was housed at the Hof van Zessen, between the Rapenburg and the Papengracht in Leiden, sharing space with the Museum of Antiquities and the Physisch Cabinet. Part of the Stadholder's collection was already there (brought back from Paris to the Netherlands by Brugmans), as well as other collections from the Museum of Antiquities. Despite Temminck's continuous complaints to the Ministry about the lack of space and the inadequacy of the building, it took eighty-five years and two consecutive directors for 's Rijks Museum to have its own building, in the Raamsteeg, which opened in 1905. Even Temminck's private collection remained in his house in Amsterdam for a decade, and after that, it remained unpacked in the cellar of the building at the Hof van Zessen. It was Temminck's way of pushing the Ministry to give the museum more space, but it did, understandably, irritate Falck.[76] But the museum expanded and the buildings became crammed and insufficient. When the collections outgrew the building, a series of renovations and expansions took place between 1824 and 1855. A second floor was added and a whole row of houses were bought and demolished to make place for a new wing to house the collections. Temminck's magnificent collection of birds did not find a place to his satisfaction in the museum until 1838.[77]

The collection remained in the now expanded Hof van Zessen, open to the public on Mondays and Wednesdays between eleven 'o clock in the morning till two in the afternoon. Judging from an advertisement in the newspapers for the opening of the museum to the general public, Temminck thought it was too early and too inconvenient to let the public in. The note in the paper read: "The Director of 's Rijks Museum van Natuurlijk Historie in Leijden, announces that, although the galleries are not yet

[76] Colenbrander, *Gedenkschriften van Anton Reinhardt Falck*, 227.

[77] Gijzen, " 's Rijks museum," 249-56; C. J. Kortenbach, "Het Hof van Zessen, thans Rijksmuseum van Oudheden," *Jaarboekje van de Historische Vereniging Oud Leiden* 37 (1945); Susanna, "Levensschets van Temminck," 58.

completed, and that not all the objects in store can be displayed, those who wish to visit it *in this condition* will be given the opportunity, and entrance tickets will be available at the Papengracht."[78] The advertisement suggests that Temminck had a very clear image of what made a museum "complete" and when a museum was ready for opening to the public.

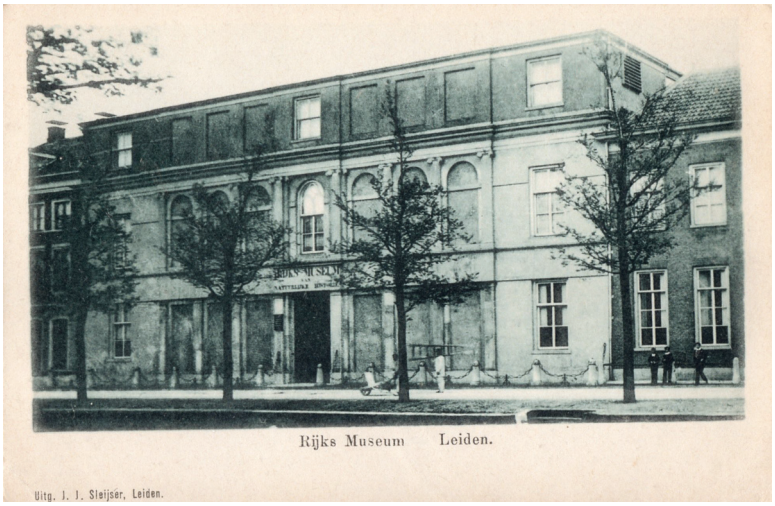

FIGURE 3.3. 's Rijks Museum van Natuurlijke Historie in the Hof van Zessen, Rapenburg, Leiden, ca. 1898.

*** De DIRECTEUR van 's RIJKS MUSEUM van NATUURLIJKE HISTORIE te LEIJDEN, adverteert bij deze, dat, hoezeer de galerijen nog niet zijn voltooid, en al de voorhanden zijnde voorwerpen niet kunnen geplaatst worden, er echter, aan diegenen, welke verlangen mogten hetzelve *in dien staat* te bezigtigen, daartoe gelegenheid zal worden verschaft, door het afgeven van toegangbilletten, welke te bekomen zijn op de Papengracht, wijk IV, n°. 366, binnen deze stad.

De dagen ter bezigtiging van het Museum zullen zijn *Maandag* en *Woensdag*, des voormiddags van 11 tot 2 uren, doch op andere, als ook op *Zon-* en *Feestdagen*, zal er geen toegang tot hetzelve verleend worden.

Leyden, den 2 Mei 1822. *De Directeur voornoemd*, J. C. TEMMINCK.

FIGURE 3.4. Advertisement of the opening of 's Rijks Museum for the general public, published in 's *Gravenhaagsche Courant* on May, 5, 1822.

[78] Coenraad Jacob Temminck, "Van de Directeur van 's Rijks Museum," 's *Gravenhaagsche Courant*, May 5 1822.

In any case, by 1822 ’s Rijks Museum was not yet ready and Temminck preferred to make this clear to the public, so that they would not come to visit with all too high expectations. Interested and curious naturalists were, on the other hand, most welcome to work in the collections, at any time.[79] In contrast, students from Leiden University could get access to the museum’s collections only after obtaining a ticket from the museum administrator. They could visit the museum four days a week, three hours a day. Fortunately, students had access to the anatomical collection of the university every day except Sundays, at any time without announcing themselves first.[80]

The royal decree of 1819 did not regulate the organization of the museum—it only appointed its director. The scientific and technical staff were therefore selected by Temminck and later approved by the Board of Trustees of the University. Temminck surrounded himself with like-minded naturalists. The administration of ’s Rijks Museum was entrusted to Leonardus Franciscus Thijssen, who had travelled to Paris with Brugmans to reclaim the Stadholder’s cabinet. Thijssen passed away in Augustus 1824 and was succeeded by his friend, Joannes Andreas Susanna, a clerk at the Leiden Court.[81] He worked at the museum with Temminck for thirty-three years. The museum records and correspondence suggest that Susanna was an influential figure. Susanna took the helm every time Temminck travelled abroad, and during the last years of his life, Temminck asked Susanna and the curator of vertebrates, Hermann Schlegel to act as directors of the museum. Susanna’s life was strongly entwined with the museum: he married Thijssen’s widow and one of his daughters married the museum curator Jan Adrianus Herklots.[82]

The scientific staff was organized in three departments: Vertebrates, Invertebrates, and Mineralogy (without the fossils, as those were regarded as zoological objects). After more than twenty years, a department of Entomology was added. Each of the departments was led by a curator, who was assisted by technical staff. The scientific staff consisted of men Temminck had personally met or men recommended to him by his acquaintances. The curation of the department of Vertebrates was entrusted to Heinrich Boie, Temminck’s correspondent ever since Boie had published some sharp remarks on the *Manuel d’ornithologie*. Boie left his post at the zoological collection of the

[79] Vrolik, “Levensbericht van Coenraad Jacob Temminck,” 75.
[80] Hieke Huistra, "Preparations on the Move: the Leiden Anatomical Collections in the Nineteenth Century." (PhD dissertation, Leiden University, 2013), 17.
[81] Most of the following details of the administration of the Rijks Museum under Temminck’s directorship can be found in Gijzen, “ ’s Rijks museum”; and Holthuis, *Rijksmuseum*. Biographical details of the staff members of the Leiden Museum can be found in Holthuis, *Rijksmuseum,* 18-38.
[82] Holthuis, *Rijksmuseum*, 26.

University of Heidelberg to come to Leiden. Working at 's Rijks Museum was apparently a very appealing prospect for a young zoologist.[83]

The collection of vertebrates was the most impressive of all, and the biggest. Besides the mounted specimens, it also contained a substantial collection of skulls and skeletons. Reinforcements came in 1822: Heinrich Christian Macklot was appointed curator of the osteological collection, which had grown dramatically in just two years.[84] Of German origin, Macklot was trained as a pharmacist and had also studied physics and medicine from 1818 to 1822 in Heidelberg, Boie's *alma mater*, where he obtained his doctorate in 1822. He came to Leiden on Boie's recommendation.[85] With Macklot, the department of Vertebrates included two curators, but only for a very short period of time. Both Boie and Macklot were appointed members of the Natuurkundige Commissie in 1823, so that Temminck had to look for replacements once more. He turned to his network of acquaintances and colleagues. The director of the Naturhistorisches Museum in Vienna, Carl Freiherr von Schreiber, had a suggestion for him: the amateur naturalist and bird-lover Hermann Schlegel. He had been in contact with—and learning from—ornithologists Christian Ludwig Brehm and Johann F. Naumann for years. By the time Temminck wrote to Schreiber looking for an assistant to replace Boie, Schlegel had been working at the Vienna museum for a year.[86] Satisfied with Schlegel's references, Temminck appointed him curator of the Vertebrate department in 1825. He eventually became Temminck's successor as director of 's Rijks Museum in 1858. Schlegel was the only member of Temminck's curatorial staff without an university degree.

The Invertebrate collection remained without a captain until 1823, when Temminck succeeded in creating a much needed position for a curator.[87] For the post, he chose Jan van der Hoeven, a young naturalist with a doctorate from Leiden University. His dissertation bore the promising title *Dissertatio philosophica inauguralis de sceleto piscium*. In the end, Van der Hoeven's appointment proved to be a misstep. He left the museum after only one year to study medicine. A versatile and accomplished man, Van der Hoeven worked on comparative anatomy, medicine, entomology, anthropology,

[83] Joannes Andreas Susanna, *Levensschets van Hendrik Boie, en hulde aan zijne deugden en verdiensten, benevens eenige door hem geschrevene brieven, gedurende zijne reis en verblijf in Oost-Indië* (Amsterdam: P. Meijer Warnars, 1834).

[84] Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 29 Augustus 1822, Naturalis Biodiversity Center Archives, Jaarverslagen.

[85] Holthuis, *Rijksmuseum*, 29.

[86] Gustav Schlegel, "Levensschets van Hermann Schlegel," *Jaarboek Koninklijke Akademie Wetenschappen*, 1884, 539–40.

[87] Holthuis, *Rijksmuseum van Natuurlijke Historie 1820-1958*, 29.

education and even politics.[88] He would become a professor at the University of Leiden in 1826, and became Reinwardt's colleague.

Temminck found a replacement for Van der Hoeven in the paleontologist Willem de Haan, also with doctorate from Leiden University, who would quickly become an authority on insects and crustaceans. Unfortunately, a spinal disease left him partially paralyzed and he had to retire in 1846. Jan Adrianus Herklots (Susanna's son-in-law) took over the invertebrates department. He was also a former student from Leiden University, and had written a thesis on the crustaceans from the African Gold Coast.

The realm of insects, at the time also coming under the invertebrate department, was first taken care of by Anthony Johannes d'Ailly, the chemist from Amsterdam who had assisted at 's Lands Kabinet and continued to do so at 's Rijks Museum, but without being officially appointed as curator. In 1854, a separate department for Entomology was established. The curator for the new department did not have a university degree in science, but in law.[89] Samuel Constantinus Snellen van Vollenhoven was a lawyer by occupation and an entomologist by avocation, and an excellent one at that. A frequent visitor to 's Rijks Museum's insect collection, Snellen van Vollenhoven was the president of the Dutch Entomological Society and the founder of the Society's journal, dedicated exclusively to insects: the *Tijdschrift voor Entomologie*. An excellent draftsman, he also provided many of the beautiful illustrations included in the journal. By the time he was appointed curator, his name was already very well-known in the entomological world—and it still is.[90]

Paulus Godfried van Hoorn (Brugman's former assistant director at the Leiden University cabinet) settled for a position as curator of Mineralogy. He did so grudgingly, however. He had unsuccessfully contended for the directorship of the museum, and after his appointment as curator he was nowhere to be seen for weeks at a time. He was finally—and rather shamefully—forced to resign in 1837. He was replaced by Elte Martens Beima, an astronomer with a degree from Leiden University.

The technical staff was chosen by Temminck too, as carefully as he chose the curators. Cornelius Overdijk prepared the invertebrates, supervised by De Haan, until he too was appointed member of the Natuurkundige Commissie in 1838. Oddly, it

[88] See, for example, Bert Theunissen, "Biologie en Bildung: Jan van der Hoeven (1802–1868)," *Gewina* 21 (1998); Bert Theunissen, *'Nut en nog eens nut': wetenschapsbeelden van Nederlandse natuuronderzoekers, 1800–1900* (Hilversum: Verloren, 2000), chap. 2.

[89] Temminck rewarded d'Ailly for his efforts and assistance with a gift, a collection of insects from Java made of duplicates from the Leiden collection (Holthuis, *Rijksmuseum*, 31).

[90] Jan Krikken, Cees van Achterberg, Piet H. van Doesburg et al., "Samuel Constant Snellen van Vollenhoven (1816–1880) and his Entomological Work," *Tijdschrift voor Entomologie* 124 (1981); Menno Schilthuizen, "Early Entomological Art: The Colour Plates of Snellen van Vollenhoven," *Tijdschrift voor Entomologie* 150, no. 2 (2007).

seems he was not replaced until much later. The museum also benefitted from the craftsmanship of Hendrik Verstraten, who took care of the osteological preparations, and of the taxidermist Jacobus Thomas ter Meer. He had learned the art from his father, Hermanus Hendrikus ter Meer, an adaptable man who besides making mechanical puppets, also worked as an art teacher, firefighter and watchman in Leiden, doing some taxidermy work on the side. There are a few specimens prepared by him in the Leiden museum collection, including a mandrill and a few baboon species.[91] His son Jacobus was truly gifted. So much so, that he soon forged himself quite a reputation, with lifelike mounts of birds and mammals. He worked for fifty seven years for 's Rijks Museum and passed his artistic and technical knowledge on to his sons Franciscus Hendrikus and Hermanus Hendrikus, both also employed at the Leiden museum for decades. Hermanus Hendrikus, in turn, taught the art of taxidermy to his son Herman Hendrik ter Meer, who became one of the best in his trade. Herman left the Leiden museum in 1907 to work at the Zoologisches Institut of the University of Leipzig, frustrated because only a handful of his excellent products were ever seen on display by the general public.[92]

For Temminck, aesthetics was pleasing, but quality was critical. We know that Temminck was an expert taxidermist himself. He had learned the techniques first from Levaillant and from Naumann (his friend and author of a well-known manual on taxidermy) and had later, by experimentation, constantly refined the way specimens were mounted.[93] He even developed a new way to mount fish, which were traditionally clean ed through a cut in their belly. This procedure damaged the underside of the fish and its fins, important for classification. Temminck proposed to cut the fish on one side only, from head to tail, gutted and mounted so that one side and the ventral aspect remained intact. The procedure became known as "Temminck's method."[94]

Life-like mounts, however gratifying, were not meant to please the eye, but to preserve the main characteristics needed to classify the animal. In 1829, Temminck

[91] J. A. M. A. Grondhout, "De Ter Meer's," *Jaarboekje voor Geschiedenis en Oudheidkunde van Leiden en Rijnland* 9 (1912).

[92] R. W. Shufeldt, "Taxidermical Methods in the Leyden Museum, Holland," *Report of the U.S. National Museum for 1895* (1897); Hans Völkel, *Herman H. ter Meer. Ein Leben als Dermoplastiker und Kuñstler* (Leipzig: Leipziger Universitätsverlag, 2004).

[93] Johann Friedrich Naumann, *Taxidermie, oder, Die Lehre Thiere aller Klassen am einfachsten und zweckmässigsten für Kabinette auszustopfen und aufzubewahren* (Halle: Hemmerde und Schwetschke, 1815).

[94] Coenraad Jacob Temminck, *Voorschrift, hoedanig te handelen met voorwerpen van Natuurlijke Historie, ten einde dezelve behoorlijk te verzenden en voor bederf te bewaren: ten gebruike van het 's Rijks Museum van Natuurlijke Historie te Leyden* (Leiden: printed by the author, 1825), 13; see also Gijzen, " 's Rijks museum," 195.

FIGURE 3.5. An example of Temminck's method to prepare fish: cut at one side, head to tail.

reported to the Ministry of Home Affairs how the museum staff were making progress in the art of taxidermy. The Ter Meers had stopped stuffing the skins with hay and hemp, and started making mannequins of wood or bundles of tied-up hay that mimicked the original form of the animal in question, making a frame over which the skin was stretched. This was no trivial matter. These were the first steps towards the development of the modern technique known as *dermoplasty*, which involves making a customized frame that is exactly the right size and form to shape the animal skin. One of the first wooden models of Ter Meer made the news: in November 1835, the newspapers reported that the museum had a *charpente* ready for the recently acquired skin of an African elephant. Temminck was so pleased with the model that it was exhibited for the general public, as proof of the extraordinary proficiency of the museum's first taxidermist, Jacob ter Meer.[95] These advances in taxidermy were important for the museum and for systematics, and Temminck therefore reported them to the Ministry of Home Affairs:

> Because of this [use of wooden models], one can better restore the natural shape of the animal; every superficial muscle and bone can be made visible and, furthermore, in this way it is not necessary to pierce the skin; as the skin can be

[95] Coenraad Jacob Temminck, "Nieuwstijdingen. Nederland," *Middelburgsche Courant*, November 7, 1835; Coenraad Jacob Temminck, "Binnenlandsche berigten. 's Gravenhage, den 3den November," *Nederlandsche Staatscourant*, November 4, 1835.

> wrapped like a robe around the accurately built shape. The splendid final result justifies all the effort that goes into this process.[96]

Temminck kept the talented Ter Meers—four generations of them—employed at the museum, not to please the visiting public, but mainly because their excellent mounts facilitated the morphological study of the specimens, so vital for systematics.

In short, Temminck made sure the museum was full of capable people, all with a keen interest in the collections under their care, in natural history and particularly, in systematics. Remarkably enough, eight of his nine curators had studied at a university, six of them had a Doctor of Philosophy degree, and almost half of his crew had studied at Leiden University. Susannah Gibson points out that anyone interested in pursuing a career in natural history in the period 1790–1830 had either a medical degree, enough wealth to own his own cabinet, or became a collector and dealer of natural specimens.[97] Indeed, two curators had a degree in medicine and five of them had a doctorate in natural sciences. Two of Temminck's curators had been plucked from German institutes: Boie from the Heidelberg University Museum and Schlegel from the Naturhistorisches Museum in Vienna. In the end, the most productive of them became members of the Natuurkundige Commissie (Boie and Macklot) or remained at the museum until the end of their careers—or their lives, whichever came first: Beima, Schlegel, De Haan, Herklots and Snellen van Vollenhoven. All of them ended up specializing in systematics, except Beima, naturally, as he was in charge of the geological collections. Nevertheless, as the collection grew, the technical staff grew accordingly.

By 1830 no fewer than eight taxidermists and technical assistants were employed, feverishly working on the material sent to Leiden from all corners of the world. After all, Temminck's main goal as director was to boost 's Rijks Museum into one of the most important museums in Europe in the shortest possible time, and at the lowest cost.[98] This short-term objective was, actually, nothing more than an extension of what he had been doing for his own private cabinet ever since he inherited it from his father around 1800. In the long run, however, Temminck was itching to work on his own projects, the second edition of his *Manuel d'ornithologie* and the *Nouveau recueil*. He therefore made sure of having a team around him of men he trusted to take care of the collections and to publish as many discoveries as possible. Temminck proved up to the challenge, and 's Rijks Museum van Natuurlijke Historie soon enjoyed great prestige in Europe.

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[96] Temminck, Report to the Ministry of Home Affairs, 10 May 1829, Naturalis Biodiversity Center Archives, Jaarverslagen, no. 8/341.
[97] Gibson, "Careering Naturalists," 210-211.
[98] Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 29 Augustus 1822, Naturalis Biodiversity Center Archives, Jaarverslagen.

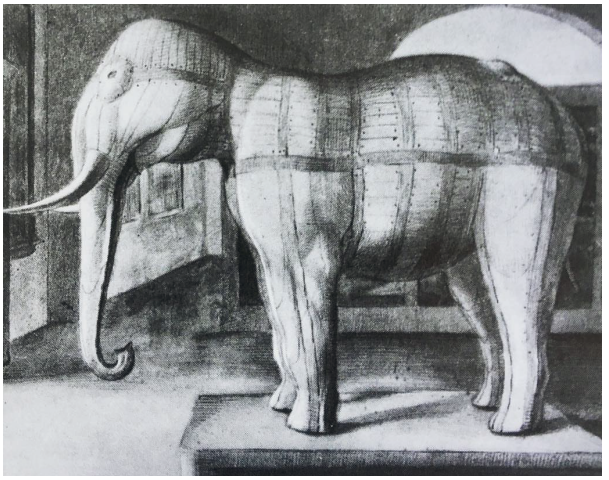

FIGURE 3.6. Jacob ter Meer's wooden frame or *charpente* for an African elephant skin, exhibited in the Leiden museum in 1835.

FIGURE 3.7. *Left*: The African elephant prepared by Jacob ter Meer in 1835. *Right*: Detail of the wooden frame underneath the skin, as seen from a hole in the elephant's belly. The panel now inside the specimen was probably accompanying the *charpente* while on dispay and placed inside it afterwards, before the elephant's skin was mounted.

The growth of the collection was an immediate concern for Temminck. The first annual reports he wrote to the Ministry reflect his constant preoccupation with acquisition. It made sense in the context of the political reasons for the establishment of the museum: putting the Netherlands on the European map and competing with museums like those in London and Paris. But also, advances in natural history and especially in systematics depended directly on the natural history collections. For these two reasons, increasing the quantity and quality of the collections was the very first item on Temminck's to-do list. Besides, 's Rijks Museum was required to fill the cabinets of the universities and academies, which increased the need for acquiring more specimens. In order to do this, Temminck divided the collection into two lots: one for the museum and one with duplicates for the universities and for exchange with other institutes.

Temminck diligently reported to the Ministry on the acquisitions for the universities in Utrecht, Groningen, Ghent, Liège and Leuven, even though he had received limited financial means to do so.[99] The museum was to keep the newly discovered species and those that were needed to fill gaps in the museum series, while the academic collections received objects that represented the "higher divisions" and the known genera.[100] This arrangement was a direct reflection of Temminck's conception of the different collections, and it suggests that universities were mostly concerned with the main groupings of organisms (that is, with studying fundamental body plans), while the museum was the place to study the whole natural system, its variations, its general organization and the arrangement of the species. Therefore, ensuring the growth of the collection became Temminck's main task. And he certainly succeeded.

Most of the material pouring in was sent from the colonies by Reinwardt and the Natuurkundige Commissie, but Temminck also needed specimens from other parts of the world. Thus as soon as he took office, he put everyone to work. He relied on two sources: other institutes and individual collectors. He even asked the Ministry to instruct anyone abroad in service of the government to collect for the museum: ship commanders, medical officers, anyone posted to interesting places like Japan, Makassar or China. They were to be paid according to the value of the collected objects—very much like his father had done in the old VOC times.[101] But Temminck did not remain idle while leaving it to the government to put civil servants at work. Besides keeping an eye on the Natuurkundige Commissie, he actively corresponded with anyone willing to

[99] Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 1 Augustus 1821, Naturalis Biodiversity Center Archives, Jaarverslagen.
[100] Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 1 Augustus 1821, Naturalis Biodiversity Center Archives, Jaarverslagen.
[101] Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 29 Augustus 1822, Naturalis Biodiversity Center Archives, Jaarverslagen.

shoot, stab, skin, pin, put in jars and otherwise kill and preserve specimens for the Leiden museum.

In order to ensure the quality of the specimens, and to guide those who had the spirit but not the knowledge, Temminck wrote a short manual on taxidermy and preservation, focusing mostly on the techniques needed to transport specimens and prevent them from decaying. These were not instructions for aesthetically pleasing displays. The booklet was small and could easily fit into a pocket or travel-bag, and its title left no room for mistake: "Instructions on how to handle Natural History objects, with the purpose of sending them and preserving them from decay: for the benefit of 's Rijks Museum van Natuurlijke Historie in Leiden." In twenty-seven pages, Temminck summarized the basic techniques for the preservation of any kind of natural object, from mammals to worms, and even gave directions regarding the desired size of minerals. The closing remarks noted: "It is always useful in science to have more than one natural history specimen; moreover, all well-preserved objects are of equal importance for the museum's collection, independently of their degree of beauty of color or shape."[102] Knowing Temminck's policy of relegating the less perfect or complete specimens for didactic collections, this curious final remark may have been meant to make sure that *all* available specimens were sent to Leiden, leaving the final judgement of their scientific value to him. After all, the chances that an ugly or discolored tropical fish, for example, might be new to science were reasonably high.

Soon, Temminck had an extensive and occasionally distinguished network of collectors at his disposal. It included merchants, medical doctors like Philipp Franz von Siebold in Japan or Hubertus Benedictus van Horstok in South Africa, pharmacists like Hendrik Haagen Dieperink in Surinam, civil servants like Hendrik Severinus Pel in Ghana, and even consuls, like Samuel Willem Ruyssenaers in Egypt or Reinhard Frans Cornelis van Lansberge in Venezuela.[103] Temminck never missed a chance to direct these men's efforts towards his own goals and interests. Pel, for example, had started working for Temminck in 1832 as a thirteen-year old boy, at the taxidermy department of the musem. Temminck, knowing of Pel's desire to travel, requested the minister to send the boy along with an expedition to Ashanti (nowadays a region in Ghana) planned for 1839. The petition was rejected, possibly in the light of the death-toll the expeditions to the Dutch East Indies were taking and the inflammable political situation in the region. But Temminck and Pel insisted, and devised a way to allow Pel to travel to West Africa. He was finally sent to St. George d'Elmina in 1840, partly to fulfill his job as a civil

[102] Temminck, *Voorschrift*, 28.
[103] Temminck, Report to the Ministry of Home Affairs, 26 November 1851, Naturalis Biodiversity Center Archives, Jaarverslagen, no. 37/409; Gijzen, " 's Rijks museum," 97-114.

servant (working on the lucrative slave and gold trades), and partly to collect for the museum.[104]

These are just a few examples of Temminck's legion of contacts. Agatha Gijzen listed over four hundred correspondents with the Leiden museum's director and the curators during Temminck's directorship. Most of them sold or exchanged specimens and a few of them only provided information and scientific facts. The list is not exhaustive, but is does give an impression of the museum's long tentacles around the globe.[105] There are few records of local collectors working for the Leiden museum, and although the Natuurkundige Commissie did have local helpers, hunters and assistants, they were almost never mentioned in their field notes or letters by name. Korthals' diaries, however, were different. He recorded details of the villages, their inhabitants, their customs and administration systems, and did note the names of those who travelled with him and assisted him.[106] Whether this was the result of his instructions or of an idiosyncrasy on his part, is by now unclear.

Occasionally, professional dealers got news of Temminck's hunt for specimens, and seeing a chance for their business to expand, they contacted him directly to offer their services. There are records of a particularly avid collector, Joachim Brehm, a pharmacist stationed at the Cape of Good Hope, approaching Temminck for a transaction. Brehm had a botanical garden in Uitenhage, collected plants and carried out experiments on their medicinal properties.[107] When he heard of Temminck's wish-list from a certain Mr. Kachelhoff, also living in the Cape of Good Hope and already sending material to 's Rijks Museum, he wrote to Temminck informing him that he was able to provide some of the specimens on that list. Brehm asked for the price Temminck normally paid for "Birds, four-legged Animals, Insects, Butterflies, fishes and snakes, and perhaps also Flower seeds and dried Plants."[108] The collector already had some specimens ready and nicely prepared: the birds were treated with arsenic soap, the four-legged animals with "grass and salt," snakes placed in spirit and butterflies pinned or papered. Brehm made sure to mention that he also had a lion, the head of a sea cow, and soon, he would also have a young elephant available.[109] That was an offer Temminck could not resist and so

[104] Lipke Bijdeley Holthuis, "Biografische notities betreffende verzamelaars voor het Rijksmuseum van Natuurlijke Historie te Leiden. I. Hendrik Severinus Pel (1818–1876)," *Zoologische Bijdragen* 10, no. 1 (1968).
[105] Gijzen, " 's Rijks museum," 300-05.
[106] Manse, "Kennis is macht," 46.
[107] Hugh F. Glen and Gerrit Germishuizen, "Brehm, Joachim," in *Botanical Exploration of Southern Africa*, 2 ed. (Pretoria: South African National Biodiversity Institute, 2010), 107-08.
[108] Joachim Brehm to Temminck, 15 October 1821, Naturalis Biodiversity Center Archives, Archive C. J. Temminck, NAT_ARC_TEM_00179.
[109] Brehm to Temminck, 15 October 1821, Naturalis Biodiversity Center Archives, Archive C. J. Temminck, NAT_ARC_TEM_00179.

it was that Brehm became one of the many museum's collectors, although he proved to be a rather unreliable one – his prices were often too high, and the quality too low.[110]

In addition to people who worked individually for him, such as Brehm and Pel, Temminck also acquired collections from professional dealers like the Deyrolle family (still going strong today), the firm of Frank in Lepzig and Amsterdam, or the Verreaux family. Sometimes, collections put up for sale at auctions or through other channels were interesting enough to set Temminck in motion. For any purchase, though, he needed to ask permission from the Board of Trustees and the Ministry, and more often than not, extra funds too, something that frustrated Temminck to no end, especially, when he received a negative answer while he was convinced of the value of the collection he happened to have his eye on. Occasionally, Temminck bought a collection without waiting for authorization, as he did in 1822 with the collection of the French naturalist Pierre Antoine Delalande (sometimes written as De Lalande, or De LaLande). Delalande had collected a large number of specimens while travelling in South Africa from 1818 until 1820, together with his nephew, Jules Verreaux, the oldest of the Verreaux brothers, who was only eleven years old when they set off.[111] Temminck simply went ahead and wrote to Theyssens: "While waiting for an answer, I have already bought and received the specimens, but do not speak to anyone about what has happened but to Boie."[112]

On the other hand, Temminck did not need the trustees' permission to exchange specimens, either with other museums, societies, universities and academies, or with private collectors. It was a cheap and convenient way to obtain whatever species he thought was missing, so exchange became the museum's main source of specimens. When scanning potential acquisitions, Temminck looked for quality, not just for quantity.[113] As we shall see, for his pursuit of a *natural system*—a zoological system arranged in such a manner that one could discern the general laws of nature from studying it—Temminck needed a global view of the diversity of animal species, and for that, he needed a collection as complete as possible, in the sense of covering the whole range of extant species. Although this hunt for missing specimens has often been portrayed—and ridiculed—as mere "stamp collecting," it was in fact a means to an

[110] Gijzen, " 's Rijks museum," 176.
[111] Miquel Molina, "More Notes on the Verreaux brothers," *Pula: Botswana Journal of African Studies* 16, no. 1 (2002): 31.
[112] Temminck to Leonardus F. Thijssen, 13 May 1822, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.
[113] Gijzen, " 's Rijks museum," 41.

end.[114] As we will see later on, it was Temminck's tool to answer the pressing issues of systematics at that time. The main source of this misinterpretation of Temminck's goals can be found in the account of his curator, and later successor, Hermann Schlegel. In his autobiography, published by his son Gustave, Schlegel bitterly accused Temminck of not having an eye for a scientifically assembled collection, picturing him as a collector of curiosities more than a systematist.[115] Stresemann accepted Schlegel's vision and incorporated it in his book *Die Entwicklung der Ornithologie* and, with that, it went into the annals of the history of ornithology.[116] Holthuis has repeatedly tried to dismantle this image, which is, as he succinctly put it, "a myth."[117]

Being responsible to both the Ministry and the Board of Trustees was for Temminck very tiresome. Every decision, from the purchase of new specimens to the appointment of new staff, the management of the museum and of the Natuurkundige Commissie, needed to be sanctioned by both. But in April 1822, Minister Falck signed a Royal Decree granting 's Rijks Museum the management of its own budget, effectively making it independent from the Leiden University budget and somewhat freeing Temminck's hand. He still had to report to the Ministry and the Board of Trustees, which always had the last say in the decision-making processes.[118] The reason for this break may very well have been Temminck's complaining—perhaps aided by his long friendship with Falck. At that point, however, Temminck was already acting quite autonomously and informed only Falck about his plans. He had appointed Macklot before informing the University, he planned to purchase a collection of African animals without permission and he had ordered new cabinets without informing the Trustees, for which he received a fairly mild letter from Falck inviting him to send his propositions to the trustees.[119] After 1823, Temminck stopped altogether sending his annual reports of the museum to the Board of Trustees and answered only to the minister.[120]

Temminck's opinion about the interference by third parties in the management of scientific institutions becomes very clear in his report to the Ministry over the year 1824.

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[114] For a discussion on the meaning of the phrase "stamp collecting" applied to natural history, see Kristin Johnson, "Natural History as Stamp Collecting: a Brief History," *Archives of Natural History* 34, no. 2 (2007).

[115] Schlegel, "Levensschets van Hermann Schlegel."

[116] Stresemann, *Ornithology from Aristotle to the Present*.

[117] Holthuis, "Dutch Authors of von Siebold's Fauna Japonica," 696-99; Holthuis, *Rijksmuseum*, 45-49.

[118] Royal Decree no. 110, 12 April 1821, NL-HaNA, RMNH 3.12.17, inv.nr. 1; Hans de Jonge, "Macht, machinaties en musea. Jan van der Hoeven, Hermann Schlegel en hun strijd om het Rijksmuseum van natuurlijke historie te Leiden," *Bijdragen en Mededelingen betreffende de Geschiedenis der Nederlanden* 120 (2005): 194.

[119] Falck to Temminck, 4 April 1822, NL-HaNA, RMNH 3.12.17, inv.nr. 1.

[120] Dreier, "Voor Museum en Vaderland," 85.

In it, Temminck lamented that the British, having expanded their empire as they had, had contributed so little to natural history:

> One should expect that the natural sciences in the British Kingdom would bring forth the most splendid results. But far from profiting from such a favorable period, during which they reigned over the seas, they have achieved nothing significant. Old crippled institutions, futile customs, inept people and useless societies enveloped in old privileges were always an obstacle, and are now still in place hindering good institutions. Nothing significant can be done and accomplished in England for the natural sciences, as long as an Archbishop of Canterbury, the Lord Mayor of London, and the Speaker of the House of Commons occupy the highest ranks at the British Museum; and the president of the Royal Society has the right to appoint a chemist as Director of the Zoology.[121]

He could not understand—it is almost as if he was offended by the fact—that the British Museum's trustees were politicians and ecclesiastics. Temminck was at least partly right, judging by a report of the trustees from 1823: "In short, the whole Zoological and Botanical department of the Museum is disgraceful to the nation, and very discreditable to the Trustees, to whose charge it has been consigned."[122] For Temminck, the situation across the Channel served him well in warning the Ministry of Home Affairs about what might happen if the management of zoological institutions, including the Natuurkundige Commissie, should be entrusted to the wrong persons.

What most affected Temminck's directorate was the economic crisis that sent the Netherlands into near bankruptcy, forcing the country to reshuffle its political and economic priorities. The financial problems started just a few years after the foundation of the Museum. The country's finances had been severely damaged by three simultaneous conflicts: the Java War between 1825 and 1830, the Dutch intervention in the Padri Wars in West Sumatra between 1821 and 1837, and the Belgian Revolution in 1830 and its nine-year aftermath. In the midst of these serious economic and territorial challenges, 's Rijks Museum suffered budgetary cuts, as did 's Rijks Herbarium and other scientific institutes. At the beginning of 1824, for example, the museum had already missed several payments, as Temminck complained in his most sarcastic style:

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[121] Temminck, Report to the Ministry of Home Affairs, 3 October 1824, Naturalis Biodiversity Center Archives, Jaarverslagen. Temminck referred to the three principal trustees of the British Museum: the Archbishop of Canterbury Dr. Charles Manners Sutton; the Lord Chancellor, or Lord Keeper, John Earl of Eldon and the Speaker of the House of Commons, a position also occupied by Charles Manners Sutton. The total number of Trustees was forty-one.

[122] Trustees of the British Museum, "Annual Report of the Trustees of the British Museum, 1822," *The Edinburgh Review or Critical Journal for Feb. 1823–May 1823* 38, no. 76, V (1823): 390.

> Why does the government always leave us in January, February and March without a penny? Do they believe that we, like wild […] animals, hibernate or live from our hoarded supplies like hamsters? No advances and no payments on time, fine housekeeping is that! Now, every man for himself.[123]

A few months later, when Macklot was preparing for his journey to Java as the newest member of the Natuurkundige Commissie, the government did not send the funds needed for equipment and supplies. Temminck decided to resolve this single-handedly, as he was used to do. He asked Macklot, in the face of the government's "indécision flegmatique," to acquire whatever equipment he thought he might need without waiting for approval, and offered to pay for it himself if the government failed to do so.[124]

The lean times had only just started. Despite the new wing to house the collections and the annual subsidies, the investments never seemed to keep up with the museum's growth. Temminck's annual report of 1825 is more a reckoning of the lack of funds than a report of activities. Although he kept the costs of acquisition of new specimens at a minimum by resorting to the exchange with other museums and private collectors, bills were piling up. The museum could not cover the costs of the staff, the smith, the carpenter, raw material like alcohol, labels, ink, heating and lighting. The most basic needs seemed to have become a luxury. The financial support from the Ministry was simply not enough to keep the museum running, let alone growing.[125] The situation never really changed much after 1825. From the mid-1820s to the end of Temminck's life, he was constantly struggling for funds. We find traces of his frustration in nearly all the documents related to the management of the museum from this period. For example, in 1826 Susanna explained that Temminck had been forced to economize by not buying any new material for the collection.[126]

To make matters worse, the 1840s brought a political change that made things really difficult for Temminck, and for that matter, for all museums in the Netherlands. The new difficulties were not just economical, for there was a palpable change in the attitude towards cultural and scientific institutions, partly fueled—or embodied—by the liberal minister of Home Affairs and later, prime minister, Johan Rudolph Thorbecke. This

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123 Temminck to Thijssen, 14 Februari 1824, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

124 Temminck to Heinrich C. Macklot, 14 July 1824, Naturalis Biodiversity Center Archives, Archive C. J. Temminck.

125 Temminck, Report to the Ministry of Home Affairs, 31 December 1825, Naturalis Biodiversity Center Archives, Jaarverslagen.

126 Johannes A. Susanna to Fr. Moldenhauer, n.d. [1826], Naturalis Biodiversity Center Archives, Archive C. J. Temminck, NAT_ARC_TEM_01975.

chapter of the history of the Leiden museum deserves a great deal more attention than it receives here, but for the moment, it can be very well summarized by Thorbecke's biting nicknames for 's Rijks Museum van Natuurlijke Historie and 's Rijks Herbarium, to which he referred as the "monkey house" and the "hayloft."[127] Thorbecke's view of the Leiden museum was nowhere near Temminck's "national monument." The annual subsidy from the government had shrunk from *f*5000 in 1830 to *f*3600 in 1850, and by then, the persistent financial drought had brought Temminck to the brink of a nervous breakdown:

> 's Rijks Museum van Natuurlijke Historie still splendidly maintains its well-earned fame, a fame magnified by the deterioration of similar institutes, even those of great empires. As long as Heaven gives me life and strength, I hope to spare from such a sad fate the object to which I have devoted all my time and diligence for more than thirty years, and I will succeed in that effort as long as my strength is reinforced by the protection and support of the Government, which I have enjoyed, as I gratefully acknowledge, to the present day, and which I will surely not lack in future under the strong direction of Your Excellency.[128]

Besides the headaches brought by the administration of the museum, Temminck faced another, more alarming problem: his hands started shaking. Around 1840, he suffered from tremors that made writing very difficult. In the spring of 1842 he wrote from Paris to his wife complaining about his shaking hands, the result of his sixty-four years, but celebrating his otherwise healthy body and mind.[129] Notwithstanding the optimistic note, his handwriting deteriorated further, until it was virtually illegible. He was forced to stop using ink and use pencils instead. In 1846, he sadly confessed his lack of strength and confidence to his friend Lichtenstein: "Work is not so quickly accomplished as it once was, and yet there are more things to do. One demands as much of oneself as before, but one does not satisfy these expectations as well as formerly. Many outlines for articles are lying about unfinished and will die off quietly."[130] But he was not yet ready to retire. In 1851, the ornithologist and nephew of Emperor Napoleon I, Charles Lucien Bonaparte complimented Temminck in the most charming way: "Telling you that I am working on the gallinaceous and water birds, equals telling you how much I am thinking of you, because, if you are the Papa (not the Pope) of all birds,

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[127] Schlegel, "Levensschets van Hermann Schlegel," 69.
[128] Temminck, Report to the Ministry of Home Affairs, 26 November 1851, Naturalis Biodiversity Center Archives, Jaarverslagen, no. 37/409.
[129] Temminck to Anna A. Smissaert, 2 April 1842. Temminck Family archives, A. M. van Lynden-de Bruïne private collection, no. 6.
[130] Temminck to Lichtenstein, 27 July 1846, Museum für Naturkunde Berlin Archives; translated in Stresemann, *Ornithology from Aristotle to the Present*, 150.

you are the Genius of the fowl and the gulls, whose cock-a-doodle-doos suffocate the Lafayettes, will carry us, you and me, hopefully, on the white wings of the latter down to the remotest posterity."[131] Temminck replied: "And long live the Gallinaceous birds, the pigeons and the water birds! They return an old man to the time of his youth, and rejuvenate me a quarter of a century."[132] Despite this rejuvenating effect, Temminck was well aware of his waning strength. He wrote to Prince Max von Wied-Neuwied in 1854, when he was seventy-six, that he felt he was a "veteran in the decline of his career, but one that still has hopes of dying weapon in hand."[133] In the summer of 1857, Temminck passed the scepter on to Schlegel and left the direction of the museum to both Schlegel and Susanna. Half a year later, on January, 30, 1858, Temminck passed away, a few weeks before turning eighty.[134]

Despite all the problems, drawbacks, arguments and disappointments, Temminck had achieved his main goal for the museum: to put the Netherlands on the map with an institute that could compete with those of other countries. Indeed, Temminck managed to build a collection that ranked amongst the best in Europe. As William Swainson put it in 1840: "The most celebrated [national museum] in the world is that of France: next may be ranked the museums of Berlin, Vienna, Holland, Bavaria, Denmark, and Florence."[135] Charles Bonaparte went even further:

> The superiority of the Leyden Museum over any other is unquestionable, not perhaps so much on account of its containing a greater number of species than those of London, Paris, Philadelphia and Berlin, but for the freshness and perfection of the specimens, for the quantity of skeletons, and above all for the never-sufficiently-praised series of individuals of the various species of both sexes, in different ages, and from different localities and countries, which facilitate one's judgement, and show at once in most cases, especially with Mammalia, what is or is not a good species.[136]

[131] Charles L. Bonaparte to Temminck, 8 January 1851. Temminck Family archives, A. M. van Lynden-de Bruïne private collection, no. 47; de Beaufort, "Coenraad Jacob Temminck, uit zijne brieven geschetst," 38.
[132] Bonaparte to Temminck, 8 January 1851. Temminck Family archives, A. M. van Lynden-de Bruïne private collection, no. 47.
[133] Temminck to Prins Max von Wied-Neuwied, March 1854. Temminck Family archives, A. M. van Lynden-de Bruïne private collection, no. 48.
[134] Susanna, "Levensschets van Temminck," 77.
[135] William Swainson, *Taxidermy, with the Biography of Zoologists and Notices of their Works*, The Cabinet Cyclopædia. Natural History (London: Longman, Orme, Brown, Green & Longmans, 1840), 73.
[136] Charles Lucien Bonaparte, "On the Lorine genus of Parrots, Eclectus, with the Description of a New Species, Eclectus Cornelia," *Proceedings of the Zoological Society of London* 17 (1849): 142-46.

This had been Temminck's goal all the way, at least, when it came to the quality and fame of its collections. The scientific output of the museum, on the other hand, has been a matter of debate ever since Schlegel succeeded Temminck as director.

FIGURE 3.8. Portrait van Coenraad Jacob Temminck (1778–1858), lithograph by Johannes Christiaan d'Arnaud Gerkens, 1856 or somewhat earlier (1850–1856).

The museum's scientific output

There has been quite some disagreement amongst historians and biographers concerning the scientific output of the museum during Temminck's directorship. Veth, Gijzen and Stresemann, for example, look at the number of publications that appeared in the period, and mostly only those by Temminck's hand, while Holthuis and Farber focus more on the quality of the publications in terms of material discovered and described. Inevitably, they all reached different conclusions. But any measure of

scientific success, both in terms of quality and quantity, needs to take into account, besides the number and the content of the publications, their reception abroad, the scientific debates, the authors' status and perspectives, and the social and political circumstances under which all was made possible—or difficult, depending on the moment. Such an analysis has yet to be made for the Leiden museum. What follows here is not such an analysis, but a brief and necessarily limited overview of the museum's scientific activity during Temminck's directorship. The content and reception of his works will be discussed in more detail in the following chapters.

Concerning Temminck's zoological works, at first glance one might think that he produced little more than a few titles scattered over the years. Besides a few minor publications, such as a preparation and taxonomy manual or his collection *Catalogue*, Temminck wrote five books on birds and three on mammals (eighteen volumes in total), a three-volume treatise on the Indian archipelago, and sixteen short articles.[137] Also, from 1839 to 1844 Temminck acted as editor of the *Verhandelingen over de natuurlijke geschiedenis*. However, a closer look reveals that he was working non-stop, investing a considerable amount of time in any particular publication. For example, during the decade of the 1830s he worked simultaneously on the second edition of the *Manuel d'ornithologie*, completed in 1840 (twenty years after the first volume appeared), on the *Nouveau recueil de planches coloriées d'Oiseaux* together with Laugier de Chartrouse (for nineteen years), on the *Monographies de mammalogie*, issued between 1827 and 1842, and on the volume on mammals for Philipp Franz von Siebold's *Fauna Japonica.* Published in five volumes between 1833 and 1850, this splendid work was based on the zoological collections made by Siebold and Heinrich Bürger in Japan, a country at the time hermetically closed and virtually unknown to Europeans. The volume on the vertebrates was authored by Temminck and Schlegel, while Willem de Haan wrote that on the crustaceans.[138]

Temminck based part of his *Nouveau recueil* and the *Monographies de mammalogie* on descriptions, drawings and specimens of the Natuurkundige Commissie, as well as those from his vast network of collectors, and considerably less on the specimens deposited in other museums. He was after all now director of the national museum and could not freely roam through Europe visiting cabinets for months, as he had done for the *Manuel d'ornithologie*. He was aware of this shortcoming, and noted it in the

[137] See Appendix II, Bibliography of Coenraad Jacob Temminck.

[138] For Philipp F. von Siebold and his collections, see Matthi Forrer and Arlette Kouwenhoven, *Siebold en Japan; zijn leven en werk* (Leiden: Hotei, 2000); Lipke Bijdeley Holthuis and Tsune Sakai, *Ph. F. von Siebold and Fauna Japonica; a History of Early Japanese Zoology*, 1 ed. (Tokyo: Academic Press of Japan, 1970); Masuzō Ueno, "The Western Influence on Natural History in Japan," *Monumenta Nipponica* 19, no. 3/4 (1964).

introduction of the *Monographies de Mammalogie*. He "provisionally" classified the species he had been unable to examine in supplementary articles, a method Temminck was not particularly happy with, and rightly so.[139] These works are less comprehensive than the previous ones and, more importantly, they included many descriptions of species that Temminck labeled as new, but that had already been described by others before him. It tainted his reputation, which never recovered. Also, there is a marked shift in Temminck's interests in the 1830s and 1840s. Perhaps because of his *Monographies de mammalogie* or because he finally had access to a wider range of specimens, Temminck wrote more on mammals (especially on bats), and a lot less on birds. This is rather inexplicable, especially if it is taken into account that Temminck had repeatedly stated that monographs and specialization were the way forward in natural history, as new discoveries were piling up at an increasing rate. Whatever his reasons, he was right when he stated that "qui trop embrasse mal étrient," and his work on mammals was his weakest. It was criticized mostly in Britain because of the descriptions of many species that had been described previously by others. Why Temminck did so, will be explained in the next chapter.

In addition to these books, Temminck wrote fifteen short notes and articles: ten about mammals, three about the geographical distribution of animals, and only two on birds. Those treating the geographical distribution are of special interest because, as we will see in the following chapter, they mark the only occasion when Temminck took a step back and looked globally at what he knew to formulate a general law governing the natural world. But apart from this detour, Temminck wrote mostly specialized and exhaustive monographs: "How can anyone dare to claim that a single man can embrace the study of the whole creation? To describe with precision and accuracy a single class of the animal kingdom, the life of the most active man would barely be enough. The best means that naturalists can choose to disseminate the results of large numbers of facts seems to be by publishing *Monographs*."[140] Temminck's work was specialized, descriptive, bulky and above all, meticulous:

> What this work contains [the *Manuel d'ornithologie* and its system] is based on the most rigorous examination of nature, without any kind of compilation; all species have been examined and often compared between them in all the cabinets in Europe; these may be the only merits of my work, and the only

[139] Coenraad Jacob Temminck, "Discours préliminaire," in *Monographies de mammalogie, ou Description de quelques genres de mammifères, dont les espèces ont été observées dans les différens musées de l'Europe*, vol. 1 (Paris: G. Dufour et Edmond d'Ocagne, 1827), ix.

[140] Temminck, "Discours préliminaire," *Monographies de mammalogie*, vol. 1, viii-ix.

> difference that will distinguish it from the works of sedentary and library naturalists.[141]

Travelling through Europe, from cabinet to cabinet, examining all the specimens he thought he needed is not only a conscientious way of working, it is also an exceedingly slow one. After taking up the directorship of the museum, Temminck could no longer keep up this methodology.

There is a title among Temminck's publications that seems out of place. Joannes Susanna, in his biography of Temminck, remarked: "in 1846, we meet him on a path where we did not expect to find him."[142] For reasons that had more to do with politics than with science, he decided to make a compilation of *everything* known about the Dutch colonies of the East Indies. It included descriptions of geography, local history, civil administration, population, agriculture, horticulture, cattle breeding, and of course, natural history. Temminck used information from a wealth of other sources, including the reports from the Natuurkundige Commissie (especially those of Korthals), government archives and published books. He wrote about geology, geography, botany, ethnography and zoology as well as on economically important products like tobacco, sugar, rattan cane, nutmeg, gold and copper mines, coffee or granite quarries.

This eclectic encyclopedia was written with two purposes. Firstly, he claimed, it was intended to make information about the region available to other countries and naturalists, and for this reason he wrote it in French instead of Dutch.[143] Temminck wanted to prove wrong those who had accused the Dutch nation of keeping all this valuable knowledge to themselves. Sir Thomas Stamford Raffles, who—among a great deal of other things—had been lieutenant-governor of British Java from 1811 until 1816, had been extremely critical of the Dutch colonial government in his *History of Java*.[144] So had been John Crawfurd, resident governor at the Court of Yogyakarta from 1811 to 1815. Temminck rebutted their accusations of cruelty and secrecy: "The Dutch nation and its government have often been accused of a *supposed* reserve in everything concerning our overseas possessions. I am commited to proving that this imputation has no foundation whatsoever."[145] And secondly, by publishing the *Coup-d'oeil* Temminck wanted to draw the attention of the Dutch government to the value of all the riches yet to be discovered in the colonies. It was an unveiled plea to resurrect the Natuurkundige Commissie. He repeatedly stressed the need to organize expeditions to discover more

[141] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xxvii-xxviii.
[142] Susanna, "Levensschets van Temminck," 65.
[143] Coenraad Jacob Temminck, "Avant-propos," in *Coup-d'oeil général sur les possessions néerlandaises dans l'Inde archipélagique*, vol. 1, (Leiden: A. Arnz & comp, 1846), xv-xviii.
[144] Thomas Stamford Raffles, *A History of Java*, vol. 1 (London: Black, Parbury, and Allen, 1817).
[145] Temminck, "Avant-propos," *Coup-d'oeil général*, vol. 1, xvi.

about the natural history of the East Indian Archipelago, an enterprise that was essential not only for the museum, but even more to boost the economy of the Dutch nation:

> The value of these expeditions of discovery is nowadays widely recognized; we recommend them from the double point of view of the progress they will produce in the sciences and the influence they can have on the future of our distant possessions; even the advocates of a strict economy and those who only look at a positive balance of expenses will be forced to accept that these expeditions, up to now always a meager investment by governments in the progress of the sciences, invariably have a purpose that is real, immediate and of public benefit.[146]

Despite his insistence, these government-sponsored expeditions *à la* Natuurkundige Commissie were too expensive, too fragile, and too bureaucratic to be efficient. Later on, Schlegel enrolled collectors already living there, like the medical officer Heinrich Agathon Bernstein and civil servants like Carl Benjamin Hermann von Rosenberg, which proved a more successful strategy.[147] The importance of the *Coup-d'oeil* for zoology turned out to be, a bit unexpectedly, greater than Temminck himself may have anticipated. In particular, it helped those naturalists studying distribution patterns of animals to formulate theories that would have made Temminck turn in his grave. We will see this in more detail in the next chapter.

Including the *Coup-d'oeil*, the bulk of Temminck's work was contained in extensive monographs and books, issued in installments. It took him decades to complete a single title. Ironically, just as these large-scale but precise books like the *Manuel d'Ornithologie* had catapulted Temminck into fame, publishing at such slow pace would also partly be responsible for his decline, as we will see later on. In a period of constant discovery of new species and of fierce competition, pondering a particular systematic arrangement for years was something naturalists could no longer afford.

While the collections grew and Temminck was immersed in the directorship and in his own books, the outside world was missing an important contribution from the museum: there was no catalogue of the Leiden collections. After thirty years had passed since the establishment of the museum, Bonaparte could not bear it any longer. In an article on parrots published in the Proceedings of the Zoological Society of London, Bonaparte claimed in a footnote (that went on for three pages) that the lack of such a catalogue was hindering the advance of science. He wrote: "no book on Natural History, we shall never enough repeat it, would prove more effectual to the progress of science, more creditable to the nation, to the government, and to the able individuals willing to

[146] Temminck, *Coup-d'oeil général*, vol. 2, 424-25.
[147] Fransen, Holthuis, and Adema, "Type-catalogue of Decapod Crustacea," 311.

accomplish the labor, than the Catalogue of the Leyden Museum."[148] Bonaparte urged Schlegel to get going: "And the greater benefit have we the right to expect for science from the execution of this noble enterprise, inasmuch as M. Schlegel, who would certainly be the head and arm of the publication, combines the knowledge for which he has long been celebrated all over the world, with the skill of a first rate draftsman."[149] His tone was perhaps a touch theatrical, but then again, a collection catalogue was not merely a numbered list of objects: it was an essential tool for systematics. When one is aiming at completing the catalogue of life, it is crucial to be able to know which species have already been described and which are present in collections, available for examination.

Temminck understood the need of cataloguing collections as well—cataloguing had been his gateway into taxonomy, after all. In fact, he had started compiling a catalogue somewhere in the 1820s with the intention of publishing it, entitled *Galerie Zoögraphique du Musée des Pays-Bas*. But he never got further than listing part of the mammals and the birds.[150] Boie's work on the reptiles and amphibians of Java was also meant to be part of the *Galerie*. The indexing was suspended, however, in view of the numerous specimens arriving in Leiden on a monthly basis.[151] Schlegel, picking up the gauntlet thrown down by Bonaparte in 1850, needed twelve years to finally publish the first volume of the inventory, after ensuring that the government would subscribe to sixty copies, paying *ƒ*300 annually for a period of five years.[152] The catalogue was passed on from director to director as some sort of revered family heirloom. Each of them added one or more volumes to it, but it was never finished. The collections grew faster than the curators could catalogue them. In total, fourteen volumes were published between 1862 and 1908. The title of the catalogue was equally lengthy: *Muséum d'Histoire Naturelle des Pays Bas. Revue méthodique et critique des collections déposées dans cet établissement.*

Temminck was well aware of an increasing impatience among his colleagues, and perhaps on his own part as well, for more publications on zoology from the Leiden museum and, especially, about the results of the Natuurkundige Commissie's efforts.

[148] Bonaparte, "On the Lorine genus of Parrots, Eclectus," 144.
[149] Bonaparte, "On the Lorine genus of Parrots, Eclectus," 144.
[150] Coenraad Jacob Temminck, *Galerie Zoögraphique du Musée des Pays-Bas. Catalogue des Mammifères exposés dans les Galeries du Musée des Pays-Bas.* MS, [1825], Naturalis Biodiversity Center Archives, Archive C. J. Temminck. Apparently, he also catalogued the bird collection, or at least, part of it, as this is mentioned in Otto Finsch and Gustav Hartlaub, *Die Vögel Ost-Afrikas. Baron Carl Claus von Deer Decken's Reisen in Ost-Africa.*, vol. 4 (Leipzig: Heidelburg, C. F. Winter'sche Verlagshandlung, 1870), 162.
[151] Snellen van Vollenhoven, "Coenraad Jacob Temminck," 5.
[152] Holthuis, *Rijksmuseum*, 69; Edward C. Dickinson and Florence F. J. M. Pieters, "Some Bibliographic Findings on 'Muséum d'Histoire naturelle des Pays-Bas. – Revue méthodique et critique des collections déposées dans cet établissement' (1862–1881) edited by Hermann Schlegel," *Zoological Bibliography* 1, no. 3 (2011).

He did the only thing left to do: he asked experts from the very same museums he saw as competitors to study and describe these new species. He had already done so in the 1820s for groups he was not familiar with. Cuvier and Valenciennes, for example, worked on South-East Asian fish using material from the Natuurkundige Commissie and published their findings in their *Histoire naturelle des poissons* (1828–1849). But perhaps the most striking of Temminck's collaborations was that with Gustav Hartlaub, a bird collector and naturalist connected with the Bremen Museum of Natural History. Faced with the African collection gathered by Hendrik S. Pel, Temminck decided for some reason to tackle only the mammals. In 1850, he handed the treatment of the birds over to Bonaparte and Hartlaub.[153]

Temminck, now seventy-two, felt his health deteriorating and his energy diminishing, so that he resorted to asking Hartlaub for his assistance. At Temminck's invitation, Hartlaub came to Leiden several times to study the birds collected by Pel in West Africa.[154] Temminck had seen and labelled Pel's specimens and given scientific names to the new species, but he only described two of them in a short article published in 1854.[155] Hartlaub took care of the rest in a book and two articles.[156] He gave Temminck due credit for his discoveries by writing "Temm." after each new species name coined by Temminck. But in a rather cruel twist of fate, the modern Rules of Zoological Nomenclature dictate that Hartlaub should be considered the author of the names, because the descriptions were most probably Hartlaub's while Temminck authored only the species names.[157] Of the twenty-eight new species described by Hartlaub in 1855 based on Pel's specimens, twenty-five had been first labelled by Temminck. Hartlaub is now deemed the author of all of them.

While Hartlaub and Bonaparte took care of the birds, Temminck published his volume on mammals in 1854 entitled *Esquisses zoologiques sur la Côte de Guinée*. It was, to borrow Susanna's phrase, his "swan song."[158] The work was actually meant to become

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[153] Snellen van Vollenhoven, "Coenraad Jacob Temminck," 7.

[154] Gustav Hartlaub, "Vorwort," in *System der Ornithologie Westafrica's* (Bremen: C. Schuïnemann, 1857), vi.

[155] Coenraad Jacob Temminck, "Zoologische Schetsen van eenige soorten van Hoenderachtige Vogelen," *Bijdragen tot de Dierkunde* 6, no. 1 (1854).

[156] Gustav Hartlaub, "Beschreibung einiger neuen, von Herrn H.S. Pel, holländischem Residenten auf der Goldküste, daselbst gesammelten Vögelarten," *Journal für Ornithologie* 3 (1855); "Systematisches Verzeichniss der von Herrn H. S. Pel auf der Goldküste zwischen Cap Tres Puntas und Accrah gesammelten Vögel," *Journal für Ornithologie* 3 (1855); *System der Ornithologie Westafrica's* (Bremen: C. Schuïnemann, 1857). See also Holthuis, "Biografische notities," 28-29.

[157] See art. 50, International Commission on Zoological Nomenclature, International Code of Zoological Nomenclature (London: The International Trust for Zoological Nomenclature, 1999); René W. R. J. Dekker, "Type Specimens of Birds in the National Museum of Natural History, Leiden. Part 2. Passerines: Eurylaimidae – Eopsaltriidae (Peters's Sequence)," *NNM Technical Bulletin* 6 (2004).

[158] Susanna, "Levensschets van Temminck," 68.

part of a more general work, the *Faune d'Afrique*.[159] In the end, Pel's collection was studied over the years by several specialists, including Schlegel and Herklots (whose PhD dissertation was based on this material), and the ichthyologist Pieter Bleeker.[160] Each of them published about the collection independently, and an envisaged work embracing the entire African Fauna was never produced.

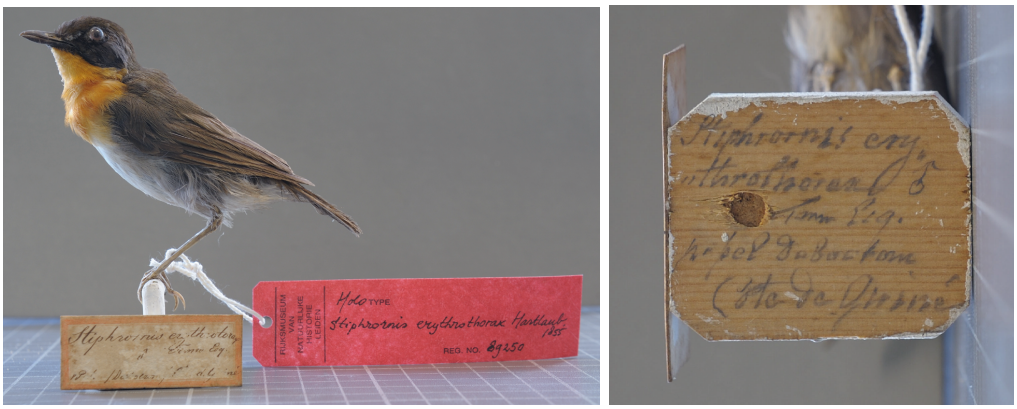

FIGURE 3.9. *Left*: A specimen of the Western Forest Robin collected by Hendrik S. Pel and described by Hartlaub in the *Journal für Ornithologie* as "*Stiphrornis erythrothorax* Temm." (1855). *Right*: Temminck's annotation on this specimen reads "Stiphrornis erythrothorax Temm Esq. Mr Pel Dabocrom Côte de Guiné," indicating that he had at some point intended to describe it himself in his *Esquisses zoologiques sur la côte de Guiné*.

After the *Esquisses*, Temminck only published two very short articles. One described two birds from Pel's collection in 1854, just two pages long, and the second one was a Dutch translation of the description of three new species of squirrels previously published in the *Esquisses*. These were South-east Asian squirrels, so that the editors of the *Natuurkundig tijdschrift voor Nederlandsch Indië* felt that a second edition was justified.[161]

[159] Coenraad Jacob Temminck, "Avant-propos," in *Esquisses zoologiques sur la côte de Guiné. Pt.1: Les mammifères*, (Leiden: E. J. Brill, 1853), xi.

[160] For example, Jan Adrianus Herklots, "Additamenta ad faunam carcinologicam Africae occidentalis, sive descriptiones specierum novarum e Crustaceorum ordine, quas in Guinea collegit vir strenuus H. S. Pel praefactus residentiis in littore Guineae" (PhD dissertation, 1851); Hermann Schlegel, "Over eenige nieuwe soorten van vergiftige slangen van de Goudkust," *Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen* 3 (1855); Pieter Bleeker, "Mémoire sur les poissons de la côte de Guinée," *Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem* 2, no. 18 (1863).

[161] Temminck, "Zoologische Schetsen"; "Over eenige nieuwe soorten van Eekhoorns van den Indischen Archipel," *Natuurkundig Tijdschrift voor Nederlandsch Indië* 4 (1854).

How about the work of the scientific staff at the Leiden Museum? On average, the curators kept up a quicker pace than Temminck. Among the most productive ones were De Haan, Schlegel and Snellen van Vollenhoven. All three of them, each within his own field of expertise, worked mostly, but certainly not exclusively, on systematics. De Haan for instance, straightened out the classification of jellyfish, made comparative studies of the anatomy of crustaceans and other arthropods, researched the wonders of the metamorphosis of beetles—perhaps his best known work—and described many new species of crustaceans and insects in the *Fauna Japonica* and in the *Verhandelingen*.[162] Hermann Schlegel, an autodidact like Temminck, wrote handbooks on zoology, did comparative studies of the venom glands of snakes, published a series of monographs on the comparative anatomy of whales and dolphins, and wrote a treatise on falconry, among a great number of other works. But his main preoccupations were vertebrate systematics and the quest for a satisfying definition of the species concept.[163] He spent more than ten years studying the snakes of the Leiden museum before publishing a two-volume monograph, the *Essai sur la physionomie des serpens* (1837), in which he revised the existing classification systems and the characters used to identify the different groups and species of snakes. Snellen van Vollenhoven concentrated on insect classification, life histories and from time to time also paid attention to pest management and other issues of immediate practical value.[164]

The most striking difference between the curators' works and Temminck's is to be found not in the content of their work, but in their form. They chose to publish mostly articles and short notes above monographs of several volumes—and to publish a lot more. It seems that this allowed them to expand their range of subjects from the purely classificatory to comparative essays and more applied research, even if briefly. It is difficult to pinpoint the exact reason for this. For one, the curators were on average a quarter of a century younger than Temminck. Twenty-five or so years might not seem much, but the practice of systematics was evolving rapidly. For example, Cuvier laid the grounds for the field of comparative anatomy between 1800 and 1817, and by the 1820s it was already embedded in nearly all classification systems.[165] Most of the curators developed their scientific ideas and skills in the 1810s and the 1820s—the period when the first works by Temminck appeared. As we will see later on, this was also the time

[162] Willem Vrolik, "Levensberigt van Wilhem de Haan," *Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen (Afdeeling Natuurkunde)* 3 (1855).
[163] Schlegel, "Levensschets van Hermann Schlegel"; C. Smeenk, "Hermann Schlegel 1804–1884. Ein reiches Leben in einer reichen Sammlung," *Mauritiana* 15, no. 2 (1995).
[164] Krikken, Van Achterberg, Van Doesburg et al., "Samuel Constant Snellen van Vollenhoven (1816–1880) and his Entomological Work."
[165] Georges Cuvier, *Leçons d'anatomie comparée*, 5 vols. (Paris: Crochard, 1805).

when articles devoted to systematics began to appear in zoological journals while iconographic books were becoming a luxury. Short notes in professional journals accelerated communication, facilitated debates and gave momentum to systematics. Temminck began to publish on systematics when he was already past thirty, possibly as a consequence of his lack of formal training. De Haan, by comparison, had started studying in Leiden at seventeen and wrote his first works when he was twenty years old. These may have been additional reasons for the differences in style between Temminck and his curators. There was clearly a difference in temperament and taste between them; Temminck was scrupulous and methodical to the point of being fastidious, and clearly preferred monographs above short articles. Also, the curators had much more time available for research. After all, Temminck was the museum's director and judging from the archives, he took care of the management of the institute single-handedly. Finally, from the mid-1840s on, Temminck's shaking hands could not keep up with his mind. Because of this affliction, writing anything down took a lot of time, effort and frustration. Susanna took on the task of writing most of his letters and the annual reports to the minister.

There is a particular episode in the early years of the Leiden museum that offers a clear picture of the path the museum was meant to follow in terms of its scientific activity. After Jan van der Hoeven decided to leave the museum after working there for only a year, he went back to Leiden University to study medicine. His wish to study was, however, not his primary reason for leaving. What he really wanted was to be able to carry out research in the field of comparative anatomy. Van der Hoeven was a follower of Brugmans' school of thought (but not his student, as Brugmans died before Van der Hoeven could follow his lectures). Right after his appointment as curator in 1826, he requested a room to house a separate collection of anatomical preparations. Not surprisingly, Temminck refused. He had spent years convincing Falck that anatomy and physiology required separate collections in the universities, and that the museum should primarily hold specimens specifically prepared for systematics—not to mention Temminck's efforts to keep the museum as independent as possible from the university, the place to practice comparative anatomy. Additionally, a second collection within the museum inevitably meant dividing funds, space and time between the two collections, something Temminck was not prepared to do. And so it was that Van der Hoeven left the museum, frustrated with the apparent narrowness of the museum's policies and its director.[166] Van der Hoeven returned in 1858 to claim the directorship of the museum, a post that according to the regulations of the museum and of Leiden University, should

[166] This episode and the power struggles between Schlegel and Van der Hoeven are described in De Jonge, "Macht, machinaties en musea."

be his, as professor of zoology. Schlegel, on the other hand, claimed to be the rightful successor. The dispute was fierce, to say the least. In the end, Van der Hoeven was appointed *opperdirecteur* and Schlegel *directeur.* It was a disaster, and Van der Hoeven left the museum, again, angrier than the first time.[167]

At the time of Temminck's death, thirty years after the establishment of 's Rijks Museum, its collections ranked amongst the best in Europe, and the museum's scientific activity had decidedly narrowed down to systematics and descriptive zoology, as had been Temminck's wish—and his best argument for the foundation of the museum. Whether this focus on systematics is viewed as a limitation or as a deliberate step towards specialization is crucial to form an opinion of the museum's scientific production. Understanding that Temminck saw systematics as a new and promising branch within natural history, independent from other disciplines, necessarily puts question marks behind the oft-repeated statement that Temminck was an old-fashioned collector practicing eighteenth-century natural history. In the next chapters, the content and meaning of Temminck's work will broaden this narrow view, exposing the complexity of the practice of systematics within natural history between 1800 and 1850.

[167] De Jonge "Macht, machinaties en musea"; Holthuis, *Rijksmuseum*, 41-42.

PART TWO

“Systhème de la nature”

CHAPTER FOUR

Patterns, laws and the type concept[1]

Temminck's law on animal distribution patterns

Which animals could be found where, and why, was a particularly problematic issue in systematics. Animals were being arranged mainly according to their anatomical features (external and internal), but their habits and distribution were thrown in as additional information that helped clarify the degree of relatedness between them. Naturally, *relatedness* was at the time interpreted not as genetic kinship, but as a degree of morphological similarity that placed particular groups close to each other in the great catalogue of life. This was a deceptively simple concept. As more and more animals were being discovered, their geographical distributions often seemed to contradict the arrangements one could make from their anatomy. How could there be marsupials in North America and Australia but nowhere in between? How did a sluggish and lethargic animal like the sloth ever manage to travel after the biblical deluge from the mountains of Ararat all the way to South America? It was perplexing. Any interpretation of the distribution of animals invariably meant getting engaged in prickly discussions about the origin and the fixity of species, and the meaning of variations. The answer to these questions posed several scientific and philosophical problems. The main issues were the origin of species, including humankind, the species concept, the limits of species variation, the veracity of the biblical account, and whether nature is governed by universal laws or by direct intervention by God. These were not discussions for the faint of heart.

Between the late 1820s and the late 1830s Temminck published a small number of works on biogeography. He was dealing with the fauna of South-east Asia and Japan,

[1] This chapter is partly based on a previously published article, M. Eulàlia Gassó Miracle, "The Significance of Temminck's Work on Biogeography: Early Nineteenth Century Natural History in Leiden, the Netherlands," *Journal of the History of Biology* 41, no. 4 (2008). Changes have been made to include new insights and references, and to avoid duplications in this book.

mostly because of the specimens available to him in the Leiden museum collected by Reinwardt, the Natuurkundige Commissie, Philipp F. von Siebold, Heinrich Bürger, and a few others. These works are remarkable for two reasons. Firstly, in them Temminck accurately described the species composition of poorly explored regions, like the Sunda Islands and Japan. Secondly, he formulated a new law on the geographical distributions of animals around the globe, based on the parallels he observed between the fauna from Europe, Asia and Japan. The underlying ideas that led Temminck to this law were the type concept, which he understood as the ideal morphological plan behind animal form, the unchanging character of the species and a strong belief in nature's divine design.

Temminck repeatedly stressed the importance of considering animal distribution patterns for understanding nature. He used the geographical distribution patterns of species to complement morphology in his classification of birds. He emphasized that studying animal distributions and comparing the fauna of similar latitudes was a subject "rich in facts and consequences" for science.[2] Charles Darwin noted: "Geographical distribution has often been used, though perhaps not quite logically, in classification, more especially in very large groups of allied forms. Temminck insists on the utility or even necessity of this practice in certain groups of birds; and it has been followed by several entomologists and botanists."[3]

While studying the Asian collections in Leiden, Temminck began to ponder the differences and similarities in bird and mammal fauna of the Sunda Islands and Japan. In 1828 he published an article in Dutch entitled *Blik op de dierlijke bewoners van de Sunda-eilanden en van de overige Nederlands bezittingen in Indië* (An overview of the animal inhabitants of the Sunda Islands and other Dutch possessions in the Indies). In this article Temminck briefly listed which species could be found where and noted the differences in species composition between islands. Two additional essays on biogeography appeared in Philipp Franz von Siebold's *Fauna Japonica*. Two sections from this magnificent publication are of special interest here: the general introduction (*Coup-d'oeil sur la faune des Iles de la Sonde et de l'Empire du Japon*) and the introduction to the volume on mammals (*Aperçu général et spécifique sur les mammifères qui habitent le Japon et les îles qui en dépendent*). The first was published in 1836 as a general introductory essay to the *Fauna Japonica*. Temminck formulated here, for the first time, a general law concerning the geographical distribution of animals on the globe. Two years later,

[2] Coenraad Jacob Temminck, "Over de kennis en de verbreiding der Zoogdieren van Japan," *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie* 5, no. 4 (1838): 293; "Aperçu général et spécifique sur les mammifères qui habitent le Japon et les îles qui en dépendent," in *Fauna Japonica sive Descriptio animalium,* ed. Philipp Franz von Siebold, vol. 5 (Leiden: A. Arnz et socios, 1842), 8.

[3] Charles Darwin, *On the Origin of Species by Means of Natural Selection* (London: John Murray, 1859), 419.

Temminck published a translation of this essay under the title *Over de kennis en de verbreiding der zoogdieren van Japan* (About the knowledge and the distribution of mammals of Japan).[4]

The *Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique* (1846–1849) is of particular interest in this context. In general, Temminck's *Coup-d'oeil* was received as a wide-ranging and consistent work, which relied only on facts; a trustworthy source of information for those wanting to learn more about the Dutch East Indies.[5] It is because of his care in selecting the available information and his attention to detail that many other naturalists would consult it for data to complement their own work on biogeography, like William Swainson, Andrew Murray, Charles Darwin or Jan Baptist Jozef van Doren.[6]

Because of his attention to the geographical distribution of birds and mammals, Temminck began to spot certain generalities. After comparing the fauna of Central Europe, North America and Asia with the newly described species from Japan, he formulated a general law on "animal organization," as he put it. According to his principle there is a correlation between the fauna from different regions of the globe, namely, that animals living in the same latitude display the same organization, external form and behavior:

> The zoological products of Japan […] offer us new evidence of the geographical distribution of living beings: they help us establish this law of animal organization, [..] according to which there is a relation in organization, external form and behavior between almost all animals that inhabit the same latitude, however far from each other the regions may be where they live and freely disperse. The extension of the seas between regions has no influence on this, and

[4] Coenraad Jacob Temminck, "Blik op de dierlijke bewoners van de Sunda-eilanden en van de overige Nederlandsche bezittingen in Indië," *Bijdragen tot de Natuurkundige Wetenschappen* 3 (1828); Temminck, "Zoogdieren van Japan"; Temminck, "Aperçu général, Fauna Japonica," vol. 5. In my previous article "The Significance of Temminck's Work on Biogeography," I erroneusly gave 1842 as the year of publication of the *Coup-d'oeil sur la faune des Iles de la Sonde et de l'Empire du Japon*.

[5] For example, Ulrich Gerard Lauts, professor of Dutch language and literature at the Museum for Science and Arts in Brussels, was very positive in his reviews: "Nieuw uitgekomen boeken: Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique par C. J Temminck, 1846," *Algemeene Konst- en Letterbode* 1, no. 12 (1847); and "Nieuw uitgekomen boeken: Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique par C. J Temminck, 1847," *Algemeene Konst- en Letterbode* 1, no. 9 (1849).

[6] Jan Baptist Jozef van Doren, *Mémoire sur les Quadrumanes et les Chéiroptères de l'Archipel Indien* (Amsterdam: J. D. Sijbrandi, 1868); Andrew Murray, *The Geographical Distribution of Mammals* (London: Day and Son, limited, 1866); Swainson, *Treatise on the Geography*. For Darwin's use of the *Coup-d'oeil*, see Jane R. Camerini, "Evolution, Biogeography, and Maps: An Early History of Wallace's Line," *Isis* 84, no. 4 (1993).

> neither has the enormous space of uninterrupted land that stretches between them.[7]

This law is a generalization of the parallels that Temminck had observed between the mammals from Japan with those inhabiting Europe, Asia and North America. The general principle was drawn from observing the fauna across the Northern hemisphere, but it was assumed to be valid for the whole globe. The law was, however, less applicable to the Southern hemisphere, where there is a higher degree of diversification of forms in the tropical and subtropical regions. Unfortunately, Temminck did not attempt to explain this difference:

> This law is applicable in some respects to both hemispheres, but more strictly so to the Northern hemisphere, where the species are exactly the same, while in the Southern hemisphere the groups and the species are distributed following a more diverse model, even though they very often present analogies with the animals that live in parallel latitudes.[8]

In these few lines we find encapsulated the theoretical foundations of Temminck's thinking, the underlying ideas that guided his zoological works and by extension, his writings, his goals and his museum politics.

The type and species concepts

After studying the mammals of Japan, Temminck concluded that none of the new species on that island were substantially different from those already known from central Europe or Asia. There are no mammals in Japan with a fundamentally new morphology, like the marsupials from Australia. There are no monkeys in Japan either, with the exception of a single species, which is in every way comparable to the only species of monkey in Europe, the Gibraltar monkey, or the Barbary Ape. Temminck noted that both monkeys lived in regions with similar climates. In fact, in Europe, Japan, central Asia or North America there are no monkeys or apes like those of tropical regions.[9] Hence his universal principle, according to which animals from a particular region are alike in their *general organization* to animals from other areas on the same latitude:

[7] Temminck, "Aperçu général, Fauna Japonica," vol. 5, 7. This passage is a literal translation of the Dutch formulation of the law of 1838 in "Zoogdieren van Japan." Apparently, Temminck found no reason to expand or alter the original text.
[8] Temminck, "Aperçu général, Fauna Japonica," vol. 5, 7.
[9] Temminck, "Aperçu général, Fauna Japonica," vol. 5, 4.

> Among the Japanese mammals not a single species has been found that differs from the known basic forms (*types*) in any distinctive manner, such as those found in Australia, with the exception of a few mammals that differ slightly from the known genera; all other mammals can be placed in the European and Asiatic systematic categories.[10]

In other words, the same basic forms or *types* inhabit similar latitudes. For Temminck, the "types d'organisation" are molds for building living beings; they represent the morphological plan upon which a group of similar animals is built and each type manifests itself in every region of the same latitude.[11]

Every type is definite, and clearly separated from other types. However, Temminck hastened to clarify that, although animals from the same types lived in Asia and North America, the species were different from each other due to "local deviations" from the original type. Because of these deviations from the original form, species were difficult to define: there was nowhere a sharp break between them that allows us to clearly separate one species from the next.[12] In other words: Temminck identified the type as the basic mold for a genus, and species were varieties of that genus, the physical expression of the type in a particular region of the globe.[13] Species should then be defined by the principal characteristics of the genus they belonged to, that is, of the ideal type. Temminck wrote that if all variations of a type were to be described as separate species, this would only obstruct the progress of science, and would make naturalists use for their classifications characters that were insignificant, only recognizable "with the scalpel in the hand or with a magnifying glass before the eye," while in fact one could, "at first glance, recognize all the main characters that belong to the type of the true species."[14] For example, a bear is, he explained, in its general sense a basic form of organization, a type, while the American bear is the expression of the type in that particular region, North America.[15] Temminck's type corresponds to the taxonomic category of the genus. The type embodies the common morphological features shared by a group of species, each living in a different region of the globe, in the same way as the genus manifests itself in similar species.

The difference between the type and the species in Temminck's thinking reflects his belief in the principle of continuity. What he observed in the collections was actually a continuum of forms—the oft-quoted principle *natura non facit saltus*. When he

[10] Temminck, "Zoogdieren van Japan," 287.
[11] Temminck, "Aperçu général, Fauna Japonica," vol. 5, 7.
[12] Temminck, "Zoogdieren van Japan," 8.
[13] Temminck, "Aperçu général, Fauna Japonica," vol. 5, 8.
[14] Temminck, "Zoogdieren van Japan," 292-93.
[15] Temminck, "Zoogdieren van Japan," 283-84.

described a new species of shrew mole from Japan, Temminck was confident that it "filled a gap in the animal series," proving that as naturalists advanced in their research, they would eventually describe all the "links of this uninterrupted chain, which closely links together the different groups of animals," both ancient and living.[16] A clean break between species was nowhere to be seen:

> The sight of a multitude of individuals from the same species, native to different regions, clearly indicates how difficult it is sometimes to determine precisely the limits between analogous species, and to affirm that there is a specific separation or a well-traced demarcation for all the species we recognize as such. In sum, the existence of *Genera*, in its conventional meaning, seems a paradox to me: I am even far from accepting the existence of *species* as axiom.[17]

It explains Temminck's emphasis on the need for choosing the right characters to define species and genera, as well as his reluctance to split genera, as we will see in the next chapter.

FIGURE 4.1. Illustration of the Japanese macaque *Innuus speciosus* in Von *Siebold's Fauna Japonica*, vol. 5 (1842).

[16] Coenraad Jacob Temminck, "Description d'un nouveau genre de Mammifères (Urotrichus)," *Magasin de zoologie, d'anatomie comparée et de palaeontologie* 4 (1842): 1.
[17] Temminck, "Introduction à cette troisième partie," in *Manuel d'ornithologie,* 2 ed., vol. 3, xix.

Temminck's concept of the species is rather unclear. Species could, and did, differ from one another depending on their distribution. A species, Temminck wrote, although it is modeled after a certain *type*, is under the influence of the climate of the particular region where it lives. He gave several examples of species belonging to the same type (and thus, classified as belonging to the same genus) that were slightly different from each other because they inhabited regions with a different climate. For instance, Temminck described two new species of bats from Japan that are both covered by a thick layer of wool, while similar species of the same genus that live in tropical forests are almost hairless.[18] Similarly, a snow leopard living in the Altai Mountains has a dense, thick coat, but a Sumatran leopard has short, shiny fur. The leopard, according to Temminck, is provided by nature with very thick and long fur when living near the pole.[19] Nature is directly responsible for shaping the type into different species according to the climatic conditions of the places in which these animals live.

Just as climate has an impact on a type to produce different species, certain features within species can also be influenced by local conditions. The deviation from the basic model is, in this case, even smaller. Species of the same type share a basic morphology, "without denying," Temminck wrote, "that species can undergo certain alterations and appear as slightly different varieties; this does not mean that these varieties are divergent enough to isolate them from the types and to classify them as truly different species."[20] These altered forms, or varieties, differ but little from the original species by, say, different size or coloration. Temminck did not clarify to what extent species might differ from the type.

It is important to note that even though different species exist as a consequence of the environment, this is not a transformist argument, in the sense that species adapt to the environment and change into new, different species. The scope of variation is limited, and there is no word about the transformation of species in a progressive, directed sense, in any of Temminck's publications. The same is true for varieties within species. The different features of species and varieties are "provided by nature" from the beginning. Furry leopards belong to cold areas, and Temminck never suggested that if a bald Sumatran leopard decided to migrate to Mongolia, its descendants would grow thick fur in their new, cold environment.

[18] Temminck, "Zoogdieren van Japan," 282.
[19] Temminck, "Zoogdieren van Japan," 283.
[20] Temminck, "Aperçu général, Fauna Japonica," vol. 5, 8.

Temminck's typological thinking, with types seen as molds or models, was a common concept during the eighteenth and early nineteenth centuries.[21] Georges-Louis Leclerc de Buffon attempted in his encyclopedic work *Histoire naturelle, générale et particulière* to present a theory of the earth and the natural history of minerals, humans, quadrupeds and birds. Buffon's ideas evolved over time, sometimes even appearing contradictory in different volumes of the *Histoire naturelle,* but nonetheless his observations had a notable influence on how naturalists after him looked at the natural world.[22] Buffon described a "prototype" or archetype "upon which each individual is modeled, but which seems, in its actual expression, to be altered or improved by circumstances; therefore, with regard to certain characteristics, there appears to be an astonishing variation in the succession of individuals, and, at the same time, an admirable uniformity in the entire species."[23] All horses, for example, are always shaped after the "first horse," which is "the exterior model and the interior mold."[24] This "interior mold" is more than an ideal plan, as it acts both as an arranging force and as a model for all animal forms. The characters of the "prototype" were perpetuated generation after generation, and they changed as the species multiplied.

The species was, for Buffon, an historical continuity that did change over time.[25] Temminck's type, in contrast, is fixed and eternal, as we will see below. He rejected Buffon's view that all species belonging to a certain group, say, an order, were descended from a single original source. In doing so he also implicitly rejected Buffon's idea of the interior mold as an arranging force:

> What a strange error it is to indicate the Bizet or the Wild Pigeon as the common ancestor of all different species of Pigeons on the surface of the earth; what are the reasons that have led M. Buffon to establish a law that nature denies in every individual? I will make these reasons known and then it will be easy to prove that M. Buffon's supposition lacks any credibility. The lack of observations made of nature is the principal source of an error that results from a too great confidence in his creative genius; this confidence, fatal for science, perpetuates

[21] For an in-depth discussion of the morphological type concept and its evolution in the nineteenth century, see Joeri Witteveen, "Suppressing Synonymy with a Homonym: The Emergence of the Nomenclatural Type Concept in Nineteenth Century Natural History," *Journal of the History of Biology* 49, no. 1 (2016).

[22] For more information on Buffon's writings and how they evolved over time, see for example Paul Lawrence Farber, "Buffon and the Concept of Species," *Journal of the History of Biology,* vol. 5, no. 2 (1972); Jacques Roger, *Buffon: A Life in Natural History*, trans. Sarah Lucille Bonnefoi (Ithaca and London: Cornell University Press, 1997).

[23] Georges Louis Leclerc Buffon, "Quadrupèdes," in *Histoire Naturelle, générale et particulière, avec la description du Cabinet du Roi*, vol. 1 (Paris: P. Didot l'ainé et Firmin Didot, 1799), 61-62.

[24] Buffon, "Quadrupèdes," 62.

[25] Farber, "Buffon and the Concept of Species," 263-66; Roger, *Buffon: A Life in Natural History*, 399-400, 12.

> the aberrations of a great man, whose merits are justly respected and whose talents, honored.[26]

The differences between some groups of pigeons, Temminck continued, are so clear and definite that they should never have "escaped such a great genius."[27] The whole group of pigeons could not possibly have originated from just one original species. To him, Buffon's assumption that climate alters form in such a way as to create new species was unfounded and entirely wrong. While the nuances in color may be due to the environment, climate has not "the magical power" to affect coloration and size in any significant way.[28] Buffon, he claimed, had failed to observe that not only the external morphology of these species of pigeons is distinct; their behavior and anatomy are different as well. Temminck did not accept that animals were subject to any significant change under the influence of "circumstances". Therefore, he could not agree either with the idea of an interior mold behind those changes. While Buffon thought of the prototype as the source for the whole group of pigeons—or horses, for that matter—Temminck argued that many types were necessary to explain the diversity of the entire order of pigeons, that diversity is so great that it could not possibly have come into being only by the influence of the climate on a single primordial form.

Temminck's type fits in the category of Paul Farber's "morphological type-concept, " which he defined as a "basic plan or type that could be discerned at various taxonomic levels."[29] According to Farber, the type concept that dominated pre-Darwinian natural history was that of George Cuvier. Cuvier believed in a natural, true and permanent plan of organization behind every form. There was a type for every level of organization, from his four *embranchements* to the species. Cuvier insisted on the unity of form at every level of organic function, and this unity applied to species but also to genera, families, and so on. Deviation from the types had to be limited because, according to the principles of comparative anatomy he established, any significant change in the animal body leaves it unable to function properly.[30] Therefore, animal

[26] Temminck, "Discours sur l'Ordre des Pigeons," in *Histoire naturelle générale des pigeons et des gallinacés,* vol. 1, 16.
[27] Temminck, "Discours sur l'Ordre des Pigeons," 17.
[28] Temminck, "Discours sur l'Ordre des Pigeons," 23.
[29] Farber, "Type-concept in Zoology," 100-01. The development of the morphological type through the eighteenth and nineteenth centuries has recently been explored by Witteveen, "Naming and Contingency."
[30] For more information on Cuvier's theories see for example Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin*; William Coleman, *Georges Cuvier, Zoologist. A Study in the History of Evolution Theory* (Cambridge: Harvard University Press, 1964); Dorinda Outram, *Georges Cuvier: Vocation, Science, and Authority in Post-revolutionary France* (Manchester: Manchester University Press, 1984); Rudwick, *Georges Cuvier*.

morphology could not be as changeable as Buffon and Lamarck proposed: "There are thus characteristics in the animals which resist all influences, whether natural or human, and nothing indicates that the passage of time has, so far as they are concerned, more effect than the climate and domestication."[31] Temminck shared with Cuvier not only the notion of type as the basic form of organization, but he also saw variations of a species in exactly the same way as Cuvier did, that is, as limited to size and color. Cuvier wrote:

> Thus the most superficial characteristics are the most variable. Color is closely related to sunlight; the thickness of the hair to heat; size to the abundance of nourishment. [...]. Thus, although the wolf and the fox live from the torrid zone right up to the glacial zone, they hardly give evidence, in this immense space, of another variety except for a little more or a less beauty in their fur.[32]

The question of the relation between variation and climate had also caught the attention of the German zoologist Constantin W. L. Gloger. In 1833, he observed that birds tended to be darker near the equator, where the environment is more humid.[33] This link between climate and coloration in birds applied in fact to all warm-blooded animals, and it is now known as "Gloger's rule": humid climates are inhabited by darker varieties of a given species. Temminck did not mention this rule in any of his works on biogeography or when discussing variation. It is possible that he was unfamiliar with it, as Gloger's publication of 1833 is not amongst the books Temminck owned, according to the auction catalogue of his library, even though other works by the same author are listed.[34]

Étienne Geoffroy Saint-Hilaire also based his theories on the idea of a morphological type or, more explicitly, on the unity of type. Geoffroy Saint-Hilaire, in contrast to Cuvier, stressed form above function, that is, function is a consequence of form. Geoffroy Saint-Hilaire concluded that animal form could change without leaving the body so altered that it was unable to function properly anymore, and he proposed that species are not fixed in their morphology. Even more, he believed that more complex forms had progressed from simple ones. He maintained that vestigial organs, homologies, fossils and embryological studies indicated the common origin of actual forms, which were descended from one archetype. Cuvier vigorously opposed his

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[31] See Georges Cuvier, *Discours sur les révolutions de la surface du globe: et sur les changemens qu'elles ont produits dans le règne animal* (Paris: Chez G. Dufour et Edmond d'Ocagne, 1826), 62. Translated by Ian Johnston, 2009.

[32] Cuvier, *Discours sur les révolutions*, 59-60. Translated by Ian Johnston, 2009.

[33] Constantin Wilhelm Lambert Gloger, *Das Abändern der Vögel durch Einfluss des Klima's* (Breslau: August Schulz & Co., 1833).

[34] See the 1858 auction catalogue of Temminck's library, *Catalogue de la bibliothèque délaissé par C. J. Temminck* (Leiden: E. J. Brill et C. van der Hoek).

views.[35] The affair ended in one of the most notorious debates in the history of biology, and one of the most heated. Although the views of both scientists were widely known in the world of natural history, we have found no direct reference to Geoffroy Saint-Hilaire's unity of plan in Temminck's writings, but because of his belief in the fixity of the species, as we will see below, he could never have agreed with one of its more polemical implications: transformism.

The parallels between Cuvier's theories and Temminck's ideas are very significant. Temminck admired Cuvier and considered him one of the greatest minds in natural history. He frequently visited Cuvier in Paris and they wrote each other regularly. He referred to Cuvier as "mon maître, et depuis lors mon ami".[36] He manifested his esteem for Georges Cuvier by dedicating to him the *Nouveau recueil de planches coloriées d'Oiseaux* as "an expression of our most respectful devotion."[37] Cuvier's writings strongly influenced Temminck and it seems that he applied the typological thinking of Cuvier to interpret the patterns of animal distribution he observed in the Dutch East Indies and Japan. It is possible that Temminck developed his law to fill the gap—biogeography—left by Cuvier in his writings, applying Cuvier's principles of comparative anatomy and his type concept to the subject of animal distribution.

Temminck's law versus Buffon's law

Buffon was as intrigued by the problem of geographical distribution patterns as almost all other naturalists. He addressed it in his *Histoire Naturelle*, starting with the proposition that animal organization was the result of external factors, that is, of the environment in which they originated. He concluded that each fauna belonged to a certain area of the world, and he expected that regions with similar environmental conditions would contain similar species.[38] But the newly discovered species from tropical countries contradicted Buffon's expectations. He observed that what naturalists had found in the Old and New World were different kinds of animals, even under the same climatic conditions. Buffon explained these unexpected findings by bringing into play geographical barriers. Mammals simply found those physical barriers

[35] See, for example, Appel, *The Cuvier-Geoffroy Debate*.
[36] Temminck, "Avant-propos," *Coup-d'oeil général*, vol. 1, ix.
[37] Temminck and Laugier de Chartrouse, "A monsieur le Baron G. Cuvier," *Nouveau recueil de planches coloriées*, vol. 1.
[38] Buffon, "Histoire Naturelle, générale et particulière, servant de suite à l'Histoire des Animaux quadrupèdes," in *Histoire Naturelle*, vol. 3, Supplément, 270. See also Mayr, *The Growth of Biological Thought*, 441.

insurmountable and therefore, different species of quadrupeds were isolated and unable to spread from one continent to the other. And with that, Buffon changed his mind:

> All of the animals that, by their nature, are unable to support the climate of the north, even those that can support it but are unable to reproduce in it, are therefore confined on two or three sides by oceans that they cannot cross, and on another side by regions so cold as to be uninhabitable. Accordingly, there is no longer any reason to be astonished by the general fact, which first appeared very strange, and which no one before us even suspected, that no species of the torrid zone of one continent is found in the other.[39]

He concluded that different species must inhabit different regions:

> We do not presume to affirm categorically that, of all the animals that live in warm climates in one or the other continent, there is none that lives in both; to do so and be absolutely certain would require knowledge of the facts. We merely offer a judgment, because such is evident for all of the large animals, which are the only ones generally noticed and well described by travelers; because such is also fairly clear for the majority of the small animals, and of them there are only a few for which we cannot yet judge. If some exceptions are discovered (which is difficult for me to imagine), they could involve only a few cases, and would not destroy the general law that I have just established, and that appears to me to be the only compass that can guide us in our investigations of animals.[40]

Alexander von Humboldt and Augustin Pyramus de Candolle arrived at the same conclusion by studying plants or by comparing the fauna or flora between other regions.[41] Humboldt combined his own observations on vegetation with Buffon's passage and extended it to a principle that applied to the whole globe and to all animal groups, including birds, insects and reptiles.[42] The principle is referred often to as "Buffon's law": different forms in different regions. It was, like Temminck's law, a generalization; it was mostly based on the comparison of mammals between the Old and the New World only. But nonetheless, by the 1820s Buffon's law was widely acknowledged by naturalists. The Scottish geologist Charles Lyell quickly adopted it: "the French naturalist caught sight at once of a general law in the geographical

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[39] Buffon, *Histoire Naturelle*, vol. 9, 96. Translated by Gareth Nelson, "From Candolle to Croizat: Comments on the History of Biogeography," *Journal of the History of Biology* 11, no. 2 (1978): 275.

[40] Buffon, *Histoire Naturelle*, vol. 9, 118-19; translated by Nelson, "From Candolle to Croizat," 275-76.

[41] For the history and implications of Buffon's law see Nelson, "From Candolle to Croizat." A general history of biogeography can be found in Janet Browne, *The Secular Ark: Studies in the History of Biogeography* (New Haven: Yale University Press, 1983).

[42] Alexander von Humboldt, "Sur les lois que l'on observe dans la distribution des formes végétales," *Annales de Chimie et de Physique* 1, 2nd ser. (1816): 234.

distribution of beings, namely, the limitation of groups of distinct species to regions separated from the rest of the globe by certain barriers."[43] Soon after, Charles Darwin and Alfred Russell Wallace were also concerned with the differences in species composition between different regions—concerns that led them to elaborate their own theories to explain this phenomenon.

Temminck's law is exactly the opposite of Buffon's law. Was Temminck ignorant of Buffon's observations? Presumably not. Although no reference to Buffon can be found in Temminck's publications on animal distribution, Temminck was a well-informed, well-connected naturalist. His library contained four different editions of Buffon's *Histoire naturelle* and Temminck often referred to it in his works.[44] Nevertheless, the same principle was described in almost every work of natural history that dealt with the patterns of geographical distribution, works Temminck was familiar with. On top of it, Temminck corresponded with Humboldt, Cuvier, Illiger and other European naturalists, and visited them on several occasions.[45] It is hard to imagine that Temminck had never read Buffon's law or works that referred to it, or talked about it with his colleagues. But there is no allusion to Buffon's observations about the geographical distribution of animals or to his history of life on earth in Temminck's discourse on animal distribution.

There are certain elements in Temminck's thought that may have led him to formulate a law opposed to Buffon's observations. In the first place, Buffon and other naturalists highlighted the differences between the Old and the New World, that is, between Europe and America. Their emphasis on variation is absent in Temminck's theories. He based his law on the similarities between Europe, Asia, Japan and North America. Even when Temminck described the nature of species and its variations, he focused on the features common to related forms, more than on specific characters, while others centered their attention upon individual species instead of upon their general organization plan. In fact, all naturalists dealing with distribution patterns during the first half of the nineteenth century, like de Candolle and Humboldt, agreed with Temminck that species from different regions, in their most basic form, were analogous. De Candolle wrote: "The same distance from the equator, or the same degree of latitude, produces rather a resemblance in the forms—an agreement in the families and genera—than the same species, chiefly because, besides this geographical latitude,

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[43] Charles Lyell, *Principles of Geology: Being an Attempt to Explain the Former Changes of the Earth's Surface, by Reference to Causes now in Operation*, 1 ed., vol. 2 (London: John Murray, 1832), 66; Nelson, "From Candolle to Croizat," 274.

[44] See *Catalogue de la bibliothèque délaissé par C. J. Temminck*, 2-3; Temminck, *Catalogue Systématique.*

[45] Van Lynden-de Bruïne, *In vogelvlucht*; Raat, "Humboldt and Temminck"; Stresemann, "Briefwechsel von Temminck mit Hoffmannsegg und Illiger"; "Aus C. J. Temmincks Briefen an H. Lichtenstein"; "Ornithologen-Briefe aus den Jahren 1816 bis 1820."

the height above the surface of the sea, the temperature during the growing season, the soil and constitution of the mountains, even the degree of longitude, and several other circumstances, have an influence on vegetation."[46] The British physician and ethnologist James C. Prichard also recognized that on different continents "the vegetable tribes will present, in each respectively, analogies of form and general character; but few, if any, of the same species will be found in localities thus separated."[47]

All agreed with Temminck about the similarity in families and genera composition at the same latitude, but Temminck seems to stand alone in giving much more weight to the recurrence of these groups than to the diversity of species, which he related to the influence of the environment. Temminck's whole theory of animal distribution is based on the types and not on the particular species. It is not surprising, then, that these naturalists interpreted the variation of forms throughout the globe in two entirely different ways. They were looking at geographical distribution from different levels. While Temminck emphasized unity of a widespread form, the type, along the same latitude, Buffon, Humboldt, de Candolle, Wallace and others were surprised about the great diversity of forms (including species and varieties) in regions with the same climate.

The stress on the similarity of the general form of the species horizontally, that is, along certain latitudes in the northern hemisphere, is probably the main reason Temminck arrived at a different conclusion than Buffon. Perhaps his notion that species could not be 'true' natural divisions played a role in focusing on the types. In Britain, Sir John Richardson, the Scottish surgeon and naturalist known for his two famous Arctic expeditions, understood that the validity of Temminck's law depended directly on the taxonomic level one was looking at: the genera or the species. In a report on North American zoology published in 1836, he noted:

> Buffon hazarded the remark that none of the animals of the Old World exist in the New, except the few which are capable of propagating in the high northern latitudes. Temminck adduces circumstances which favor a modern opinion almost directly opposed to Buffon's; namely, that all the genera which people the earth (a small number belonging to the polar regions only excepted) are to be found in the equatorial zone, or at least within the tropics; and that the genera are spread abroad by means of analogues or species possessing exactly similar generic characters, which range in the same parallels of latitude, through all the

[46] Augustin Pyramus de Candolle, *Elements of the Philosophy of Plants: Containing the Principles of Scientific Botany ... with a History of the Science, and Practical Illustrations*, trans. Kurt Polycarp Joachim Sprengel (Edinburgh: W. Blackwood, 1821), 266.

[47] James Cowles Prichard, *Researches into the Physical History of Man* (London: J. and A. Arch, 1813), 50; Nelson, "From Candolle to Croizat," 271.

> degrees of longitude, and that notwithstanding the barrier which a wide ocean may be supposed to interpose. The comprehensiveness of this law will evidently be modified by the number of generic divisions admitted by naturalists, and it will be scarcely tenable if the geographical groups of species be raised to generic rank as has been of late frequently done.[48]

Indeed, whether certain populations were regarded as a genus, a subgenus or a species was a matter in constant dispute. As new exotic species were being described, the width and limits of genera needed constant revision and a great deal of definition. How one delimited a genus or a species affected not only systematics, but also biogeography and even comparative anatomy. This point will be discussed more in depth in the following chapter.

Another question remains that may have colored Temminck's views on biogeography. Could it be that Temminck underestimated the differences between tropical regions because he focused on the northern half of the globe? For Temminck, studying animal distribution patterns was less confusing if one focused on the species of Europe and Asia. He found the Sunda islands too diverse to observe general patterns. These islands were "due to their position and their fertile soils covered by vigorous vegetation, the most favorable place to study the animals of the tropical region of the Old World […]; while there [in the temperate regions of the Ancient Continent], better than anywhere else, one can obtain firm evidence about the geographical distribution of the species."[49] Even so, Temminck was not ignorant of the nature of the American fauna. His library included many descriptions of voyages, monographs on American birds and mammals and several natural histories of South America.[50] He also had at his disposal the Leiden collection, extremely rich in specimens from Southeast Asia, Africa and Central America. It is very unlikely that Temminck's law was written in ignorance of Buffon's law or of the fauna of tropical America. Moreover, the presence of marsupials both in Sulawesi and in South America was for Temminck a confirmation that his law was valid beyond the northern hemisphere: "The *Phalangers* and the *Couscous*, marsupial animals […], are for the Ancient Continent what the *Opossums* and the *Didelphes* are for the parallel regions in the New World."[51] By focusing on the general morphology of

[48] John Richardson, "Report on North American Zoology," *Report of the British Association for the Advancement of Science* 5 (1836): 223.

[49] Coenraad Jacob Temminck, "Coup-d'oeil sur la faune des Iles de la Sonde et de l'Empire du Japon. Discours préliminaire destiné à servir d'introduction à la Faune du Japon," in *Fauna japonica, sive, Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis, superiorum, qui summum in India Batava imperium tenent, suscepto, annis 1823–1830*, ed. Philipp Franz Von Siebold, vol. 1 (1836), v.

[50] *Catalogue de la bibliothèque délaissé par C. J. Temminck*, 8-14, 30-34.

[51] Temminck, *Coup-d'oeil général*, vol. 3, 113, 16.

marsupials instead of on individual species, what Temminck inadvertently discerned was their common ancestry, while Buffon's law focused on their posterior evolution and diversification.

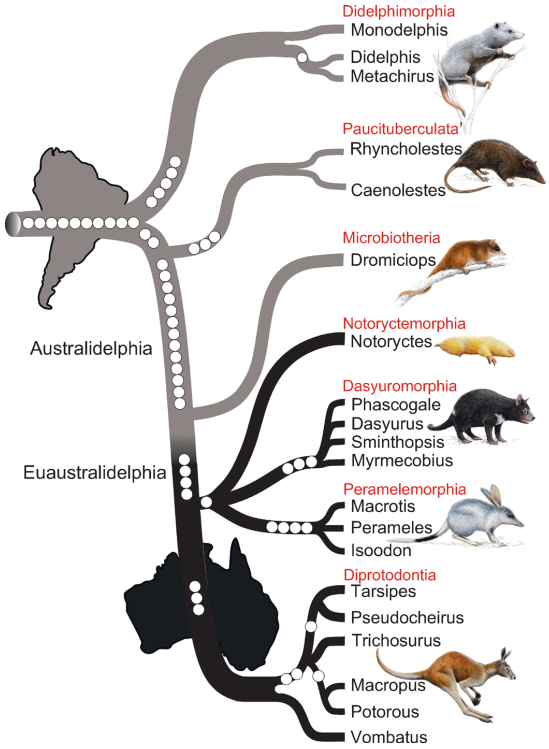

FIGURE 4.2. Phylogenetic tree of marsupials, showing the relation between marsupial forms and their distribution.

On the origin and fixity of species

By the time Temminck formulated his law on biogeography, animal and plant distribution patterns had puzzled naturalists for at least a century. The explanations for the strange phenomena they observed ranged from divine design to more materialistic explanations that comprised universal laws and in which God's role was reduced to creation.[52] The different approaches depended heavily on one's views about creation,

[52] For the relation between geographical patterns and the ideas about the origin of the species, see the discussions in Michael Paul Kinch, "Geographical Distribution and the Origin of Life: the Development of Early Nineteenth-century British Explanations," *Journal of the History of Biology* 13, no. 1 (1980); James

the species concept and the relation between environment and varieties. For those accepting that God's intervention was behind all patterns in nature, divine design and ecological factors were important; for those who interpreted nature as a dynamic entity, constantly in flux, ecological and historical causes has a central place in their theories. As Augustin de Candolle put it: "All of the theory of geographical botany rests on the particular idea one holds about the origin of living things and the permanence of species."[53]

Temminck's type and species concepts are important in understanding his view on issues as complex as the origin and the fixity of the species, as they formed the groundwork for his comprehension of nature. After introducing his law on the geographical distribution of animals, Temminck tried to explain the origin of the types and how they came to be distributed over distant, unconnected regions. The cause of their actual distribution, according to Temminck, could not be migration from one region to the other, because animals migrate and disperse until they encounter a physical barrier.[54]

In this, Temminck agreed with Buffon's statement about the quadrupeds not being able to cross seas or freezing regions, although he made no reference to the origin of these barriers. There had to be another explanation for this remarkable uniformity of type: "It is very probable that the elements that have exerted their influence on creation have produced the same types in the most easterly regions of Asia and in North America, as under the climate of Europe."[55] In other words, certain *elements* have shaped creation into similar types and into species that share a common form of organization. Temminck did not specify what exactly these elements were, nor did he explain the mechanism by which they could reproduce a type in a particular region on earth. Nevertheless, Temminck explicitly stated that a "pouvoir créateur" was directly accountable for the origin of the types.[56] Temminck's power of creation was undoubtedly of divine nature: God used ideal types as basic molds for creating species. After all, for Temminck nature was an expression of divine greatness and manufactured according to God's taste, and natural history was "the science that leads man to read

Larson, "Not without a Plan: Geography and Natural History in the Late Eighteenth Century," *Journal of the History of Biology* 19, no. 3 (1986); and Nelson, "From Candolle to Croizat."

[53] Augustin Pyramus de Candolle, "Géographie Botanique," in *Dictionnaire des sciences naturelles, dans lequel on traite méthodiquement des différens êtres de la nature, considérés soit en eux-mêmes, d'après l'état actuel de nos connoissances, soit relativement à l'utilité qu'en peuvent retirer la médecine, l'agriculture, le commerce et les arts*, ed. Frédéric Cuvier (Strasbourg: F. G. Levrault, 1820), 417; translated by Nelson, "From Candolle to Croizat," 285.

[54] Temminck, "Aperçu général," *Fauna Japonica*, vol. 5, 8.

[55] Temminck, "Aperçu général," *Fauna Japonica*, vol. 5, 8.

[56] Temminck, "Aperçu général," *Fauna Japonica*, vol. 5, 8; Temminck, "Zoogdieren van Japan," 291.

from the divine pages of the book of nature; that allows him to know the animated and inanimate parts of creation; that unnoticeably elevates his soul to worship the Almighty."[57]

Although the divine origin of nature was not really in dispute in Temminck's time, the accounts of Genesis and Noah's Ark could not explain the actual distribution of species anymore. As naturalists questioned the biblical Flood, another explanation was gaining acceptance: not one, but several centers of creation were the sources of living organisms. This theory of multiple creations, proposed first by the German naturalist Johann Friedrich Gmelin and later adopted and spread by the botanist Karl Ludwig Willdenow, implied that biogeographical regions were the result of independent acts of divine creation: every region had been populated with a set of species by a separate, unique creation. After being created, species dispersed until they encountered a physical barrier. Therefore, that different regions are inhabited by different species was nothing else than the obvious consequence of multiple creations and therefore, one could expect to find transitional areas from one center of creation to another.[58]

Temminck recorded such a transition zone in the island of Timor. A mountain chain divides the island into two regions, each with a separate set of species. There is the Asiatic fauna on the northern side of the mountains, comparable to that of the Greater Sunda Islands and the mainland, and a different fauna on the southern part of the island, with species, Temminck noted, "that belong to a Fauna that seems different, or at least transitory between the species characteristic from the Moluccas and the Australian groups, which appear to belong to a very particular creation."[59] And as Cuvier had demonstrated, fossils were also testimonies of separate creations, in this case, of now extinct animals. In the *Monographies de mammalogie* Temminck listed the number of known species according to different authors, including forty-two fossil species, remnants of animals that were part of a creation anterior to the present one.[60] When speaking of the chain of beings, Temminck included extinct species in it, as well as the living ones.[61]

Temminck believed in multiple, separate creations in different regions, as did many in his time, and his "pouvoir créateur" can be understood as the divine force that

[57] Temminck, "Discours préliminaire," *Pigeons et gallinacés*, vol. 1, 6.

[58] For discussions on the idea of multiple centers of creation, see Larson, "Not without a Plan," 458-59; Kinch, "Geographical Distribution," 96-98.

[59] Temminck, *Coup-d'oeil général*, vol. 3, 168. See also Temminck, "Blik op de dierlijke bewoners," 74-75.

[60] Temminck, "Discours préliminaire," *Monographies de mammalogie*, vol. 1, ix. Concerning extinction, Temminck accepted Cuvier's catastrophism, which he described as "new and illuminating ideas about the catastrophes that have changed the surface of the globe" (Temminck and Laugier de Chartrouse, "A monsieur le Baron G. Cuvier," Nouveau recueil de planches coloriées, vol. 1).

[61] Temminck, "Urotrichus," 1.

created particular types in particular regions on earth each with its unique creation, such as Asia or Australia. He noted that there is a line that runs through Timor, Sulawesi and the Moluccas, which separates the Greater Sunda Islands fauna from the Australian fauna. For example, in Sulawesi there are no elephants, rhinos and tapirs "anymore," while marsupials and incubator birds can be found on Sulawesi for "the first time" in the East Indies: "The *Phalangers* and the *Couscous*, marsupial animals that are not found anywhere else in the Sunda Islands, are here [in Sulawesi] the first representatives of this group."[62] Naturally, "first time" and "anymore" indicated the direction Temminck was following in the description of these island faunas, from West to East, and not a timeline. Temminck saw a clear shift from one fauna to another when moving through different latitudes—in agreement with his law and with the idea of multiple creations.

Temminck did not address the question of the fixity of species directly, but his writings reveal that he believed in the unchanging nature of species. In the first place, for Temminck species belonging to a particular genus were created by God as the physical expressions of the type of that genus, and each species displayed slight morphological variations from the ideal, but it always presented the distinct characteristics of the genus it belonged to. A strong belief in a divine order or design of nature leaves little room for materialistic explanations of nature's organization. Secondly, and more important, Temminck was certain there were limitations to the amount of variation a species could suffer. Local variations were limited to coloration and size and were due to the environment in which the animals lived. Varieties were not "species in change" nor links between different species, but slight deviations from the original form.[63] God created species in several and consecutive acts of creation in different regions, each containing its own distinctive fauna. Temminck's definition of the type as an ideal morphological plan—distributed by God along particular latitudes—is inextricably linked with a static concept of animal form.

Temminck's belief in the fixity of the species is perfectly illustrated by his explanation of the special character of the fauna of the Sunda Islands. It relies on the supposition that species cannot change with time. He concluded that if certain species could be found on a particular island of the Indian Archipelago but not on the mainland or on surrounding islands, then that particular island had never been connected to the Asian continent or to the other islands. For example, Sumatra has a different fauna than

[62] Temminck, *Coup-d'oeil général*, vol. 3, 111-13. This shift would later be described by Alfred Russel Wallace and became known as "Wallace's line." Wallace's line runs somewhat differently than the shift Temminck described, between Bali and Lombok instead of between the Lesser Sunda Islands and Timor. See also Camerini, "Evolution, Biogeography, and Maps."
[63] Temminck, "Zoogdieren van Japan," 292.

the Asian continent, even though the short distance between them could make us expect otherwise.[64] The difference between Sumatra and the mainland was for Temminck the proof that the archipelago had never been linked to the Asian continent. Likewise, the fauna differs from island to island, proving that Sumatra and Java have never been connected.

FIGURE 4.3. Illustrations of the skull of the Sulawesi bear cuscus or Sulawesi bear phalanger, described by Temminck in 1824 in his *Monographies de mammalogie*, pl. VIII (1824).

All these facts, Temminck wrote, successfully contradicted the idea, "adopted by some erudites," of a former attachment of the Sunda Islands to the Indian continent.[65] These erudites were none others than the French naturalist René-Primevère Lesson and the surgeon Prosper Garnot. They had travelled with Louis Isidore Duperrey on *La*

[64] Coenraad Jacob Temminck, *Coup-d'oeil général*, vol. 1, 85.
[65] Temminck, *Coup-d'oeil général*, vol. 2, 93. See also Temminck, "Faune des Iles de la Sonde et de l'Empire du Japon," *Fauna Japonica*, vol. 1, x.

Coquille during its memorable circumnavigation of the globe between 1822 and 1825. On the basis of their observations, they proposed that in the past Sumatra had been physically linked to the mainland.[66] If the islands had ever been connected to each other, or to Asia, then animal populations would have happily walked, crawled, swum or flown between them and, after the separation of the islands, the same species would still inhabit Sumatra, Java and the mainland. This argument can only stand if one believes in the fixity of the species: if species can change over time, Sumatra and Java could have been connected, shared the same species, and after their detachment these species could have changed into new ones, leaving both islands with different species. Therefore, if species can change into new ones, the difference in species composition is a meaningless argument for rejecting a former link between the two islands. There is no transmutation of species in Temminck's logic, as their actual form allowed him to interpret the past. This was another reason for Temminck to formulate a law that was the opposite of Buffon's: his belief in the fixity of species. Buffon claimed that species changed generation after generation due to the influence of the environment and of Buffon's interior mold, and their history is linked to that of the earth's surface.[67] In strong contrast to Buffon, Temminck stressed unity of form: horizontally (of the type along latitudes), of the species (variation is very limited) and in time (species had not changed since their creation).

Temminck's definition of the type was closely linked to his ideas regarding the fixity of species. Alternative definitions led to alternative ideas, as illustrated by Wallace's essay *On the Tendency of Varieties to depart indefinitely from the Original Type.* This was the third of the now legendary papers by Darwin and Wallace read at a meeting of the Linnean Society of London on July, 1, 1858. After presenting his arguments to prove that species evolved by what we now call natural selection, he concluded:

> We believe we have now shown that there is a tendency in nature to the continued progression of certain classes of *varieties* further and further from the original type—a progression to which there appears no reason to assign any definite limits—and that the same principle which produces this result in a state of nature will also explain why domestic varieties have a tendency to revert to the original type.[68]

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[66] Louis-Isidore Duperrey, *Voyage autour du monde: exécuté par ordre du roi, sur la corvette de Sa Majesté, la Coquille, pendant les années 1822, 1823, 1824, et 1825* (Paris: Arthus Bertrand, 1826–1830), 19; quoted by Temminck, "Faune des Iles de la Sonde et de l'Empire du Japon," *Fauna Japonica*, vol. 1, x-xi.

[67] See also Farber, "Buffon and the Concept of Species," 284.

[68] Charles Darwin and Alfred Wallace, "On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection," *Journal of the Proceedings of the Linnean Society. Zoology* 3, no. 9 (1858): 62.

For Wallace, variation from the original type was not only potentially unlimited, but it also allowed for the stronger or best-suited varieties to survive and replace the others. Wallace's type was not fixed and certainly not eternal, while Temminck's was both.

Up to 1860, most naturalists studying the distribution of plants and animals were concerned with Buffon's law and the problems posed by the geographical patterns of species. Two of these were extremely puzzling: endemisms and disjunct distributions. Endemic species are those confined to narrow areas, found nowhere else on earth—they are unique and limited to a certain habitat—while species with disjunct distributions are those living in widely separated regions but found nowhere in between, like some Alpine plants that live on the summits of both European and South American mountains. How had these species reached their actual habitats? And why are there no individuals of these species living in the areas in between? These problems could not easily be explained if one believed in a single center of creation, the dispersal following the biblical Flood and the fixity of the species. By combining the idea of multiple centers of creation and subsequent dispersal, naturalists could explain the phenomena of disjunct distributions and, at the same time, offer a plausible theory for the origin of the species.[69]

Michael Kinch explains that there were two main opposite currents to explain all this during the first half of the nineteenth century. At the one extreme, there were naturalists who believed nature was carefully designed by God, who had intentionally distributed animals and plants on the globe as they were now, and whose intervention was the only cause for the patterns they observed. They saw disjunct distributions as proof that there had been multiple centers of creation. At the other extreme, there were those who saw nature governed by general laws effective after God's creation. The geography of plants and animals was a consequence of migration and extinction: dispersion and physical barriers were the causes of disjunct distributions and endemisms.[70] Even if Temminck's law was the opposite of his colleagues' views, his writings on the Sunda islands and on variations within species suggest that he would have agreed with the first group of naturalists, those who believed that God's plan was behind the structure of nature. Disjunct distributions and endemisms were proof of God's hand in assigning certain types to certain regions. Animals, naturally, would migrate and disperse until either climate of barriers would prevent them from going any further. After 1860, some naturalists like Richard Owen and Louis Agassiz embraced the idea of a divine plan, as they saw everywhere in nature evidence of a universal plan and, consequently, of a designer, while Charles Darwin, Alfred Russel Wallace and Charles Lyell found in

[69] Larson, "Not without a Plan"; see also Mayr, *The Growth of Biological Thought*, 443.
[70] Kinch, "Geographical Distribution," 117-19.

evolution through natural selection the answers to the problems posed by the geographical distribution of the species.

The significance of Temminck's work on geographical distribution

Temminck's work on biogeography is of particular interest for two reasons. Firstly, there is Temminck's law, which gives us an idea of where he stood in terms of natural philosophy, and secondly, there is his account of which species could be found where, based on the collections and observations of other naturalists from Malaysia, Indonesia and Japan. And while Temminck's law went practically unnoticed, the descriptive section of his work certainly did not. His works on the fauna of the Dutch East Indies and Japan, when added up to the systematic works, solidified his international status. After all, he provided valuable information to those searching for answers about the geographical distribution of animals—and the fauna of Southeast Asia was particularly compelling. The importance of Temminck's publications on distribution patterns relied not on their philosophical foundations, but on their descriptive sections.

Temminck's law passed through the nineteenth century virtually unheeded. There are hardly any references to it the scientific literature, with the exception—perhaps the only one—of the note by John Richardson quoted above, emphasizing the role of genera in Temminck's law. As systematics was in constant change, especially at the genus and species levels, Richardson's remarks were prophetic: Temminck's type concept was linked to that of genus, and due to the continual changing and splitting of genera, Temminck's proposition no longer had a well-defined meaning. But there are other reasons for this silence about Temminck's law. First of all, Temminck failed to address in an ordered, clear way the issues that were central in the discussions on biogeography. His law was formulated first in an article written in Dutch, and the second time in the introductory paragraphs to the description of new mammals from Japan, in French. Temminck's law appears very isolated in a text that is actually an introduction to the description of new mammals. Further information that may allow the reader to understand his ideas is scattered through his works. There are no sections or chapters either in the *Fauna Japonica* or in his *Coup-d'oeil général* dedicated exclusively to a detailed theory of distribution. Because he did not construct a logical, comprehensive theory for his observations, it is not really surprising that other naturalists ignored his law—if they were acquainted with it at all—as a serious explanation for the geographical distribution of animals and its related problems. One has to distill Temminck's concepts by laboriously sieving through his works and interpreting them.

An added weakness of his law is that Temminck failed to explain why his law is "less true" for the Southern hemisphere. Was it because of the climate? The geology? Temminck did not say. In addition to the lack of a well-articulated theory, Temminck's law gained no attention because it relied so heavily on the unity of an ideal plan, represented by the types. This typological thinking began to fade during the first half of the nineteenth century for many naturalists. His types led Temminck to emphasize unity and similarities, while most naturalists were concerned with the overwhelming numbers of different species and their strange distribution patterns.

Temminck also left many interesting questions unanswered, like the origin of the species, the significance of variation, the role of God in creation and the meaning of disjunct distributions and endemisms. He came across strange distributions in the fauna of the Indonesian Archipelago, facts that he labeled as remarkable and yet did not attempt to explain. Unfortunately, he did not engage in a discussion on the possible meaning of these patterns, nor did he specify why they are "important" and "striking."[71] For instance, after studying the fauna of the Moluccas, he found that the differences in fauna among islands with the same climate and very close to each other were most remarkable. His account of the fauna on these islands is limited to listing which species lived where and even when he did make comparisons between islands, he offered no explanation.[72]

Temminck did not tackle the problem of disjunct distributions either: why were there individuals of the same species inhabiting distant regions? For example, he noted that the Bongsoe Mountain in Sumatra was populated by Alpine-like flora: "The vegetation on its top carries all the characteristics of the alpine plants of Europe," including species of *Vaccinium* (a genus of dwarf shrubs that includes cranberries and blueberries) and *Rhododendron* (azaleas and related plants).[73] Why are the same plants inhabiting the mountains of central Europe, Sumatra and South America? Have these mountains similar climates and soil? Did God create these species *in situ* in the process of multiple creations? Again, Temminck offered no answers. As Nelson remarked: "causal explanation for Buffon's law was explored with reference to climate and external factors generally, but there was general agreement that external factors in themselves are insufficient to account for the law—a conclusion most decisively stated, perhaps, by Candolle."[74] The failure to quote and contest Buffon's law in an articulated way, Temminck's typological thinking and the lack of explanations for endemisms and

[71] Temminck, "Blik op de dierlijke bewoners," 67.
[72] Temminck, *Coup-d'oeil général*, vol. 3, 235-36.
[73] Temminck, *Coup-d'oeil général*, vol. 2, 82.
[74] Nelson, "From Candolle to Croizat," 286.

disjunct distributions, are the greatest shortcomings of Temminck's theories on animal distribution.

Even though Temminck's law received no attention, his contemporaries attributed great value to his description of the species distribution in the Dutch colonies. Works like the *Faune des Iles de la Sonde et de l'Empire du Japon* and the three-volume *Coup-d'oeil général* were relevant because in them he compared the faunas of the Sunda Islands and Japan with each other and with those of Asia and Australia. The account of the species living on certain islands, but not on others, the report of endemisms on Sulawesi and the Moluccas and the transition from Asian to Australian fauna were all important observations in Temminck's time, even though he was certainly not the first to address this phenomenon. Eberhard A. W. Zimmermann, a German geographer, zoologist and professor of mathematics and natural sciences at the Collegium Carolinum in Braunschweig, published in 1777 in Leiden what could be qualified as the first work on mammal zoogeography. In his *Specimen Zoologiae Geographicae Quadrupedum Domicilia et Migrationes sistens*, he compared the faunas of Asia, the Sunda Islands and Australia, the very same regions that so intrigued Temminck.[75] Similarly, French naturalists published in the 1840s a series of accounts of the fauna of the region after the discoveries made during the voyages of the *Uranie*, the *Physicienne*, the *Astrolabe* and the *Coquille*.[76]

From Britain, works like Charles Lyell's *Principles of Geology* (1830–1833), James Horsburgh's *India Directory* (1836) and Thomas Horsfield's *Zoological Researches in Java and the Neighbouring Islands* (1824) also dealt with the East Indian fauna. Temminck's works, however, included additional information on the species distribution among the Indian archipelago, facts that were new to naturalists. Particularly important were the newly described species and the meticulous comparison between the Sunda Islands, and the description of the Japanese fauna, until then mostly unknown in Europe. These facts were either completely new or had previously been published in Dutch or in German in journals with a limited distribution, and were therefore not accessible to other naturalists.[77] For nineteenth-century natural history, the description of the faunas of the

[75] Temminck was at least acquainted with this work, as it is listed in the *Catalogue de la bibliothèque délaissé par C. J. Temminck*.

[76] Jules-Sébastien-César Dumont d'Urville, *Voyage de la corvette l'Astrolabe exécuté par ordre du Roi, pendant les années 1826-1827-1828-1829, sous le commandement de J. Dumont d'Urville*, 13 vols. (Paris: J. Tastu, 1830); Duperrey, *Voyage autour du monde: exécuté par ordre du roi, sur la corvette de Sa Majesté, la Coquille, pendant les années 1822, 1823, 1824, et 1825*; Louis Claude Desaulses de Freycinet, *Voyage autour du monde: entrepris par ordre du roi ... exécuté sur les corvettes de S. M. l'Uranie et la Physicienne, pendant les années 1817, 1818, 1819 et 1820*, 4 vols. (Paris: Pillet, 1824?–1844).

[77] For instance, Temminck, "Zoogdieren van Japan" and "Blik op de dierlijke bewoners"; Salomon Müller, "Aanteekeningen, over de natuurlijke gesteldheid van een gedeelte der westkust en binnenlanden van Sumatra," *Tijdschrift voor natuurlijke geschiedenis en physiologie* 2 (1835) and "Ueber den Character der

European colonies opened a new range of problems, questions and possibilities. All these zoological and botanical treatises, loaded with new information like Siebold's *Fauna* and *Flora Japonica* or Temminck's *Coup d'oeil* and the *Verhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche bezittingen*, were fundamental for the development of new theories, including natural selection and evolution. Temminck's publications in particular were quoted by Andrew Murray in *The Geographical Distribution of Animals*, Jan Baptist Jozef van Doren in the *Mémoire sur les Quadrumanes et les Chéiroptères de l'Archipel Indien* and Alfred Russel Wallace, who had also consulted Temminck's works, especially those on mammals and birds.[78] Jane Camerini explains how Charles Darwin made use of Temminck's writings when looking for information about the East Indian fauna, among many other sources.[79] Darwin drew a table comparing the mammals from Sumatra, Java, Borneo, the Moluccas and other islands which, according to Camerini, "was almost certainly made in conjunction with his reading of Temminck's *Coup d'oeil sur la faune des îles de la Sonda et de l'empire de Japon* in 1839."[80]

Because of the paucity of theoretical explanations by Temminck, this analysis of his law on biogeography gives unique insight into his understanding of the concepts of type, genus and species, which stood at the very foundation of all of Temminck's work in systematics. In particular, his definition of genera, his views on variation and, by extension, his practices of zoological nomenclature were crucial for his classifications – and were praised as well as criticized. It is in his reactions to these criticisms that we will gain a deeper understanding of the significance of Temminck's work in particular, and of the advancement of systematics within natural history in general.

Thierwelt auf den Inseln des indischen Archipels, ein Beitrag zur zoologischen Geographie," *Archiv für Naturgeschichte* 12, no. 1 (1846).

[78] Murray, *The Geographical Distribution of Mammals*, 116, 376; Van Doren, *Mémoire sur les Quadrumanes et les Chéiroptères de l'Archipel Indien*. Wallace referred to Temminck's *Monographies de mammalogie* and the *Verhandelingen over de natuurlijke geschiedenis der Nederlandsche Overzeesche Bezittingen*. See Alfred Russel Wallace, "On the Orang-Utan or Mias of Borneo," *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 17 (1856); "On the Habits of the Orang-Utan of Borneo," *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 18 (1856); *The Malay Archipelago: the Land of the Orang-utan, and the Bird of Paradise*, 1 ed. (New York: Harper & Brothers, 1869).

[79] Camerini, "Evolution, Biogeography, and Maps," 711.

[80] Camerini, "Evolution, Biogeography, and Maps," 712.

CHAPTER FIVE

Systematics wars[1]

Temminck's debates

Temminck was quite cryptic when it came to describing his more philosophical views on nature and how to best comprehend it, even though these were fundamental in his practice of systematics. Only in two contexts do we learn more about them: through his law on the geographical distribution of animals and in his rebuttals of other naturalists' criticisms of his methods of zoological classification. His law allows us to understand Temminck's type concept, which is intimately linked to his ideas of genus and species, as we have seen in the previous chapter. His reactions to other naturalists will give us a better understanding of Temminck's daily practice in systematics as well as provide a broader context for his work. Temminck's discussions with other systematists revolved mostly around the rules of zoological nomenclature, the establishment of genera and the best methods for arriving at a natural system of classification. Although these issues may seem quite technical to the non-specialist, they are actually at the very core of how naturalists understand the world around us, and therefore these debates dealt with much more profound issues than just naming species and grouping them into categories.

Temminck's disputes with the French ornithologist Louis Pierre Vieillot and with the Irish zoologist and politician Nicholas Aylward Vigors can serve as the starting point to place Temminck's ideas on classification in the context of his time as well as to illustrate three main points. Firstly, between 1800 and 1840 the main goal of classification was to find a natural system, one that reflected the true organization in nature. Secondly, although this goal was shared by most naturalists, their approach varied according to their scientific backgrounds, cultures and beliefs. This resulted in a variety of systems of

[1] This chapter is partly based on a previously published article, M. Eulàlia Gassó Miracle, "On Whose Authority? Temminck's Debates on Zoological Classification and Nomenclature: 1820–1850," *Journal of the History of Biology* 44, no. 3 (2011). Changes have been made to include new insights and references, and to avoid duplications in this book.

classification, chaos in nomenclature and heated discussions. Thirdly, as more and more naturalists participated in these discussions, natural history changed from being the dominion of a few learned men into a field of expertise of many devoted naturalists. During the first decades of the nineteenth century, natural history was transformed from an autocracy into a democracy. The pursuit of standardization of rules, practices and forms of communication was a main occupation—and preoccupation—of naturalists at the time. As a result, scientific progress only became possible through debate and consensus. This shift had important consequences for the practice of natural history as well as for Temminck's influence and reputation as an ornithologist. I will return to this point in the next chapter.

Temminck and Vieillot had already clashed when the French naturalist copied some descriptions of new species from Temminck's *Catalogue Systématique* of 1807 and gave them Latin binomials—something Temminck, inexperienced as he was, had neglected to do. Nearly ten years later, Vieillot wrote a seventy-page book entitled *Analyse d'une nouvelle ornithologie élémentaire*, in which he proposed a whole new classification system and described many new species, some already described before him by other naturalists.[2] Temminck was quick to respond to what he considered an attack on his credibility while stating very clearly his ideas on how the classification and nomenclature of birds should be carried out. In 1817, he published the *Observations sur la classification méthodique des oiseaux, et remarques sur l'Analyse d'une Nouvelle Ornithologie Élémentaire par L. P. Vieillot*. It was an act of war.

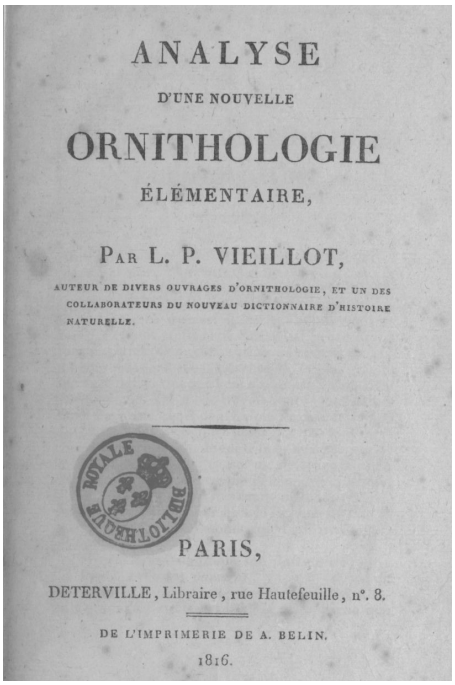
Vieillot answered him a year later, in the entry on ornithology in the *Nouveau Dictionnaire d'Histoire Naturelle*. Vieillot aimed to demolish Temminck's system, accusing him of plagiarism but ignoring the *Observations* of 1817, much to Temminck's surprise.[3] Temminck wondered, not without sarcasm, if the reason why Vieillot only mentioned works published up to 1815 was to avoid referring to Vieillot's own *Analyse* from 1816 and Temminck's *Observations* from 1817.[4] However, Temminck may have been wrong, as the second edition of the *Nouveau Dictionnaire* had been commissioned several years before, and it is possible that Vieillot had already submitted his article to the editors before Temminck's *Observations* had been published in 1817. On the other hand, Howard Saunders suggested that Vieillot may in fact have modified his classification:

[2] Louis Pierre Vieillot, *Analyse d'une nouvelle ornithologie élémentaire* (Paris: Deterville, 1816); Paul H. Oehser, "Louis Jean Pierre Vieillot (1748–1831)," *Auk* 65, no. 4 (1948); Stresemann, *Ornithology from Aristotle to the Present*, 122-23.

[3] Louis Pierre Vieillot, "Ornithologie," in *Nouveau Dictionnaire d'Histoire Naturelle, Appliquée aux Arts, à l'Agriculture, à l'Économie rurale et domestique, à La Médecine, etc.*, ed. Charles Sigisbert Sonini (Paris: Deterville, 1818), 96-98.

[4] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xv.

"The main principles of classification adopted by Vieillot are applied by him in his portion of the *Nouveau Dictionnaire d'Histoire Naturelle* (1816–1819), although some appear to have been modified in consequence, perhaps, of the criticisms passed upon the *Analyse* by Temminck."[5]


ANALYSE

D'UNE NOUVELLE

ORNITHOLOGIE

ÉLÉMENTAIRE,

PAR L. P. VIEILLOT,

AUTEUR DE DIVERS OUVRAGES D'ORNITHOLOGIE, ET UN DES COLLABORATEURS DU NOUVEAU DICTIONNAIRE D'HISTOIRE NATURELLE.

PARIS,

DETERVILLE, Libraire, rue Hautefeuille, n°. 8.

DE L'IMPRIMERIE DE A. BELIN.

1816.

FIGURE 5.1. Title page of Louis Pierre Vieillot's *Analyse d'une nouvelle ornithologie élémentaire* (1816).

The main point of Vieillot's criticism of Temminck's system of classification was that it seemed to him to be nothing more than a compilation of previous ornithological systems. By comparing Temminck's groups with those of other naturalists, Vieillot concluded that Temminck's work was simply not original. Temminck's bitter answer to the *Dictionnaire* appeared in the introduction of the second edition of the *Manuel d'ornithologie* in 1820. A few years later, Temminck engaged again in a dispute, this time with Nicholas Vigors, who in 1825 published an article questioning Temminck's classifications, his concept of genera and his general views on the advance of science. For some reason, Temminck did not answer in a short article directed at Vigors, but he did so indirectly, in the second edition of the *Manuel*—as he had done with Vieillot's

[5] Howards Saunders, "Preface," in *Vieillot's Analyse d'une nouvelle ornithologie élémentaire*, ed. Howards Saunders (London: The Willughby Society, 1883), iv.

criticisms. Not only did Temminck's answer appear ten years after Vigors' article had been published, but Temminck did not mention Vigors' name at all. Whether Temminck noticed the 1825 article rather late or whether he deliberately chose to include his rebuttal in the *Manuel*, remains unclear. In any case, the delay explains why their discussion has not been noticed before and, in all probability, it went unnoticed in Temminck's time too. Temminck's remarks, however, are clearly an answer to Vigors. The altercations between Temminck and Vigors were less nasty than those with Vieillot in that they were less personal and more technical, but in them we also find vital clues to these men's understanding of the natural world and of natural history. What follows is an account of the subjects in dispute between Temminck, Vieillot and Vigors, and an attempt to link these issues with their common ideal of attaining a natural and universal system of classification of animals that reflected the true order of nature.

Nomenclatural chaos

In the period when Temminck and Vieillot were engaged in their disputes, natural history collections and literature were rapidly growing. A multitude of works were published dedicated to European and exotic birds. Many were iconographic in nature, other works were strictly descriptive and some were accounts of *naturalistes voyageurs*.[6] One of the most immediate and obvious problems to appear on the scene of natural history was the multiplication of scientific names. As more naturalists dedicated themselves to the study of local and tropical faunas, it became very difficult to keep track of new discoveries and to have access to all publications. Sometimes, the same species was described independently by different naturalists and thus given two names at more or less the same time. Similarly, naturalists could easily be unaware that a species had already been described and proceed to give it another binomial. Additional confusion came from the practice of substituting older names by new ones that seemed more appropriate. On top of this, and also as a consequence of the increase in the number of naturalists devoted to cataloguing nature, classification systems and the ranking of species within those systems were constantly changing. Knowledge increased and classification systems were in constant revision. Genera were split into two or more new ones, species were moved from genus to genus and the suprageneric levels were just as unstable. Consequently, specific names changed with every review.

In the midst of this proliferation of works on birds, Temminck was determined to put some order into the nomenclature, beginning by listing the names known to him, followed by a validation process for each. Temminck had set his mind on minimizing

[6] Farber, *Emergence of Ornithology*, chap. 5.

the problem of synonymies, in order to present other naturalists with the most complete and accurate nomenclature.[7] Consequently, in his monographs on pigeons and gallinaceous birds, as well as in the *Manuel d'ornithologie*, Temminck compiled all names known to him and revised the status of the synonymy, then decided which name was to be preferred in each case on the basis of priority or suitability: "I have spared neither effort nor means to bring the *General Index* [of the *Manuel*] to the level of the current knowledge in ornithology, that is, I have purged it as much as possible of the double, triple and often quadruple names which clutter the works of Gmelin, Latham as well as more recent publications."[8]

Vieillot's and Temminck's imputations of plagiarism were a direct consequence of the absence of a canon or code for zoological nomenclature. By the early nineteenth century, most binomials in zoology followed the precepts set by Linnaeus, later amended by Johann C. Fabricius in 1778.[9] After them, the Swiss botanist Augustin Pyramus de Candolle published his version of the rules for botanical nomenclature in 1813.[10] By the early 1800s every natural historian was familiar with these rules of nomenclature, although there had been no explicit agreement on which rules were universal and when exceptions might be made. Naturalists held different opinions and interpretations of the rules of nomenclature and this gave rise to heated discussions about the validity of many scientific names. Also, they were inconsistent in their publications when it came to applying these rules; some, including Temminck, changed their minds along the way, finding justifiable exceptions and breaking the rules as they went. Not surprisingly, these discussions were always quite complex and almost never conciliatory.

One of the most important and debated rules since Linnaeus was the rule of priority. There was a general agreement on preserving the first scientific name ever given to a species or genus. The original name in the literature for a species at the time of its first

[7] Temminck, "Avant-propos," *Manuel d'ornithologie*, 1 ed., ix.

[8] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xviii.

[9] Carolus Linnaeus, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 ed. (Leiden: Theodor Haak, 1735), and subsequent editions; *Philosophia Botanica in qua explicantur fundamenta botanica cum definitionibus partium, exemplis terminorum, observationibus rariorum, adjectis figuris æneis* (Stockolm: G. Kiesewetter, 1751); *Species plantarum: exhibentes plantas rite cognitas ad genera relatas, cum differentiis specificis, nominibus trivialibus, synonymis selectis, locis natalibus, secundum systema sexuale digestas*, 2 vols. (Stockholm: Holmiae, 1753); Johann Christian Fabricius, *Philosophia entomologica sistens scientiae fundamenta, adiectis definitionibus, exemplis, observationibus, adumbrationibus* (Hamburg: Impensis Carol. Ernest. Bohnii, 1778).

[10] Augustin Pyramus de Candolle, *Théorie élémentaire de la botanique; ou, Exposition des principes de la classification naturelle et de l'art de décrire et d'étudier les végétaux* (Paris: Déterville, 1813). See also Melville, *Towards Stability*; Antonello La Vergata, "Au nom de l'espèce: classification et nomenclature au XIXe siecle," in *Histoire du concept de l'espèce dans les sciences de la vie: colloque international (mai 1985) organisé par la Fondation Singer-Polignac, Paris*, ed. Scott Atran (Paris: Fondation Singer-Polignac, [1987]).

description was to be kept for the sake of clarity and stability. Any name later given to the same species was considered a junior synonym and invalid.[11] The rule of priority was widely acknowledged, but far from being strictly applied. Many, including Temminck, accepted that there were exceptions to this rule. Consequently, a new name was proposed to replace the original one if it was considered more suitable, a better description of a certain character, behavior or the place where the animal had been collected. This was not a mere technicality: by changing a name, a naturalist invalidated the work of the author who had coined it, undermining his authority. The author's credibility was thus challenged and it is also partly for this reason that we find such bitterness in discussions on nomenclature.

The arguments between Temminck and Vieillot revolved around two main points: firstly, on the validity of the names coined by these two men and secondly, on the validity of their classification systems as a whole. Regarding nomenclature, each accused the other of appropriating the names of species and higher taxonomic categories from other works. In his *Analyse* from 1816, Vieillot described several known species by using other naturalists' names and descriptions, without giving any credit to the original author and thus committing plagiarism. This was an unforgivable crime in Temminck's eyes, "an insolent pillage, consisting in appropriating the research and the nomenclature published by other modern authors, who are nowhere mentioned, altering their ideas by changing the meaning of the words or their orthography."[12] Vieillot's plagiarism was met with anger and cynicism by Temminck: "it is hardly imaginable that our savant believed in good faith that his plunder would go unnoticed, and that his new classification and nomenclature would be quoted as the fruits of his own discoveries, and of the conceptions of his genius."[13]

Other naturalists joined Temminck in condemning Vieillot's practice of borrowing descriptions, but his classification system was partly accepted by some ornithologists. For example, the British zoologist William Swainson echoed Temminck's complaints: "M. Temminck has publicly protested against these plagiarisms, and others have spoken

[11] Linnaeus wrote: "Nomen genericum dignum; alio, licet aptiore, permutare non licet. […] Abstinendum ab hac innovatione quæ numquam cessaret, quin indies aptiora detegerentur ad infinitum" ("A generic name, that is worthy to be retained, ought not to be changed for any other, though more fit and proper. [...] Such innovations ought by no means to take place, because new names more fit might be every day invented without end." In Linnaeus, *Philosophia Botanica*, 196). The German botanist and pharmacist Carl Ludwig Willdenow proposed the same law of priority in 1792 in his *Grundriss der Kräuterkunde zu Vorlesungen* (Berlin: Haude und Spener, 1792).

[12] Coenraad Jacob Temminck, *Observations sur la classification méthodique des oiseaux, et remarques sur l'Analyse d'une Nouvelle Ornithologie Élémentaire par L. P. Vieillot, auteur de divers ouvrages d'ornithologie, et un des collaborateurs du Nouveau dictionnaire d'histoire naturelle* (Paris: Gabriel Dufour, 1817), 7.

[13] Temminck, *Observations sur la classification méthodique*, 55-56.

of them in terms of severe censure."[14] Nevertheless, Swainson remained objective and noted that Temminck "does not attempt to grapple with the more difficult and intricate groups, such as the old genera *Picus, Psittacus, Sylvia, Columba*, &c., all of which he leaves nearly in the same state as they are to be found in Latham, and other Linnaean writers. In this respect, his divisions are far inferior to those of Vieillot [*Analyse*, 1816], and even of Cuvier."[15]

Outraged by Temminck's harsh critique, Vieillot pointed out that Temminck had replaced existing names for new ones, disregarding the work of others. Furthermore, he found Temminck was relying too heavily on the main groups as established by his predecessors, Latham and Illiger.[16] Because of this, Vieillot concluded that the *Manuel* was hardly anything more than an assemblage of previous works: "This is the compilation that the author [Temminck] claims to be the fruit of his efforts and the model to be followed by modern ornithologists. Does this not remind us of the Fable of the Jay?"[17] Temminck was infuriated: "Rest reassured, too scrupulous Vieillot! I will not evoke in turn other allegories of the good La Fontaine."[18] The disputes on names between Temminck and Vieillot were a bitter contest for credibility. Temminck wrote:

> Some of my readers have undoubtedly already done justice to the conduct of M. Vieillot, and perhaps they will blame me for responding to puerilities; but being attacked, as I am, by a censor who seeks fame, no less by his literary pretensions than for by scientific works, I will in turn display my competence by employing other weapons than his.[19]

That said, Temminck presented his counterarguments to Vieillot's practices of zoological nomenclature.

Vieillot had replaced existing names with new ones by translating Latin names into Greek, suppressing a few letters or altering the orthography, and then presenting the new names as his own. For Temminck, it was not only a grave impropriety not to quote the author of the original name, but it was also against the fundamental principles of nomenclature and the practice of science itself. By universal agreement since Linnaeus every new name had to be a Latin or Greek one and to be formulated according to the

[14] Swainson, *Treatise on the Geography*, 182.
[15] Swainson, *Natural History and Classification of Birds*, vol. 1, 201.
[16] John Latham, *Index ornithologicus, sive Systema ornithologiae; complectens avium divisionem in classes, ordines, genera, species, ipsarumque varietates: adjectis synonymis, locis, descriptionibus, &c.*, 2 vols. (London: Leigh et Sotheby, 1790); Johann Karl Wilhelm Illiger, *Prodromus systematis mammalium et avium; additis terminis zoographicis utriusque classis, eorumque versione germanica* (Berlin: C. Salfeld, 1811).
[17] Vieillot, "Ornithologie," 97-98. Here Vieillot referred to the Fable "The Jay Dressed in Peacock's Plumes" of Jean de La Fontaine; "Le geai paré des plumes du paon," in *Fables*, vol. 4, fable 9 (Paris: Barbin, 1668).
[18] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xv.
[19] Temminck, "Introduction," *Manuel d'ornithologie*, 2 ed., vol. 1, xi-xii.

grammar of these languages. However, if a binomial was a hybrid of both languages, a "barbarian" one (that is, not derived from Greek or Latin) or incorrect either in grammar or orthography, it was common practice to replace it. This was particularly annoying to Temminck. For him, the new systems and the alternative nomenclature slowed down the progress of zoology and destroyed the work done by previous naturalists.[20] As an example, Temminck mentioned the thirteenth edition of Linnaeus' *Systema Naturae*, edited by Johann Friedrich Gmelin. According to Temminck: "[Gmelin] had the talent of making of the thirteenth edition of Linnaeus the most indigestible book there is: therefore, those who insist on following it slavishly cannot fail to fall into the greatest errors."[21] Even though a name may not be derived from Greek or Latin, Temminck said, it was always better to preserve it, provided of course it had been widely recognized and accepted:

> In my view it is preferable to keep the ancient name of a species that has been accepted around the world (even though the name might be barbarous in its composition, not having Greek or Latin roots), rather than substitute it with another name that, although it might be better chosen or grammatically more correct, it will likely cause misunderstandings, because nothing is worse for the development of the natural sciences, and in particular for the natural history of birds, than all these different opinions about the names of genera and species.[22]

Naturally, he meant opinions other than his own. When Temminck decided to change a scientific name, he said, it was to correct misidentifications and mistakes such as when variations due to sexual dimorphism or molting stages had been incorrectly described as new species.

There were, however, in Temminck's view a few cases that justified the replacement of a scientific name by a new one. One of these had to do with geography. Often, animals received names denoting the geographical origin of the species, like *javanicus*, or *borneensis*, shortly after their discovery but without having an accurate picture yet of their actual distribution. Later, new discoveries proved that the name was actually mismatched. In such cases, Temminck felt that a correction was called for. He argued that during an age of continuous discovery and with such large areas yet to be surveyed, naturalists should avoid "the unfortunate fancy of giving to animals the names of places," causing confusion about their actual geographic distribution.[23] However, other

[20] Temminck, "Avant-propos," *Manuel d'ornithologie*, 1 ed., xi-xiv.
[21] Temminck, "Avant-propos," *Manuel d'ornithologie*, 2 ed., vol. 1, xxxii.
[22] Temminck, "Avant-propos," *Manuel d'ornithologie*, 1 ed., xi.
[23] Coenraad Jacob Temminck, "Monographie over een nieuw geslacht van Knaagdier, onder den naam van Nyctocleptes," *Bijdragen tot de natuurkundige wetenschappen* 7 (1832): 3, footnote.

naturalists had different opinions on the matter. Frédéric Cuvier, for instance, thought that naming animals after countries had an irrefutable advantage: after all, a geographic epithet recorded the place where particular specimens had been first discovered.[24] Consider the Sunda leopard cat, a small wild cat that inhabits the islands of the Philippines, Sumatra, Borneo, Java and Bali. Demarest named it *Felis javanensis* in 1816. By 1824 it had become clear that the cat's distribution was actually wider than only Java, so Temminck decided to change its name into *Felis minuta.*[25] The American naturalist Thomas Horsfield felt that the change was unjustified: after all, the cat did actually live in Java, even if not only there. He responded to Temminck's "inconsiderate" change by quoting a passage from the *Histoire naturelle des mammifères* by Geoffroy Saint-Hilaire and Frédéric Cuvier:

> Men have objected, apparently with reason, to the practice of giving names of countries to specimens that may have a wider distribution; but considering that these names are given when these organisms are discovered for the first time, when their distribution is still unknown; and as everybody knows, as it is easy to agree that these designations are not absolute, one may recognize that of all names that mean something, names of countries are the ones with less disadvantages.[26]

But, if a species name was completely misleading (for example, when Cuvier named a Sumatran bear *javanensis*), Horsfield accepted that "this is a case therefore in which a topical name is erroneously applied and cannot be retained."[27] Accordingly, he provided a catalogue of Javanese birds listing their names as accepted in 1820, and the changes made since then by "the rejection of topical names, by the introduction of several names employed in the *Nouveau recueil de planches coloriées d'oiseaux*, published by M.M. Temminck and Laugier, and by other necessary alterations in Nomenclature."[28] The changes were sometimes needed to correct misidentifications, and sometimes, to restore older names by applying the law of priority. But on average, in the

[24] Frédéric Cuvier, "Nouveau Recueil de planches coloriées d'oiseaux… par M. Temminck, conservateur du cabinet d'histoire naturelle de Leyde, et M. Meiffren Laugier, baron de Chartrouse," *Journal des Savants, 2 Sér*, no. 17 (1832): 645.

[25] Temminck, *Monographies de mammalogie*, vol. 1, 132.

[26] Étienne Geoffroy Saint-Hilaire and Frédéric Cuvier, "Ours de Sibérie," in *Histoire naturelle des mammiferes, avec des figures originales, coloriées, dessinées d'après des animaux vivans*, vol. 5 (Paris: A. Belin, 1824), livraison 42; quoted by Thomas Horsfield, "Description of the Helarctos euryspilus; Exhibiting in the Bear from the Island of Borneo, by the Type of a Subgenus of Ursus," *Zoological Journal of the Linnaean Society* 2 (1826): 230, footnote.

[27] Horsfield, "Description of the Helarctos euryspilus," 229, footnote.

[28] Thomas Horsfield, "General Catalogue of Javanese Birds," in *Zoological Researches in Java, and the Neighbouring Islands* (London: Kingsbury, Parbury, & Allen, 1824).

1820s, nomenclatural practices still depended very much on the author's personal views. An anonymous reviewer of Temminck's *Monographies de mammalogie* warned the reader:

> But the propriety or impropriety of employing such names does not fall fairly into discussion in this instance; such an enquiry, how indispensable soever previous to designating a species, becomes too late when the name has been applied. It must then be of necessity retained, unless it conveys a decidedly false impression; and even in this case, considerable hesitation would be experienced by every naturalist, who felt unwilling to increase the disarray already too prevalent in synonymy.[29]

Horsfield noticed that "the employment of names taken from the countries where animals are found, or have been discovered, is a constant theme of discussion and declamation with Continental naturalists."[30] This did not mean that all British naturalists agreed on this. The question of names derived from geography was viewed differently by William Swainson. He believed that names of species could, occasionally, be derived from their geographic range, "provided it is peculiar," but he warned the reader that such names should not be used when all the species of the same genus inhabit one and the same country. He added: "when a species has been so designated by old writers, we think its name should be cancelled."[31]

If deciding how to apply the rules of nomenclature when it came to topical names was complicated, how to proceed with double descriptions and priority was a can of worms. Often, species already described were re-baptized and described again, even multiple times by different people in a few years. The difficulty here was often one of interpretation: had the author who duplicated the description been unaware of previous publications? Or did he intend to replace it with a better description and a more suitable name? There was also the possibility that the first author had misidentified the species, for example, taking a female as a new species because it was so different from the male. Authors usually explained their reasons for replacing existing names, but naturalists who failed to do so could expect rebukes from their peers.

There were naturalists who thought that the law of priority had to be followed strictly—no exceptions. George Robert Gray, zoologist and keeper of the British Museum in London, referred to it in 1842 as "the inflexible law of priority." He wrote: "In accordance with established practice, however, I regard the names first given,

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[29] "Analytical Notices of Books. Monographies de Mammalogie, ou descriptions de quelques genres de Mammifères dont les Espèces ont été observées dans les différens Musées de l'Europe. Par C. J. Temminck, livraison 4ème," *Zoological Journal of the Linnean Society* 2 (1826): 532.

[30] Horsfield, "Description of the Helarctos euryspilus," 229, footnote.

[31] Swainson, *Natural History and Classification of Birds*, vol. 1, 240.

notwithstanding the anathema which has been pronounced against them by some of our law givers, as sacred, and have quoted the subsequent series only as their synonyma."[32] While taking up the monumental task of cataloguing all genera of birds ever described, Gray concluded, understandably, that the tangle generated by all the synonyms impeded the progress of science. He then listed all the names known to him in his *List of the Genera of Birds*. The first version of the list appeared in 1840 and then, rather overcome, he left it to the "judgement of each individual who chooses to pursue the subject, to select those which he considers tenable, and to erase the rest." To this he immediately added, maybe as a warning, that "no individual possesses the right of dictating what are, and what are not, good generic groups, or of erasing from the list of genera those of his fellow naturalists which may not exactly square with his own particular view."[33] As we will see, Temminck could not agree less.

Temminck found himself being criticized for intentionally renaming species already named by others. In a number of cases, Temminck seemed unaware of the plagiary or, at least, he offered no explanation at all. But on other occasions he was fully aware of the replacements, which he made mostly for two reasons: firstly, when he considered that the species belonged to a different group than the to which it had been previously assigned, and secondly, when the original description was for him somehow insufficient or based on defective specimens. For example, Temminck decided to redo the description of a particular hornbill that Levaillant had named *Calao rhinoceros*, arguing that Levaillant's description was based on a mutilated specimen, one made of parts that belonged to different species—an artifact.[34] Then, using drawings made from a living specimen (in all probability, by a member of the Natuurkundige Commissie, Pieter van Oort) he placed this bird in another genus and renamed it as *Buceros lunatus* Temm.:

> We have made known in the index of the genus and in its supplement, that the details published up to now concerning this species, plate 546, a precise figure from a live specimen, are based on Levaillant's description and on the figure of a mangled specimen, artistically made of assembled pieces. We now possess this specimen; it has only four tail feathers, in particular, those in the middle, the anterior and posterior parts of the helm have been mutilated and repaired, it seems, with pieces of cork on which a horny layer has been carefully glued; this

[32] George Robert Gray, "Preface," in *Appendix to a List of the Genera of Birds* (London: Richard and John E. Taylor, 1842), iv.
[33] George Robert Gray, "Preface," in *A List of the Genera of Birds: with their Synonyma and an Indication of the Typical Species of Each Genus*, 2 ed. (London: Richard and John E. Taylor, 1841), vii.
[34] François Levaillant, *Histoire naturelle d'une partie d'oiseaux nouveaux et rares de l'Amérique et des Indes* (Paris: J. E. Gabriel Dufour, 1801).

is the condition of the specimen used as model for plate 13 of Levaillants' *Oiseaux rares*.[35]

FIGURE 5.2. Original watercolor of a Rhinoceros Hornbill, possibly by Pieter van Oort, from a live specimen.

FIGURE 5.3. Plate by Jean-Gabriel Prêtre of the rhinoceros hornbill from a stuffed specimen from the Leiden museum, in Temminck and Laugier's *Nouveau recueil de planches enluminés*, vol. 2, Pl. Col. 546 (1838). Prêtre probably used Van Oort's drawing to improve his lithograph.

[35] Temminck and Laugier de Chartrouse, "Calao en casque en croissant. Bucerus lunatus Temm," in *Nouveau recueil de planches coloriées*, vol. 2, 65.

As Temminck grew older, more redundant descriptions slipped into his works. The reviewers of Temminck's great iconographic work, the *Nouveau recueil de planches coloriés d'oiseaux*, pointed this out on several occasions. When the first installments were published, the authors received many positive reviews for the exactitude of the figures, for the accurate descriptions of the species, and for the synonymy lists that accompanied every name.[36] A review in the *Annales Générales des Sciences Physiques* from 1820 read:

> We have delayed telling our readers about this important collection, and we are now most certain of the praise it should receive. The sixth installment that has just been published equals, if not surpasses, the installments that preceded it in beauty and perfection. After all, this is what one should expect from the reputation of its authors and from the authority these scholars have enjoyed for a long time.[37]

A year later, the reviewer stated: "This beautiful enterprise continues with admirable zeal, and its authors receive everywhere the satisfactory reviews they are entitled to expect from the many enthusiasts of the natural history of birds."[38]

But by the time the work was finally finished, in 1840, it had received mixed reviews along the way. Apparently, the quality of the last installments didn't live up to expectations, and Temminck had introduced new names for species that had already been described. The *Annals and Magazine of Natural History* published a review that praised the work for the clear descriptions of the species and the accuracy of the plates, but criticized Temminck's nomenclatural practices:

> the greatest blemish of the work is the passing of the discoveries of contemporary writers, with whose works M. Temminck should have been conversant; thus from the commencement of the series many birds are given under new denominations which had previously been described by other naturalists. A difference of opinion may have existed, but prior and contemporary labourers in the same field could scarcely all be unworthy of notice; even in the concluding Livraisons this is apparent.[39]

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[36] "Nouveau Recueil de Planches Coloriéés d'Oiseaux pour servir de complement aux Planches Enluminés de Buffon. Par MM. C. J. Temminck, d'Amsterdam, et Meiffren Laugier, baron de Chartrouse, de Paris," *Annales Générales des Sciences Physiques* 7 (1820); and "Nouveau Recueil de Planches Coloriéés d'Oiseaux. Par MM. Temminck et Meiffren Laugier," *Annales Générales des Sciences Physiques* 8 (1821).

[37] "Nouveau Recueil," *Annales Générales* (1820), 361.

[38] "Nouveau Recueil," *Annales Générales* (1821), 395.

[39] "Bibliographical Notices. Nouveau Recueil de Planches Coloriées d'Oiseaux… par M. Temminck et Meiffren Laugier Baron de Chartrouse, Livr. 98–102, 1839," *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 4 (1840): 267.

Charles Lucien Bonaparte detected a similar trend in Temminck's *Monographies de mammalogie*, in particular in his treatise on a genus of bats called *Vespertilio*. He listed a number of species that were misidentified and otherwise invalid: "His *Vespertilio brachyotus*, Baill., is nothing else than the *V. pipistrellus*. The *Vespertilio schreibersi* is perhaps the same with *Miniopterus ursinii* of my *Fauna Italica*, in the description of which he considered that the account of the teeth was wanting (of which, on the contrary, I gave a most minute description). This arose from his not knowing the proper place to seek it, for I having given these characters under the genus, could not repeat them under the species. The *Vespertilio limnophilus*, published by him as new in Plate 48 of the work, is the *Vespertilio dasycnemus* of Boie."[40] Straightening this chaos was one of the main concerns of early nineteenth century zoologists.

Strickland was particularly worried about it. A bit discouraged, he wrote: "Any one who will take the trouble to examine the various papers on ornithological nomenclature in the *Analyst*, will find that specific names are as variable as the London fashions." For him, the solution lay in applying the rule of priority: "Then will the nomenclature of Linnaeus, Cuvier, and Temminck triumph over the crude inventions of a host of anonymous scribblers."[41] In an attempt to create some order, he published a set of twenty-two rules for zoological nomenclature. However, the state of systematics was such that even these rules left plenty of room for interpretation and creativity. For instance, in his opinion there were some exceptions to the principle of priority, and rule number six was so ambiguous that it actually invited controversy: "A name may be expunged whose meaning is false, as applied to the object or group which it represents. Yet, in some few cases, where a name, though false, does not really mislead, it should be retained, if long established."[42] In general, Swainson's 1837 rules were badly received or, if approved of, regarded as guidelines and recommendations. It would not be until 1842 that zoological rules for nomenclature were formalized by an established scientific organization, the British Association for the Advancement of Science.[43] The consequences, as we will see later on, went far beyond the stabilization of nomenclature: the rules marked a shift of the seat of authority from individual practitioners to a self-governing collective of naturalists.

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[40] Charles Lucien Bonaparte, "Observations of the State of Zoology in Europe, as Regards the Vertebrata," in *Reports on the Progress of Zoology and Botany, 1841, 1842* (Edinburgh: Ray Society, 1845), 22.

[41] Hugh Edwin Strickland, "On the Inexpedience of Altering Established Terms," *Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology and Meteorology* 1 (1837): 128.

[42] Hugh Edwin Strickland, "Rules for Zoological Nomenclature," *Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology and Meteorology* 1 (1837).

[43] Rookmaaker, "Early Endeavours by Hugh Edwin Strickland."

Stability and reliability: these were the means for science to advance and to allow zoologists to understand each other. In order to attain the desired stability naturalists must follow certain rules and these rules should be accepted universally. So far, everyone agreed; but agreeing on the rules themselves was a very different matter. Vieillot coined his own names to replace older ones and created new ones by altering their original orthography; Temminck also gave new names to species that had been, in his eyes, incorrectly named or not sufficiently well-described. But because they had different reasons to make these changes, each accused the other of plagiarism. There were no universal rules and no recognized authority to settle the matter, a reflection of the fact that nomenclature and classification were still developing fields of natural history. Nicholas Vigors, convinced that nomenclature was more a tool than the foundation of classification, wrote in 1825:

> Nomenclature itself is variable. From its very nature it cannot remain stationary: it must be enlarged to suit the increasing bulk of materials which it is meant to regulate; it must be altered to meet the more accurate information of every day. But the principles which direct its art never vary. Standing on the philosophical basis upon which they were placed by Linnaeus, they are suited to every change of the science; in every alteration of views, in every modification of knowledge, they remain the same, unchanged, unchangeable. Ought it not to be the undeviating principle therefore to which we should adhere, and not the inconstant name?[44]

The rub was that naturalists could not agree on which "principles direct the art of nomenclature." But there was yet another issue that ruffled feathers and on which compromising was out of the question: the genus concept.

Establishing genera

Since the works of Latham and Illiger there had been a general agreement that the bulky Linnaean genera had to be sliced into smaller units in order to deal with the incredible number of new birds discovered since 1800. In the last edition of Linnaeus' *Systema naturae* of 1766, seventy-eight genera were listed, which contained over nine hundred species. In 1790 Latham's *Index Ornithologicus* listed almost three thousand bird species in a little over one hundred genera. Vieillot listed over two hundred and seventy genera in the *Analyse d'une nouvelle ornithologie élémentaire* in 1816; Temminck catalogued almost two hundred genera in the second edition of the *Manuel d'ornithologie* (1820–1840). In

[44] Nicholas Aylward Vigors, "Some Observations on the Nomenclature of Ornithology; Particularly with Reference to the Admission of New Genera," *The Zoological Journal* 1, no. 2 (1824): 190.

1844 Gray described eight hundred and fifteen genera and listed over two thousand four hundred generic *names* known to him at that time.

Obviously, naturalists disagreed on what a genus actually was. They held very divergent views on the splitting of genera, ranging from the most conservative ones, apprehensive to change the Linnaean system, to the most innovative ones who divided genera into multiple new ones. Species were moved from group to group, shedding their generic names with every rearrangement. Classification systems changed and groups were either enlarged or split into smaller ones. Every modification reflected each naturalist's theoretical premises. Gray sketched the situation in 1841: "an author will not hesitate to state, that he cannot adopt the genera of certain Ornithologists, because they are not what he is disposed to consider 'natural divisions'; he therefore proposes his own divisions, and designates them by his own names."[45]

In 1824, Nicholas Vigors wrote a passionate letter about Temminck's classification of birds as published in his works between 1813 and 1820.[46] The letter was addressed to the Editors of *The Zoological Journal* and published in 1824 as "Some Observations on the Nomenclature of Ornithology; particularly with reference to the admission of new genera." This article received an equally passionate response from Temminck, in the introduction of the third volume of the second edition of the *Manuel* in 1835. Their discussion revolved around three main questions. First, was a genus better than the old Linnaean sub-generic category, the *section*? Second, where should naturalists place those species that fell in between genera? Third, which were the best characters to define a genus? The debates about these three points give us very interesting clues as to why these two naturalists could not agree and illustrate the state of zoological classification at the time.

The first disagreement between Temminck and Vigors was about the use of genera versus the use of sections. As is reflected in the fact that they were usually not given Latin names of their own, sections constituted an informal systematic category that helped to cluster groups of species within the same genus. Sections were particularly useful for large genera containing many species, breaking them up into smaller units, and were used both in botany and in zoology. In this way no additional generic names were needed to place these species in a separate genus. Temminck was very critical of the proliferation of genera that had taken place in ornithology between 1800 and 1820.

[45] Gray, "Preface," *List of the Genera of Birds*, 2 ed., v.

[46] Vigors was one of the leading reformists in Britain, who advocated a change in nomenclature as well as in methods of classification. This "Vigorian reform" and the situation of nomenclature and classification in Britain have been described by Gordon McOuat; see "Species, Rules and Meaning" and "Cataloguing Power." It would be very useful if similar studies were made for the same period for the Netherlands, especially if attention is paid to links to changes in politics and culture.

He particularly disliked those descriptions that, in his eyes, were not supported by a careful comparison between forms, varieties and related species from different geographic regions. He had harsh words for Vieillot's new classification,

> which is unnecessarily divided into tribes and subfamilies belonging to groups too vaguely characterized and too imprecise, subdivided without reason into multiple genera; these genera (if we wish to follow the plan outlined by the author) are too few in relation to all the organisms known, which have not been part of his research, and then again subdivided into so many sections that he is one step away from making the species disappear and thus making ornithology comprise only genera and sections.[47]

It was not only Vieillot's system that Temminck was criticizing, but the general practice of splitting groups into smaller genera and describing a new genus for a handful of new species if these, according to Temminck, could be placed in an existing genus. Such a practice complicated the systems and impeded the advance of science. These new vague genera did nothing except create confusion, especially if they were made to include species that were difficult to place within the existing system:

> But what fate awaits the *anomalous species*, so numerous within the class of birds? Minutiae will not always help to dissipate the uncertainty; in this case, the species is destined to be bounced from one genus to another, the source of many errors and multiple synonyms; rendering naturalists less likely to understand each other […] When in doubt, to avoid this problem, a *new genus* is made. This procedure is the order of the day, and it indulgently stimulates the self-esteem.[48]

Consequently, Temminck kept the big genera and synonymized many new names with the old ones. To make the large genera more manageable, to Vigors's dismay, Temminck used *sections*.

Nicholas Vigors objected to Temminck's use of sections because when such groupings could be detected within a large genus, he argued, naturalists had two options. One, to upgrade the genus and make it a family, then create new genera to accommodate these clusters—Vigors' choice—or the second option, which consisted in keeping the original genus name and then to refer to sections as sub-generic categories to group similar species within the existing genus. The main defect of this procedure was, for Vigors, that it complicated nomenclature and sacrificed the brevity of Linnaean binomials. With the use of sections, genera became too big to be useful. To try to place a species within the system, in a genus containing dozens of species, sometimes hundreds,

[47] Temminck, *Observations sur la classification*, 6-7.
[48] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxviii-xxix.

became an impossible exercise. Therefore, Vigors concluded, sections were not in accordance with the spirit of zoological classification:

> if it should occur, that, owing to the increase of materials or of our knowledge respecting them, the terms assigned to certain groups should become too vague and limited in their application, with reference either to the magnitude of the group itself, or the variety of forms that enter into it, - as, for instance, where an original genus receives such a numerous accession of species, and such an addition of new forms, as renders the name, as generick, inapplicable to them all; – it becomes a question whether we should make an alteration in the terms of the nomenclature itself, or violate the principles which have been established for its direction.[49]

For him, it was natural that names changed to suit the growth of knowledge. The principles of nomenclature and classification, on the other hand, were immutable: "there are no terms more definite in their meaning and application than those of genus and species."[50] Therefore, similar species should be placed in one genus, creating a new one if required, even if it meant introducing changes in the nomenclature. Vigors considered Temminck's attempts to avoid creating new genera simply pointless. Even worse, new names did not create confusion in science, but the use of sections did. If sections were so distinct as to be separated from each other and adjoining genera then, Vigors said, "I cannot conceive that the subdivisions so characterized can be considered ought else than genera."[51] In this situation, he saw no reason to refrain from describing a genus:

> The follower of the modern views in science discovers, in an extensive family, a distinctly characterized group; he calls it a genus, and designates it by a scientifick name. The adherent to the Linnaean nomenclature acknowledges the same distinct group; he calls it a section of the Linnaean genus, and designates it by an unscientifick name. The process is precisely the same; the terms made use of alone are different.[52]

Sections and genera were synonyms for Vigors. That was not the case for Temminck. He saw them as two very distinct categories of different meaning and consequently, with a different function within the classification system. Temminck's sections were meant to facilitate research and could be changed in view of new discoveries without fundamentally altering the classification system or the nomenclature. Sections could even be regarded as temporary, if needed. To him, sections were always preferable to

[49] Vigors, "Observations on the Nomenclature," 190.
[50] Vigors, "Observations on the Nomenclature," 199.
[51] Vigors, "Observations on the Nomenclature," 199.
[52] Vigors, "Observations on the Nomenclature," 189.

redundant genera, because they "may be adopted, modified or removed entirely without affecting the systematic order, and without hindering, by a series of new names, the understanding between naturalists throughout the world."[53] He concluded: "The division into sections, if used with precision, seems better to me than excessive division of genera: the first can depend on one's viewpoint and it is comparable to the rules of propriety in society; the second should serve as a universal rule."[54]

Temminck perceived yet another advantage in the use of sections instead of genera: they were not followed by the author's name, as genera were. That was why someone who wished to see his name perpetuated chose to create a new genus instead of a section: "to flatter his self-esteem, it is usual to rub the sponge over the name of his predecessor and to say, by means of MIHI or by NOBIS in capital letters: *A moi la cargaison!*, and to very often give priority to the genus.''[55] Ironically, Temminck was accused of the same fault. Vigors wrote of him: "if it is an innovation to create and characterize a new genus, he [Temminck] is himself one of the greatest innovators of the present day. I have too high an opinion of the talents of that distinguished naturalist, and too high a respect for his character, to suppose that he would be influenced by any motives of prejudice or personal importance."[56]

Temminck's use of sections instead of genera followed from his understanding of what a genus actually ought to be: a permanent category in the system. He made an important distinction between convenient classification tools, the sections, and true classificatory groups, the genera. Vigors and Temminck were arguing about the use of sections and genera, but because their definition of these terms differed, they could never come to an agreement. They were, in fact, talking at cross-purposes.

The second issue in this discussion was the creation of new genera to include intermediate forms, species showing characteristics of two or more different genera. The main reason why Temminck considered many new genera to be superfluous was that, even though there were recognizable groupings of species within a big genus—the sections—the differences between them were so gradual that one could not discern where one section ended and the next started. Temminck repeated this often in his descriptions of birds. In the particular case of finches, he wrote:

> It is a vain endeavor to invent double and even triple new names to form groups that are strictly methodical. I have compared very carefully more than one hundred exotic species with our native ones; the result of this examination has

[53] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxx.
[54] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxxi.
[55] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxxii.
[56] Vigors, "Observations on the Nomenclature," 194.

> confirmed my view that there is a gradual passage, without any demarcation, from one species to the other.[57]

It had often been the case, Temminck said, that two separate genera had been described by taking species from the two ends of the morphological continuum of one single genus, without knowledge of the intermediate forms. By observing the differences between these two groups of species one might indeed believe that they belong to different genera, but a few of the intermediate or transitional species, in the middle of the gradation, would prove that they belong to the same genus, and that therefore the one new genus that has been created is invalid.[58] When finding a "gradual passage" of characters from one group of species to the next, with many species showing characters from two or more sections at the same time, Temminck always preferred including related species in one genus. He argued that without a clear demarcation between groups, it was impossible to define a new genus with enough precision to have any diagnostic value. Any new genus should exhibit distinct characters and clear-cut boundaries with other genera, or not be described at all. Consequently, he wrote, he was happy to accept new genera, provided the author had done enough comparative research to back up his description, and if the generic characters were defined with enough exactitude and precision to create a clear boundary around it.[59]

Vigors shared Temminck's view on this point: absolute divisions did not exist in nature. But this realization led him to a very different approach to classification. Every group does indeed gradually pass into another, in an uninterrupted chain of affinities that connects all living forms. From this he concluded, not without sarcasm, that if this is what Temminck considered to be a genus, then "we must admit one group, one genus alone, in Ornithology, which we may denominate the genus *Avis*."[60] The only way to deal with this apparent unity, Vigors wrote, was to admit the artificial nature of classification: divisions were ideal and man-made, because nature shows none. Boundaries were set around a group of species as they more or less approach the type species of each genus: the one exhibiting the defining characters of the genus. Vigors' "type-species," the one that displays the main characteristics of its genus, was the tool that allowed him to outline his generic groups. He did this by comparing the morphological differences of a species from the types resembling it most before deciding

[57] Temminck, *Manuel d'ornithologie*, 2 ed., vol. 1, 342-43.
[58] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xiv.
[59] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxii; Temminck, "Urotrichus," 1.
[60] Vigors, "Observations on the Nomenclature," 195.

in which genus to place the species: "Upon these typical eminences I plant those banners of distinction round which corresponding species may congregate as they more or less approach the types of each."[61] He compared this method to the process of naming hills in an undulating scenery: "And thus it is that I conceive my groups to be at once separated and united; separate at their typical elevations, but united at their basal extremes."[62]

Temminck rejected Vigors' method with the following argument: if a genus is composed of those species that most resemble its type, every genus must have an accurately defined type. And that was exactly what the new systems with their vaguely defined genera lacked, in Temminck's opinion. Every type was unique and separate from other types; each species showed deviations from it, but it always exhibited the type's main characters.[63] Therefore, Temminck said, only when the type was well defined was it possible to allocate species to their type and to set the limits of the genus. So genera might be, as Vigors said, man-made, but Temminck believed that by ascribing the species to its right type (provided its main characters were known), natural or true genera could be discovered. This method would in due course close the gap between the artificial genus and the natural entity. The first step was to define the characters of the type as accurately as possible, before describing any new genus. To this, William Swainson remarked: "Our author's [Temminck's] forte, indeed, like that of Illiger, is detail; but he seems, unfortunately for his own fame, to have imbibed the ancient notion that no genus is to be retained, if the links by which it is connected to another are discovered."[64]

The third issue in their dispute was how to differentiate a genus and its type. A type, said Temminck, should be defined by a few essential characters, intrinsic only to the form it represents, leaving no room for mistake. As types are the blueprints for genera, they should be clearly outlined by a small number of fundamental traits. A neat and concise definition of a type was an essential component of Temminck's system. He argued that, without it, the descriptions of new genera (those made for the intermediate forms) must forcibly include a long list of minor or auxiliary characters on top of those already used for the types of the existing genera. "A good diagnosis is not as easy to make as one might think. Naturalists do not always know how to clearly define a species using a few words. A long description full of minute details is precisely the most

[61] Vigors, "Observations on the Nomenclature," 196.
[62] Vigors, "Observations on the Nomenclature," 196.
[63] Farber, "Type-concept in Zoology"; McOuat, "Species, Rules and Meaning," 511-12; Witteveen, "Naming and Contingency."
[64] William Swainson, *On the Natural History and Classification of Birds*, vol. 2, The Cabinet Cyclopædia. Natural History (London: John Taylor, 1837), 184.

confusing."[65] In fact, any group exhibiting morphological characters also present in other genera could not stand on its own as a true category. If a genus was made to include these intermediate forms one must use many "minute characters," listed in interminable and complex descriptions.

This point had already been a major argument in Temminck's 1817 criticism of Vieillot's system, whose tribes and families had been described using an endless number of characters. This, Temminck said, undermined the validity of Vieillot's system, as its categories were poorly supported.[66] Ill-defined types only served to confuse classification and blur the true types within the system. The key was to define genera by using the *right* set of characters. Temminck pleaded for using a set of carefully chosen characters—the same for each genus—to make comparisons between groups possible. In ornithology, these characters should include not only the external characteristics such as the feet, the beak, the plumage or the wings, but also skeletal features, as well as traits from their geographic distribution and behavior. No minor characters such as variations in color or in size should be included, as these only clouded the real relation between species and genera, and none of the main features should be left out either. That would only hinder the comparison between groups. The essential point in his argument is that, for Temminck, there were key characters and minor characters to define a genus, and that not all of them should weigh equally in zoology:

> When one tries to establish a new subdivision within an existing genus, it is essential to know, by examining nature, all or at least most of the known species related to those one wishes to isolate. It is also necessary to examine the series of specimens with greater or smaller affinity to those that might be included in the new genus. Furthermore, it is imperative to know if the way of life, nutrition and anything related to behavior and habitat of these species are markedly different from their congeners. It is important to distinguish mere varieties in a natural series of species from characters of a higher order, which are indicative of a different organization and behavior: generally, the eye of the experienced naturalist is usually better able to identify these accurately than those first and foremost devoted to the theory of natural sciences.[67]

There are two important implications of this passage. In the first place, not every character is of equal value for zoological classification. Temminck listed in the *Manuel d'ornithologie* which characters should be used to define new genera and to arrange them in his classification system. Any other character was accessory and ineffective in

[65] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxiv-xxv.
[66] Temminck, *Observations sur la classification*, 12.
[67] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, x.

distinguishing genera of birds. The second, more incisive implication points to the authority of a naturalist to designate these key generic characters. Only those who had enough empirical knowledge and practical experience were able to determine which characters were to be used in classification. Naturalists who worked on the theory of nature, by contemplation or speculation, were not capable to distinguish variations from genuine diagnostic characters. Apparently, Temminck's pride in his extensive studies exasperated Vigors: "With considerable, and perhaps justifiable, self-complacency, he adds, that it is this knowledge which draws the line of distinction between the true expounder of nature, and the pseudo-naturalist of the cabinet and the library"[68]

What exactly a "defining character" was became a very important point of dispute, as it carried with it the possibility to create boundaries between taxa. In his criticism of Vieillot's system, Temminck pointed out his inconsistent choice of characters: "Mr. Vieillot does not follow a uniform method for the essential characters of his genera; he makes use of distinctive features with a certain indifference, taking them from here and there; this approach is highly defective, as it makes it impossible to find equivalent traits suitable for comparison between genera."[69] The characters with which to define a separate group, be it a species, a genus or a higher taxonomic level, were crucial not only for nomenclature, but also for the true method of classification. To understand how the natural groups of birds relate to each other and thus to understand nature's patterns, it was necessary first to properly define these groups. For this, Temminck turned to Cuvier's principles.

Cuvier's works on fossils and comparative anatomy had led him to postulate a starting point for the classification of living beings. From there, he defined the higher taxa based on his principles of the correlation of parts and the subordination of characters. Very simply put, he attached more value in classification to those organs that were essential for an animal to live, such as the respiratory and digestive organs, and then proceeded to group animals according to the degree of similarity of these vital organs first, arranging the smaller groups using the less important anatomical features. Temminck chose the characters to delimit his genera *à la* Cuvier. But it was just a starting point, and the weighting of the characters to establish the smaller groups remained to be done:

> It is certain that comparative anatomy and the study of the osteology of animals must be considered as basic sciences and as the point of departure for the zoologist who wishes to build the methodical edifice; but it is not exclusively

[68] Vigors, "Observations on the Nomenclature," 193.
[69] Temminck, *Observations sur la classification*, 41.

with the insights provided by these two studies that he must establish the second order groups.[70]

For example, the main features he used to establish the families of pigeons and fowl were the beak and the feet (important for feeding and locomotion), as well as the shape of the trachea (essential for reproduction, as the males use vocalization to attract the females). Genera were delimited by a combination of characters taken from their skeleton, the shape of the tail and wings, their size, their habitat and nesting behavior. Coloration patterns, a particular geographical distribution or peculiar features distinguished one species from another.[71] After the dreadful affair with Pauline Knip, the only illustrations in Temminck's book on pigeons and fowl were a few anatomical plates showing these essential diagnostic characters.

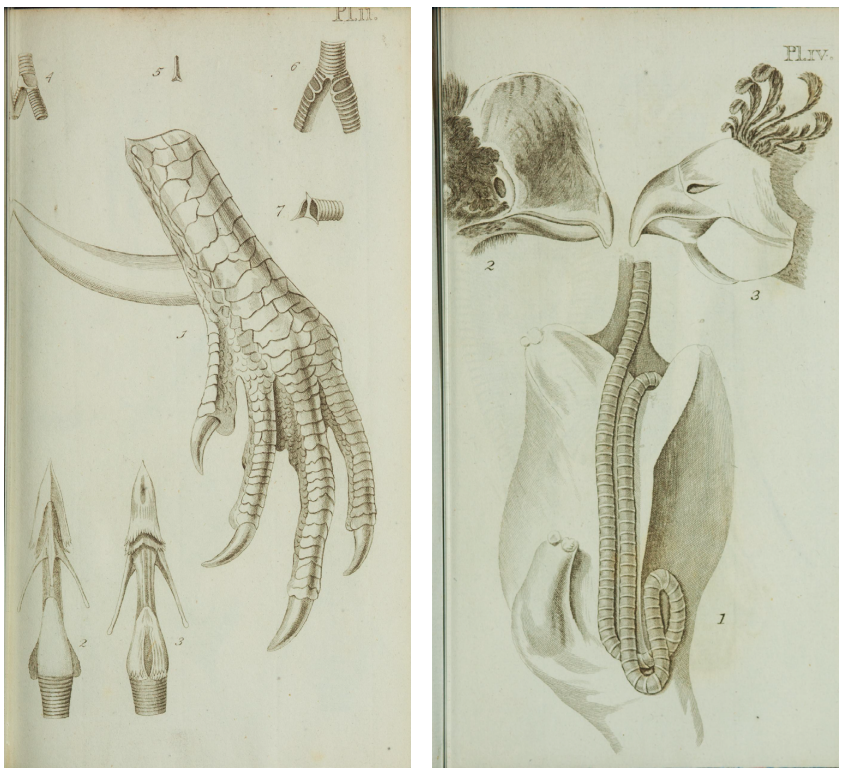

FIGURE 5.4. *Planches Anatomiques* from Temminck's *Histoire naturelle générale des pigeons et des gallinacés*, vol 2. pl. II, and vol. 3, pl. IV (1813–1815).

[70] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xv.
[71] Temminck, "Discours sur l'Ordre des Pigeons," *Pigeons et gallinacés*, vol. 1, 32-39; Temminck, "Introduction troisième partie," *Manuel d'ornithologie*," 2 ed., vol. 3.

Identifying diagnostic characters for defining taxa was in no way Temminck's exclusive practice; in fact, it had become the standard procedure since Cuvier. Karl Illiger, for example, explained it as follows:

> No one is apt to doubt that in organisms the more important parts are more constant and that unimportant parts are subject to great variability. From this follows as a second rule for the determination of generic characters that they must be based preferentially on the more important parts. The importance of a part can be recognized partly from its greater or lesser relation to the foremost vital functions (*Lebensverrichtungen*) such as nutrition and reproduction, partly from its close connection with the nervous system, as with the sense organs, partly from the connection of a part with a very special purpose of the animal or the plant, and partly from the wide occurrence (Allgemeinheit) of a part which lets us infer its indispensability.[72]

The difficulty was to get naturalists to agree on which characters were to be used for a genus, or a species. As we have seen, the species concept seems to be quite similar to that of a genus: it is represented by an ideal type, but with variations, and only by observation and comparison can one successfully delimit a species. However, as Mayr notes with a hint of disappointment, naturalists "fail to provide a thorough discussion of the species problem. Rather, they refer to it in a sentence here and in another sentence there. One has to piece their ideas painfully together from such little fragments."[73] This is certainly the case with Temminck. For him, a species description should not be an endless enumeration of characters, but naturalists should be able to select a few characters that capture the identity of the species:.

> As long as one knows most of species that have been described and recalls them from memory, then when the description of a new species has to be undertaken, one immediately finds the main affinities or the characteristic differences. What matters is to have a perfectly satisfactory description of the type species; then those of the other species of the same genus are sketched with broad strokes: often, a single well-defined character is enough to ensure that the species cannot be confused, not even with those it resembles most at first glance.[74]

Apparently, it all came down to experience and knowledge, and there were no tangible rules or guidelines that could help. In fact, most naturalists occupied with

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[72] Johann Karl Wilhelm Illiger, "Einige Gedanken über die Begriffe: Art und Gattung in der Naturgeschichte," in *Versuch einer Systematischen vollständigen Terminologie fur das Thierreich und Pflanzenreich* (Helmstadt: C. G. Fleckeisen, 1800); translated by Ernst Mayr, "Illiger and the Biological Species Concept," *Journal of the History of Biology* 1, no. 2 (1968): 177.

[73] Mayr, "Illiger and the Biological Species Concept," 167.

[74] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxv.

classification at the time were concerned with finding the right characters and giving them hierarchical values to use them in their classifications. Naming species and delimiting genera was a more complicated and deeper question than merely listing and cataloguing animals: it was the key to understand the organization of nature. The way naturalists delimited species involved comparing series of specimens and descriptions in the literature and then selecting those characters that, for them, had diagnostic value for that species. Therefore, comparison and experience, however subjective, played a decisive role.[75] In 1844, Strickland confessed with some dismay that ornithology still had not figured out how to weight zoological characters, and "must therefore be estimated by moral rather than by demonstrative evidence."[76] It seems that despite the type concept, the general approach to defining genera was an intuitive one, at least for the time being. Strickland admitted as much when he wrote: "The precise rank in the scale of successive generalizations which shall be occupied by those groups we term *genera* is then a matter of *convenience*, and consequently of *opinion*."[77] But he remained optimistic: "More definite principles of classification may hereafter be discovered, and meantime all that we can do is to arrange our systems according to sound reason and without theoretical prepossession."[78]

The search for a natural classification system

Temminck's refutation of Vigors' method indicates that they held different ideas about what the type of a genus ought to be, how to characterize it and how to use it in systematics. Evidently, they also disagreed on who had the authority to settle the matter. The debate between Vigors and Temminck may seem one of methodology and technicalities, but it was a reflection of much deeper questions. They were also arguing about the truth of their classification systems.

In this period the major goal of ornithology was the search for a natural system of classification. By *natural* was meant a system that reflected the true organization of all

[75] The concept of species in biology has been extensively studied and discussed. See for example Scott Atran, Richard W. Burkhardt, Pietro Corsi et al., eds., *Histoire du concept d'espèce dans les sciences de la vie: colloque international (mai 1985) organisé par la Fondation Singer-Polignac, Paris* (Paris: Fondation Singer-Polignac, [1987]); Jürgen Haffer, "The History of Species Concepts and Species Limits in Ornithology," *Bulletin of the British Ornithologists' Club* 112A [Centenary] (1992); Stevens, *Development of Biological Systematics*; John S. Wilkins, *Species: a History of the Idea*, Species and Systematics, vol. 1 (Berkeley: University of California Press, 2009); Frank E. Zachos, *Species Concepts in Biology: Historical Development, Theoretical Foundations and Practical Relevance* (Switzerland: Springer, 2016).

[76] Hugh Edwin Strickland, "Report on the Progress and the Present State of Ornithology," *Report of the British Association for the Advancement of Science* 14 (1845): 217.

[77] Strickland, "Report on the Progress," 218.

[78] Strickland, "Report on the Progress," 218.

living forms and the laws of the natural world.[79] There was, however, a lack of consensus on how to reach that goal, on what approach to classification would eventually lead to a natural classification system. Naturalists working on classification were very aware of the differences between three sorts of systems: artificial ones (meant to help catalogue diversity with no theoretical implications); classification systems constructed based on partial knowledge (too incomplete to reflect natural laws); and systems reflecting the true divine order in the natural world (*the* natural system). In 1826, James Ebenezer Bicheno, a colonial official with a keen interest in botany, published an article about the contrasts between artificial and natural systems and their functions. He wrote:

> The artificial and the natural systems aim at two very distinct objects, which are in some measure incompatible with each other. The one is to make us acquainted with individuals; and the other, founded upon acquaintance with individuals, to combine them according to their characters, so as to abridge the labour of reasoning, and to enable us to ascend from particular to general truths.[80]

If the goal was to analyze, Bicheno explained, divisions and subdivisions might be very convenient. But when the intention was to understand the truths of nature, these subdivisions and the characters used to define them were in fact an obstacle. He pointed out the "confusion of analysis and synthesis" that was taking place in many classification systems, "a defect which may be attributed chiefly, I apprehend, to the attempt which both we and our continental neighbours have made to combine the natural with the artificial system. We have aimed at analysis and synthesis at the same time."[81] The main question was not whether or not there was an underlying order in nature, but rather: how could zoologists turn those artificial systems into natural ones? By empirical, inductive study of nature? Or should naturalists rely on their insights and construct classification systems in a deductive way?

Temminck's method was definitely based on the Cuvierian tradition: by careful study of the main characters of birds, including every variation, their behavior and geographical distribution, he would discover the true laws of organization. He insistently stated this in every work he published. He relied on Cuvier's methods of comparative anatomy to delineate the main groups in zoology, and on the careful study of collections and nature to refine Cuvier's system. The accumulation of knowledge through the patient study of nature, building on the work of previous naturalists, like

[79] Farber, *Emergence of Ornithology*, 80-91.
[80] James Ebenezer Bicheno, "On Systems and Methods in Natural History," *Transactions of the Linnean Society of London* 15, no. 2 (1827): 481.
[81] Bicheno, "Systems and Methods," 492.

Latham's *Index ornithologicus* (1790) and Illiger's *Prodromus Systematis Mammalium et Avium* (1811), was the path to transform the artificial systems into natural ones, slowly closing the gap between them. Temminck's confidence in reaching a natural classification may have been enhanced by the fact that he was mainly interested in birds and mammals, groups well-studied since the time of Linnaeus and relatively small when compared with the insects or plants. Although new species were being discovered and the relations between groups remained a matter of discussion, Temminck believed that ornithologists had reached a point where the rough outline of the organization of the class of birds had been drawn:

> We hope that we will succeed, with time, in creating a better method of classification. The only way to achieve this goal is by a meticulous examination of nature; no genus, no subdivision, not even the acceptance of a new species can have a place in such a method, before a conscientious study of the living animals, or their undamaged remains, has been made by trustworthy naturalists; we should not admit anymore the multitude of animals described from observations of travelers and vague information, which collectors seem to have introduced in books only to enlarge the catalogue of nomenclature.[82]

For Temminck, induction was the only way to understand the true organization of nature, the foundation towards a natural classification system. Too many changes in the foundation and the whole building would come crumbling down "as a house of cards."[83] Temminck rejected Vieillot's classification system of 1816 because by changing the work of his predecessors, Vieillot discarded the advances made by other ornithologists until then. He could not accept that Vieillot had chosen to create a complete new system of classification: "Mr. Vieillot […] has shattered all the systems that have been published previously as well as the modern ones."[84] By creating endless divisions and subdivisions naturalists were also constructing a system so complicated that it could never lead to an understanding of the true nature of the relations between groups. The artificial system should not be anything else than an auxiliary tool, a rough version of the final system whereby the organization of nature becomes visible, and it should therefore be simple and neat, without unnecessary segmentation, to serve as a universal central point of reference to build upon.[85] For Temminck, knowledge emanated from the very act of classifying.

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[82] Temminck, "Avant-propos," *Manuel d'ornithologie*, 1 ed., xv.
[83] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xii.
[84] Temminck, *Observations sur la classification*, 6.
[85] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xi.

Vigors, on the other hand, saw classification systems not as a foundation on which to build a natural system, but as a practical tool to help order the natural forms. For him, understanding nature did not depend upon classification: it was the classification system that emanated from knowledge. As knowledge evolved, so did the classification systems, as they were secondary to science. So when he came to embrace Quinarianism, he employed his quinarian approach to overhaul the classification of birds. His groups of birds reflected the quinariam dictum that all groups were linked to the number five.

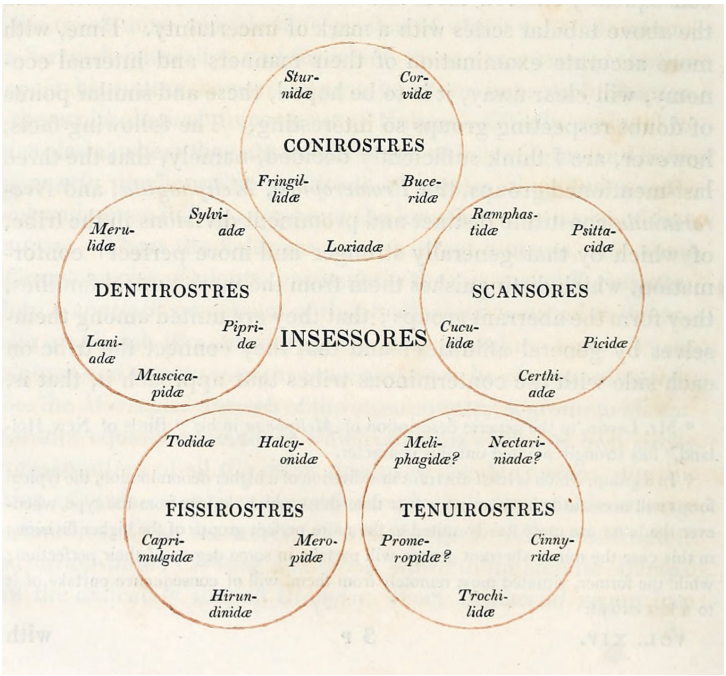

FIGURE 5.5. A diagram for the orders and families of birds, organized in circles of five according to the quinarian principles, from Vigors' "Observations on the Natural Affinities that Connect the Orders and Families of Birds" (1825).

Vigors relied on a natural philosophy *a priori* to guide the construction of his classification system, like William Sharp MacLeay (who had defined the quinarian principles for the first time in his *Horae Entomologica* in 1819) and William Swainson. But in fact, as quinarian systems proposed that all taxa are divisible into five groups, each group into five subgroups and so on, if a group consisted of four or fewer taxa it followed that a missing species or genus remained to be discovered. This led occasionally to the creation of new taxa that would fill in the gap or to the merging of groups to ensure groups were arranged in multiples of five. Vigors claim that his system

was based on the careful study of nature and that it was, therefore, a natural classification system, was met with understandable skepticism.[86]

Swainson, in his *Preliminary discourse on the study of natural history* of 1836, explained that there were two methods to study natural history, the "analytical method," based on empirical research and, therefore, inductive, and the "synthetic method," based on principles that were assumed correct before investigating. Only the first method would lead to the true classification system, the quinarian system. That Quinarianism had not been discovered earlier was, according to Swainson in 1834, because naturalists had been focusing on minute details, instead of searching for universal principles.[87] Like Vigors, he was convinced that "the circular principle of variation" had been discovered as a result of empirical research, that it emerged naturally from the knowledge zoologists had acquired until then and that, consequently, his system of classification was natural. Swainson considered Temminck's system as described in his *Manuel d'ornithologie* to be artificial, as it did not reflect the quinary circles, but excellent nonetheless:

> Of all those which have been framed *without* a reference to the general laws of the natural system, it is decidedly the best. This may appear unmerited praise, when we perceive that the very foundation, or, in other words, the primary divisions, are forced and unnatural. […] These [Temminck's divisions], however, when viewed in reference to artificial arrangement – and the author is evidently unacquainted with any other, are very clear, and, consequently, excellent. The genera, it is true, are few, but they are defined with great care, and evidence of acquaintance with this class of zoology far superior to that possessed by any of the moderns.[88]

Swainson accepted Temminck's divisions for their clarity. Vigors clearly could not. He even accused Temminck of working on an artificial system—with large, unnatural genera—to suit his own ideas: "When we see […] nature thus made to bend to the views of man, it becomes every one to enter his protest, however feeble, against doctrines so pregnant with danger to the views of the student, and so subversive to the sound principles that regulate the science."[89]

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[86] Vigors and Swainson adopted Sharpe's ideas and applied them to ornithology. Vigors published his bird classification in a series of papers in the 1820s, including his "Observations on the Natural Affinities that Connect the Orders and Families of Birds," *Transactions of the Linnean Society of London* 14, no. 3 (1825). Swainson discussed the quinarian classification extensively in *Natural History and Classification of Birds*.

[87] William Swainson, *A Preliminary Discourse on the Study of Natural History* (London: Longman, Rees, Orme, Brown, Green & Longman, 1834), 109.

[88] Swainson, *Treatise on the Geography*, 184.

[89] Vigors, "Observations on the Nomenclature," 183.

Not without irony, quinarians received exactly the same criticism for their systems of classification: creating groups to suit their own geometrical system. Getting back at Vigors, Temminck rejected Quinarianism and any other form of geometric symmetry in zoological classification without reservation. He wrote in 1835: "One gets lost in circular affinities, in the most bizarre analogies; the trinary and quinary systems divide opinions and one arrives in the arena of hypotheses and philosophical ideas, which lead to endless and pointless debates; all this to explain this beautiful nature and the wonderful and grandiose order that governs it."[90]

The search for a natural system was so vital for zoology that to label a classification system as artificial automatically implied that the system was inadequate or defective. Strickland noted: "the natural system is an accumulation of facts which are to be arrived at only by a slow inductive process, similar to that by which a country is geographically surveyed."[91] Therefore, he concluded, all systems based on an *a priori* theory, which attempt to classify forms in conformity with a philosophy, were erroneous. He proposed the study of affinities, or the similarities between species in those vital characters relevant for their existence (the equivalent of the modern concept of homology in biology), in order to construct the natural classification system. By measuring the morphological distance between species, Strickland built a system that could be drawn as a "map," much like a geographical map, placing species in a two-dimensional space.[92]

In 1856, Alfred Russel Wallace published an article cautiously entitled "Attempts to a Natural Arrangement of Birds" in which he rejected Quinarianism and adopted Strickland's map-making method as the right approach to the natural system: "When this has been done for all [families of birds], we may be able to arrange the whole group so as to present to the eye a view of the relations of the several parts, and then, and then only, shall we be able to determine whether any and what subdivisions can be established."[93] Temminck made no mention of Strickland's method nor of his concept of affinity—which was popular mainly in Britain—although his systems of classification were built upon very similar premises and also relied on morphological similarity of vital characters.

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[90] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xv.

[91] Hugh Edwin Strickland, "On the True Method of Discovering the Natural System in Zoology and Botany," *Annals and Magazine of Natural History* 6, no. 36 (1840): 186.

[92] See for instance, Mario A. Di Gregorio, "Hugh Edwin Strickland (1811–1853) on Affinities and Analogies: or, the Case of the Missing Key," *Ideas and Production* 7 (1987); O'Hara, "Representations of the Natural System in the Nineteenth Century."

[93] Alfred Russel Wallace, "Attempts at a Natural Classification of Birds," *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 18 (1856): 216.

In Germany, the *Naturphilosophen* had an entirely different approach. For the *Naturphilosophen*, classification systems reflected their philosophical views of nature, much as the Quinarian system did, but they had a more holistic and philosophical approach. *Naturphilosophie* looked for relations between the natural objects and for forces driving natural processes, applying *a priori* principles to their systems of classification.[94] *Naturphilosophen* like Lorenz Oken or Johann Jakob Kaup were searching for the ultimate natural system to organize the diversity of living beings, just as the quinarians, Temminck, Strickland and Wallace did. Their departing point was the idea that knowledge derived not from experience, but from reason and divine inspiration. The naturalist was, to borrow a phrase from Breidbach and Ghiselin, "a kind of divine mind reader," whose classifications reflected his insight into God's plan, as manifested in nature.[95] This led to seemingly illogical and even laughable classifications, which, however, appear more comprehensible when viewed in the context of their conception.

Lorenz Oken, for example, devised a classification system for animals based upon the five senses: touch, taste, sight, smell, and hearing. The underlying principle was that animal groups were the physical representation of the five senses. The resulting groups were named accordingly as Dermatozoa (invertebrates), Glossozoa (fish), Ophthalmozoa (mammals), Rhinozoa (amphibians) and Otozoa (birds).[96] Oken kept on developing his system by including the sequence of development of the brain and other vital organs in animals, until he published in 1833 his *Allgemeine Naturgeschichte für alle Stände*, where he explained in detail his theories. The final arrangement is summarized by Breidbach and Ghiselin as follows:

A. Viscera animals
    I. Gut animals (infusorians, coelenterates etc.)
    II. Vessel animals (mollusks)
    III. Skin animals (worms and insects)
B. Flesh animals
    IV. Bone animals (fish)
    V. Muscle animals (amphibians including reptiles)
    VI. Nerve animals (birds)
C. Sense animals
    VII. Sense animals (mammals)[97]

[94] Stresemann, *Ornithology from Aristotle to the Present*; Farber, *Emergence of Ornithology*.
[95] Olaf Breidbach and Michael T. Ghiselin, "Lorenz Oken and "Naturphilosophie" in Jena, Paris and London," *History and Philosophy of the Life Sciences* 24, no. 2 (2002): 220.
[96] Lorenz Oken, *Grundriss der Naturphilosophie der Theorie der Sinne und der darauf gegründeten Classification der Thiere. Frankfurt, a. M. 1804*. (Frankfurt-am-Main: printed by the author, 1804); and *Allgemeine Naturgeschichte für alle Stände*, 8 vols. (Stuttgart: Hoffmann'sche Verlags-Buchhandlung, 1833–1843).
[97] Breidbach and Ghiselin, "Oken and "Naturphilosophie", 228.

Clearly, even when all naturalists were pursuing the goal of uncovering the basic laws governing zoology, approaches and philosophies varied to such an extent that conflicts were unavoidable. Their goal was the same, namely, to discover the true laws of nature; their methods, however, were not. An understanding between these naturalists, holding such disparate ideas on the validity of a classification system was extremely difficult to achieve, not least because there was no central authority to arbitrate the disputes. Even more, each of them considered himself to be the authority on the matter.

The lack of agreement on a philosophy of natural history had brought to light the fact there was not enough knowledge to fully comprehend the true relations between taxa. In 1840, Strickland wrote: "We must first prove the existence of a real *natural system*, a subject which involves an enquiry into the designs of creative power, one of the most awful themes which the human intellect can attempt."[98] For most naturalists, the only reasonable thing to do was to keep on studying nature, accumulating facts and data, improving their systems. Or as Illiger put it: "We must try to enlarge our experience as greatly as possible; the greater the wealth of our observations the closer we will come to our goal."[99] The search for universal principles as promoted by Swainson in 1835 was abandoned and most publications focused on the description of new material and its arrangement within the most well-known classification systems, building on those of Latham, Illiger and Temminck.

According to Paul Farber, the empirical nature of most writings during the first half of the nineteenth century was a consequence of both the empiricist tradition and the process of specialization that was taking place at the time. If naturalists had restricted their fields to a minor part of the whole natural world, Farber notes, then "who, then, was qualified to comment on the larger issues in natural history? If naturalists increasingly restricted their domain of expertise, who could judge the validity of a claimed discovery of a general law?"[100] After the failures of the classification systems based on natural philosophies like Quinarianism and *Naturphilosophie*, it is also conceivable that a general feeling of disappointment and a good dose of prudence prevented naturalists from developing a philosophical foundation for classification. In the Netherlands, the empiricist tradition was particularly important in the nineteenth century; Temminck's dismissal of theories was not unique in his country. During his

[98] Hugh Edwin Strickland, "Observations upon the Affinities and Analogies of Organized Beings," *Magazine of Natural History* 4 (1840): 220.
[99] Illiger, "Einige Gedanken über die Begriffe"; translated by Mayr, "Illiger and the Biological Species Concept," 171.
[100] Farber, *Emergence of Ornithology*, 140.

time, Dutch scientists, including natural historians, were committed to applied and practical sciences and few of them pursued the philosophical questions of their particular fields.[101] There was, however, a general feeling of hope in zoology that the laws of nature could indeed be discovered. Temminck, pragmatically, advocated patience and hard work:

> In the present state of science, and surrounded as we are by this great wealth of newly discovered objects, it seems preferable to limit our research, for the time being, to the exact knowledge of the species, and to identify them carefully, in so far as this is possible. We leave to the methodists with their bias in favor of their complicated structure full of technical terms, the care of arranging in a methodical system all those subtle details that they want to characterize rigorously by generic demarcations.[102]

The role of philosophy in zoological classification is discussed more in depth in the following chapters, and this will lead us to a better understanding of how natural philosophy played a central role in determining the status of systematics within natural history.

[101] Klaas van Berkel, Albert van Helden, and Lodewijk C. Palm, *The History of Science in the Netherlands: Survey, Themes and Reference* (Leiden: Brill, 1999); Theunissen, *Nut en nog eens nut.*
[102] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xviii.

PART THREE

A place for systematics

CHAPTER SIX

Temminck's intellectual landscape

On whose authority?[1]

By the middle of the century, natural historians were spending quite some time and no less energy discussing nomenclature, the use of sections and genera, and the validity of their classification systems. These were not merely technical questions; these issues were echoing fundamental thoughts on the organization of nature. Before 1830 disputes were often settled when an influential naturalist won the argument. With only a handful of naturalists dedicated to animal classification, debates were partly solved by argument and partly by social status, the most famous example being Georges Cuvier and his conflicts with Jean-Baptiste de Lamarck and Étienne Geoffroy Saint-Hilaire.[2] Despite the occasional challenge by his colleagues, Georges Cuvier remained a renowned authority on the subject, thanks to his work on comparative anatomy as well as his social status. Figures of stature such as Linnaeus, Buffon or Cuvier ruled their institutes and set the rules of engagement. Twenty years later, as the number of naturalists studying classification swelled, the situation had changed.

Natural history and with it, classification, had since the end of the eighteenth century become a matter of general interest. Many factors contributed to this trend, including economics, politics and technology. Advances in printing techniques made iconographic books even more beautiful and, more importantly, cheaper to produce and to purchase.[3] There was a great fascination with exotic faunas, fueled by the accounts of voyages of discovery to the tropical colonies. With it, public and private zoological collections grew exponentially. This was also the time when new national museums were established, like the Zoological Museum in Berlin in 1810 and 's Rijks Museum van Natuurlijke

[1] This section is based on my previously published article, Gassó Miracle, "On Whose Authority?" Changes have been made to include new insights and references, and to avoid duplications in this book.
[2] See, for example, Appel, *The Cuvier-Geoffroy Debate*; Coleman, *Georges Cuvier, Zoologist*.
[3] Farber, *Emergence of Ornithology*, chap. 5.

Historie in Leiden in 1820. An increasing number of natural historians, whether as amateurs or as professionals within a scientific institution, dedicated themselves to the task of naming and classifying natural objects, and the literature on the subject mushroomed. New zoological and botanical clubs and associations were founded, each with their own specialized journals as vehicles of communication and platforms for debate. This was the rich milieu from which different views on classification emerged. Authors disagreed on how to practice natural history, scientific names for animals and plants multiplied and debates took place in journals as well as in the sessions of zoological and botanical clubs and societies. As Peter Stevens puts it: "One signal that all was not well was the unending proliferation of new systems and the failure to develop any way of evaluating characters and groups other than by trying to achieve a consensus with present and past masters of the art."[4]

In Britain, the situation was accentuated by the polarization between reformers like Vigors and the more conservative wing. Scientific journals were established to allow naturalists to publish their views—provided they were in line with those of the editors.[5] The 1837 volume of the *Magazine of Natural History* included eight articles exclusively devoted to discussing issues of nomenclature and the status of new genera, including Hugh Strickland's first set of *Rules of Nomenclature*. In 1838, the journal included in a single volume a back-and-forth of views in a series of articles by Strickland and the Irish naturalist William Ogilby discussing these rules. The tone of their writings was harsh and personal, and in all probability, raised more than a few eyebrows.[6] Ogilby summarized his position as follows:

> In short, these "Codes for Nomenclature" put me in mind of nothing so much as Mrs. Malaprop's account of the "laws of CONFUSION, the Chinese Philosopher, *Where you feel like a needle going astray, With its one eye out, through a bundle of hay*."[7]

[4] Stevens, *Development of Biological Systematics*, 265.

[5] McOuat, "Species, Rules and Meaning."

[6] William Ogilby, "Observations on 'Rules for Nomenclature'," *Magazine of Natural History* 2, no. 2 (1838); "Further Observations on 'Rules for Nomenclature'," *Magazine of Natural History* 2, no. 2 (1838); "Letter in Reference to Mr. Strickland's Observations on the Application of the Term Simia," *Magazine of Natural History* 2, no. 2 (1838); Hugh Edwin Strickland, "Reply to Mr. Ogilby's 'Observations on Rules for Nomenclature'," *Magazine of Natural History* 2, no. 2 (1838); "Remarks on Mr. Ogilby's 'Further Observations on Rules for Nomenclature'," *Magazine of Natural History* 2, no. 2 (1838); "A Few Words of Explanation in Reference to Mr. Ogilby's Letter," *Magazine of Natural History* 2, no. 2 (1838).

[7] Ogilby, "Further Observations on 'Rules for Nomenclature'," 284. Mrs. Malaprop is a character of Richard Sheridan's 1775 play *The Rivals*. The character became known by her verbal blunders, or *malatropisms*.

Entertaining as this exchange may be, it also reflects the huge impact that regulating zoological nomenclature had on naturalists. The time when a Linnaeus or a Cuvier could impose his views for decades by using his social and scientific position was gone.

The process through which an agreed-upon code of nomenclature eventually emerged exemplifies this shift. When Strickland published his first set of rules for nomenclature in 1837, it received almost exclusively negative reactions. The main reason for this, as Gordon McOuat points out, is that the rules were laid down by a single man and therefore, had no social or political weight. On his own Strickland had not enough scientific authority. In 1842, he suggested that the British Association for the Advancement of Science appoint a committee to work on the problem of zoological nomenclature, following "the parliamentary practice," by which the committee's proposal would be reviewed and approved as if it were a law.[8] This committee, consisting of Hugh Strickland, Charles Darwin, Sir Richard Owen, the Reverend Leonard Jenyns and eight others, presented their set of rules in a Report to the BAAS on June 27, 1842. This report was published in 1843 in the Proceedings of the BAAS and it has been known since as the Strickland Code or Strickland's Rules.

The rules rapidly spread; they were published in a number of journals and translated into several languages, which, however, does not mean they were automatically accepted. These rules were discussed, criticized and altered. Finally, in 1895, the Strickland Code became the foundation for the modern International Code of Zoological Nomenclature.[9] Strickland's parallel with a parliamentary *modus operandi* in zoology was an appropriate metaphor for the situation at that time. No single man had enough authority anymore to dictate rules, of nomenclature or of any other kind, without a consensus from his fellow naturalists. The Strickland Code, backed up by colleagues, the BAAS and soon published in the *Annals and Magazine of Natural History* and the *Philosophical Magazine*, on the other hand, had enough weight to be translated, spread, discussed and eventually, accepted. In his report on the Rules of Nomenclature of 1842, Strickland pictured the situation very accurately:

> By emanating from the British Association, it is hoped that the proposed rules will be invested with an authority which no individual zoologist, however eminent, could confer on them. The world of science is no longer a monarchy, obedient to the ordinances, however just, of an Aristotle or a Linnaeus. She has

[8] McOuat, "Species, Rules and Meaning," 506.

[9] McOuat, "Species, Rules and Meaning," 512; Melville, *Towards Stability*, 10. For more information on the gestation and evolution of the Strickland's code of zoological nomenclature, see Sandra Knapp, Gerardo Lamas, Eimear Nic Lughadha et al., "Stability or Stasis in the Names of Organisms: the Evolving Codes of Nomenclature," *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 359, no. 1444 (2004); Rookmaaker, "Early Endeavours by Hugh Edwin Strickland."

> now assumed the form of a republic, and although this revolution may have increased the vigour and zeal of her followers, yet it has destroyed much of her former order and regularity of government. The latter can only be restored by framing such laws as shall be based in reason and sanctioned by the approval of men of science; and it is to the preparation of these laws that the Zoological Section of the Association have been invited to give their aid.[10]

Natural history was not a *monarchy* or *autocracy* anymore; agreement had to be reached by consensus and, even more difficult to realize, by making concessions, very much as in a republic. This was unfortunate for Temminck, to say the least. He was born in 1778 into an influential patrician family in Amsterdam and his father was a respected man, a treasurer of the Dutch East India Company. Temminck never went to school; he received private education at home. He had powerful friends in politics, who helped him realize his dream of a national natural history museum and put him at the head of the new institute. He had looked up to Georges Cuvier, from whom he had learned that scientific authority could lie in a single man.[11] However, Temminck did not wish to be a "new Cuvier," as he saw natural history more as an autocracy, where science remained in the hands of competent naturalists, whose achievements would be remembered forever:

> It is particularly the eloquent writings of Buffon that have given new appeal to this pleasant science, sounding a wake-up call around the world; and the order and the harmony in classification from the great Linnaeus, have equally helped increase the number of enthusiastic amateurs; illustrious scholars, who by following the writings of these renowned men, have earned the glory of seeing their names inscribed in the temple of memory.[12]

Temminck perceived himself as a member of this distinguished elite, mainly because of the success of his systematic works as well as his absolute confidence in his approach to systematics and his very conscientious method of classification. He was particularly proud of the fact that he had based his classification systems on his examination of thousands and thousands of specimens in nearly all European cabinets. He believed that his search for the natural systems relied directly on observation and comparison, on the ability to extract typical forms from diversity, and finding the true diagnostic characters. This is not to say that Temminck was advocating objectivity in its modern sense; he was

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[10] Hugh Edwin Strickland, Charles Darwin, John Stevens Henslow et al., "Report of a Committee Appointed to Consider of the Rules by which the Nomenclature of Zoology may be Established on a Uniform and Permanent Basis," *Report of the British Association for the Advancement of Science* 12 (1843): 3.
[11] Temminck, "Avant-propos," *Coup-d'oeil général*, vol. 1, ix.
[12] Temminck, "Avant-propos," *Manuel d'ornithologie*, 1 ed., vii.

in fact claiming authority precisely because of his unique talents: his scientific status was there by reason of his experience and his own views. Daston and Galison have coined the phrase "truth-to-nature" for late eighteenth and early nineteenth century naturalists who, like Temminck, believed in a hidden truth in nature that could only be uncovered by observation *and* by the particular skills of the experienced observer: "To see like a naturalist required more than just sharp senses: a capacious memory, the ability to analyze and synthetize impressions, as well as the patience and talent to extract the typical from the storehouse of particulars, were all key qualifications."[13]

Temminck's celebrated monographs on pigeons and gallinaceous birds, together with both editions of the *Manuel d'ornithologie*, had given him the authoritative status of a Cuvier or a Latham. Swainson, for example, ranked Temminck amongst the most celebrated ornithologists of his time: "Of general systems […], the most popular and esteemed are those of Illiger, Cuvier, Vieillot and Temminck."[14] He thought that Temminck's *Histoire naturelle des pigeons et gallinacés* and the *Manuel d'ornithologie* were both excellent, exemplary works. *Manuel of the Ornithology of Europe*."[15] Neville Wood, in an annotated bibliography on ornithology wrote about the *Manuel*: "Temminck is the first Ornithologist since the time of Linnaeus, who promulgated a system worth attending to. In simplicity it almost rivals that of the illustrious Swede, and is infinitely its superior in exactitude and preciseness."[16]

The *Manuel* rapidly became a standard work for other ornithologists and set the basis for others to build on, thanks to his careful comparative studies, extensive investigation and patient and rigorous method of work. In recognition of Temminck's authority, he was awarded an honorary doctorate by the University in Jena, in 1828 (his first one had been awarded to him by the University of Groningen, in 1819). After its success, Temminck kept working on his system, preparing a second edition of the *Manuel.* It took him twenty years to complete this new edition, which was finished in 1840. Hugh Strickland wrote about the "long expected supplements" to the *Manuel*: "Although the author hesitates too much in adopting the generic groups of modern science, and does not sufficiently value the law of priority in nomenclature, yet the exactness of his descriptions and the general soundness of his criticisms will long render his work a valuable hand-book of European ornithology."[17]

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[13] Lorraine Daston and Peter Louis Galison, *Objectivity* (New York: Zone Books, 2015), 58.
[14] Swainson, *Natural History and Classification of Birds*, vol. 1, 200.
[15] Swainson, *Natural History and Classification of Birds*, vol. 1, 205-06, 08.
[16] Neville Wood, *The Ornithologist's Text-Book: Being Reviews of Ornithological Works, with an Appendix, Containing Discussions on Various Topics of Interest* (London: John W. Parker, 1836).
[17] Strickland, "Report on the Progress," 180.

Temminck appreciated some of the criticisms he received, as long as he thought them to be constructive, and he used them to improve his *Manuel*. In the second edition, Temminck thanked those who helped him realize his mistakes and shortcomings and wrote: "Concerning science, a work without criticism is like a meal without salt."[18] Indeed, Heinrich Boie's comments on Temminck's work had brought both men into contact and laid the basis for their friendship, and Temminck even secured Boie a place as a curator in the Leiden museum. Other criticisms, however, like those of Vieillot and Vigors, he could not accept, let alone be grateful for. He considered them to be personal attacks on his judgment and knowledge. Remarkably, although Vigors criticized Temminck's genera, Swainson praised them: "[Temminck's] merits in the arrangement of his generic groups, and the high finish he has bestowed upon them, have given to his system a prevalence and popularity above all others which have appeared since the days of Linnaeus; next to whom, as an ornithologist, he assuredly ranks."[19] The first livraisons of his *Monographies de mammalogie* (1827–1842) were also celebrated for the accuracy and care put into the descriptions and the nomenclature.[20] Temminck's meticulousness was greatly appreciated by his fellow zoologists. In 1826, a review of his *Monographies* read:

> Whatever falls from the pen of so sedulous an enquirer, is well worthy of attention, founded as his facts universally are on the most patient and laborious investigation. That such has been the case on the present occasion, is proved, by the references to the various collections of Europe, nearly the whole of which have been visited in the progress of his work. Nor are the descriptions founded only on living or on set-up specimens; to trace them with more accuracy and to obtain a more ample view of their frequent variations, he has also recourse to the warehouses of furriers in all the principal commercial towns, without a continual examination of which, he repeats again and again, no certainty can exist with respect to the species of *Felis*.[21]

Another reviewer was equally impressed with the first three installments of the *Monographies*, particularly with Temminck's treatment of the genus *Didelphis* (the large American opossums): "The synonymy of these species, which has hitherto been extremely confused, has been unravelled by M. Temminck with his usual sagacity and

[18] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, lxii.
[19] Swainson, *Treatise on the Geography*, 165.
[20] "Analytical Notices of Books"; Pierre August Joseph Drapiez, "Manuel d'ornithologie, ou tableau systématique des oiseaux qui se trouvent en Europe, par C. J. Temminck, 2me édition (1)," *Annales Générales des Sciences Physiques* 6 (1820).
[21] "Analytical Notices of Books," 534.

assiduity." [22] But things changed, especially in the 1840s. The last installments of the *Nouveau recueil* were received with less enthusiasm.[23] William Swainson, who had praised Temminck's earlier works, was rather less impressed with this one:

> In the mechanical part of its execution this is a very beautiful work […]; but the drawing is not faithful, nor is the colouring generally natural: the figures are stiff and formal, and they are all put into nearly the same attitudes. The descriptions of the birds are meagre, and for the most part relate to the mere colour of the plumage. Occasionally, however, more extended remarks are introduced on certain genera, […] which are very valuable; but the total absence of synonyms, specific characters, and scientific descriptions of the form, structure, or habits of the birds themselves, renders this work far inferior to what it might have been, and what the scientific world expected, from the reputation of its authors.[24]

The same happened with the monographs on mammals. Temminck was re-describing species already known and that diminished his authority. Charles Bonaparte's criticism of the monograph of the genus of bats *Vespertilio* reflects these changes in prominence taking place in systematics: "to correct the errors of eminent writers is the most effectual means to advance science, while the great veneration which is entertained for Temminck, and his *ex cathedrâ* tone, may in some cases prove fatal to truth."[25]

The fact is that Temminck's works on mammals were not as much applauded as his earlier works on birds. John Edward Gray, the Keeper of Zoology at the British Museum of Natural History between 1840 and 1874 (and the elder brother of zoologist George Robert Gray, author of *Genera of Birds*) was particularly harsh. He published a revision of the group of civet cats using specimens kept in the British Museum in 1864, where he summarized his ideas about Temminck in this rather harsh paragraph:

> M. Temminck was an eminent ornithologist, and has studied some groups of Mammalia, perhaps not with so much success. He was an amiable naturalist, but has carried his political anglophobia (so well seen in his 'Essay on the Dutch Colonial Possessions') into his zoological studies. This blinded him to the labours of the zoologists of this country, the richness of our collection, and thus rendered his observations in regard to their work not worthy of attention, as they otherwise might have been. It is to be observed that he never had a regular

[22] "Monographies de Mammalogie, ou descriptions de quelques genres de Mammiferes dont les especes ont eté observées dans les differens Musées de l'Europe. Par J. C. Temminck. Livraisons 1-3. pp. 72. pl. viii.," *The Zoological Journal* 1, no. 4 (1824): 575.
[23] See, for example "Bibliographical Notices," 267.
[24] Swainson, *Natural History and Classification of Birds*, vol. 1, 221.
[25] Bonaparte, "Observations of the State of Zoology," 21.

> scientific training, never attempted to form scientific specific characters, and is rather to be regarded as a patron and amateur than as a scientific zoologist. He was the first in his country, as the late Earl of Derby was in this.[26]

But if Temminck's lack of academic training did not prevent him from becoming "an eminent ornithologist," we should be looking elsewhere for reasons to explain the inferior quality of Temminck's studies of mammals.

Whether Temminck's anglophobia—a disorder he most certainly suffered from—biased him to the point of deliberately ignoring the work of British zoologists is difficult to prove, but it may very well have been the case. He seemed to disregard a large portion of the zoological work done by British naturalists, perhaps in part because of his antipathy towards England. These feelings had been ignited by Raffles' role during the Napoleonic wars in the conquest of Java, and made worse afterwards by Raffles' criticisms of Dutch rule in the East Indies in his *History of Java*. When Temminck took up the task of re-writing the same history for his *Coup-d'oeil* (the book Gray referred to) he gave a very different account than Raffles about nearly every single episode—before, during and after the period of British rule.[27] Temminck claimed throughout the work that his account was based solely on the archives of the Dutch colonial government and therefore, truthful.[28] His anti-British feelings may also have grown because of his views on the administration of the British Museum (as we have seen, Temminck was baffled by the composition of its Board of Trustees) and the fact that English naturalists published exclusively in English, while French and German were the dominant scientific languages on the continent.[29]

Britain made a rather late entry into the field of systematics, which had been dominated by continental Europe until the 1830s. This changed the course of ornithology as well as Temminck's authoritative status. As the rest of Europe was recovering from the Napoleonic wars and other political and economic difficulties, natural history flourished in Britain. By the 1840s, the research and collection in the British Museum of Natural History were challenging both the Muséum National

[26] Gray, "Revision of the Genera and Species of Viverrine animals," 505. Gray was referring here to Edward Smith Stanley, thirteenth earl of Derby and Lord Stanley (1775–1851), politician, naturalist, president of the Linnean Society and Trustee of the British Museum.
[27] Temminck, *Coup-d'oeil général*, vol. 1, chap. 1.
[28] See, for example, Temminck, "Avant-propos," *Coup-d'oeil général*, vol. 1, xiv; or Temminck, *Coup-d'oeil général*, vol. 1, 45, 106.
[29] For a study of the evolution of scientific language, see Michael D. Gordin, *Scientific Babel: the Language of Science from the Fall of Latin to the Rise of English* (London: Profile Books, 2017).

d'Histoire Naturelle in Paris and 's Rijks Museum in Leiden.[30] As the British Museum grew, English naturalists caught up with the French, the Germans and the Dutch, a change that was especially felt in Leiden. By then, Temminck was struggling for government funds, particularly for the Natuurkundige Commissie. He had to spend much of his time on administrative tasks for the museum and around 1840 he had practically abandoned ornithology. He produced the three volumes of the *Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique*, published between 1846 and 1849, partly as a cry for help to the Dutch government. In almost every page there is a passage on the importance of continuing the exploration of the colonies, both for society and for the natural sciences. These were meager times for 's Rijks Museum.

But other factors also influenced the quality of Temminck's works. In the next sections, we will look at these more attentively, but the fact that discoveries were increasingly being published in specialized journals and magazines—many of them, British—instead of in books may account for Temminck's failure to incorporate the work of other naturalists in his own publications. Besides Temminck's physical decline in the 1840s, other factors that may have influenced his *Monographies de Mammalogie* include his habit of re-describing species he felt were not properly characterized and renaming species when making changes in the taxonomic arrangements. In addition, the preoccupations at the museum and the delay of the arrival of specimens and manuscripts from the Natuurkundige Commissie may explain his slow pace in publishing. We cannot exclude that pride may also have been at play. It seems that Temminck chose to publish manuscripts that were already outdated, despite the fact that he was probably aware of the fact. If so, he pushed on in order to claim authorship for the new species, assuming that his descriptions and classification were more accurate. As a result, not surprisingly, he provoked the animosity of his peers.

Temminck was caught in the middle of a transition in which his own authority was first widely recognized but then challenged later on. He could not grasp this. The confrontations with his peers pushed him to formulate his ideas on classification and nomenclature more clearly in the second edition of the *Manuel* (especially in the third volume of 1835, where he reacted to Vigors' article of 1824) than he had done in his previous ornithological works from 1815 to 1830, with the sole exception of his booklet *Observations sur la classification méthodique* of 1817. He was forced to address directly the issue of methodology, to define his notions of sections, genera and species very clearly, as well as to explain how he applied these categories to the classification of birds. In

[30] Camille Limoges, "The Development of the Muséum d'Histoire Naturelle of Paris, c. 1800–1914," in *The Organization of Science and Technology in France 1808-1914*, ed. Robert Fox and George Weisz (Cambridge Univ. Press, 2008); McOuat, "Cataloguing Power."

1846, at age 68, he wrote to his colleague and friend Martin Heinrich Karl Lichtenstein about his disappointments:

> The new era is getting beyond me, and however much one reads one feels that it is impossible to make progress, and one seems to oneself quite stupid and ignorant in the new jargon of systematics and nomenclature, or at least too weak to swim against the stream, and through a sort of disgust frightened away from even attempting any sort of opposition. There is something revolutionary in every contemporary activity; we shall not live to see the settling of this ferment, but I cannot say that I cherish any great expectations of the final result, and I rejoice therefore that I have lived in a time when there were still scientific authorities and when everything proceeded more tidily.[31]

Indeed, with the decline of the scientific authorities things became complicated: the number of books, journals, societies and collections to process increased rapidly. Temminck, it appears, could not keep up with the faster pace of other naturalists. Around 1840, Temminck lost both his political influence in the Dutch government and his authority in ornithology. Naturalists were now quick to dispute the great experts of their time and they had a vehicle for their praise and criticism: the new journals and magazines of natural history. The time of the monarchs, as Strickland put it, was over.

The field, universities and museums

Traditionally, historians of natural history have noted the split between field naturalists and naturalists working from cabinets and libraries.[32] However, most of the discussions among historians revolve around the *space* where naturalists were working. But it was the *object* of their efforts, as well as their personal knowledge and circumstances that played a central role in defining the differences between field- and collection-based natural history. What is more, the role of each naturalist evolved with time, whether in the cabinet or in the field, which requires a closer look at each kind of naturalist. And when that is done, the distinctions become less clear-cut than previously suggested.

Temminck replied to his critics through his writings: essays and letters. There are no records, it seems, of Temminck participating in debates in the academies nor in the meetings of the many societies of which he was a member. Temminck's natural habitat

[31] Temminck to Hinrich Lichtenstein, 27 July 1846, Museum für Naturkunde Berlin Archives; quoted and translated in Stresemann, *Ornithology from Aristotle to the Present*, 150-51.

[32] For example, Dorinda Outram, "New spaces in Natural History," in *Cultures of Natural History*, ed. Nicholas Jardine, James A. Secord, and Emma C. Spary, (Cambridge: Cambridge University Press, 1996); Stevens, *Development of Biological Systematics*; Lynn L. Merrill, *The Romance of Victorian Natural History* (New York, Oxford: Oxford University Press, 1989).

was the natural history collection. Furthermore, he never did other field work than going on shooting expeditions near home in search of birds for his collection and his kitchen. He never visited the Dutch colonies nor any other tropical region where he could have admired his beloved pigeons and fowl, alive and kicking. The exact reason for Temminck's apparently unadventurous disposition is unclear. Perhaps he did not feel physically up to it, perhaps the death of so many members of the Natuurkundige Commissie had scared him. In addition, the directorship of the Leiden museum took up all of his time and, in all probability, much of his energy too. But he did not complain about this lack of field experience. More interestingly, he never did make it a priority for his own research. His daily practice consisted in methodically and fastidiously comparing as many specimens as he could lay his hands on, that is, stuffed and mounted specimens, instead of observing and recording living ones. As we shall see, comparing large series of specimens was far more appealing and rewarding for the systematist than a trip to the tropics, however exciting, which partly explains Temminck's desk-bound years.

The fact that he had never visited the Dutch East Indies seemed to Temminck an advantage rather than a shortcoming. Temminck spent years on the completion of his *Coup-d'oeil général sur les possessions Néerlandaises dans l'Inde archipélagique* (1846–1849), the three volumes summarizing all that was known to him at that time of the Dutch East Indian colonies. Temminck admitted that not having visited the islands himself made his account drier and less vivid than if he had been there to see it all himself. But no-one could ever explore all of the archipelago islands and learn all there is to know about them. A work like this could therefore never be written from first-hand experience anyway (that is, from the field), but only by assembling information from different sources and collections.[33] General surveys must inevitably be produced from home. The very first sentence in Temminck's *Coup-d'oeil* is, curiously, a quote from Cuvier's *Règne Animal*. Referring to the system of arranging animals from bigger to smaller groups by a process of induction, Cuvier wrote: "The method, once mastered, can be apply with endless benefits to fields unrelated to natural history. Any discussion that assumes a classification of facts, any research that requires a division of the subject matter, is done applying the same rules."[34] Temminck followed Cuvier's method for his systematic works, delimiting natural units, detecting gaps in continuity and carrying out comparative work, which required collections and libraries of considerable size and

[33] Temminck, "Avant-propos," *Coup-d'oeil général*, vol. 1, xxi-xxii.

[34] Georges Cuvier, "Préface," in *Le Règne Animal Distribué d'après son Organisation, pour Servir de Base à l'Histoire Naturelle des Animaux et d'Introduction à l'Anatomie Comparée*, vol. 1 (Paris: Déterville, Imprimerie de A. Belin, 1817), xix.

scope. For his encyclopedic work on the Dutch colony, Temminck relied on the same recipe, and *comparison* was its chief ingredient.

Professor Caspar G. C. Reinwardt, who had worked for almost two decades in the Dutch East Indies, had a very different view of the subject. Reinwardt fiercely contended that the field naturalist, not the cabinet naturalist, was able to arrive at an understanding of nature. He stressed the unity and connectedness of all natural phenomena, and therefore, he believed that only by working in the field could one ever come to understand nature's organization.[35] Cabinets were nothing more than collections of inert objects taken away from their original context. But Temminck was convinced that systematics would lead science to the natural system, and that this knowledge would help the natural sciences in general to understand nature's organization. This was his first concern, and he repeatedly stated so. What Reinwardt conceived as a lesser endeavor, describing and classifying objects in a museum, was for Temminck proper scientific practice, a practice that could not be carried out in the field: the collection cabinet was the place to work on systematics. Its methods were based on comparison and ranking, something impossible to do without enough specimens covering morphological variation through a wide geographic range. This is not to say that Temminck held fieldwork in contempt, quite the opposite. But Temminck believed that the goals of the naturalist in the field were simply different from his and he was certain that classification could not be carried out in the field. Temminck was not alone in this.

The first members of the Natuurkundige Commissie, Heinrich Kuhl and Johan Conrad van Hasselt, once they were feverishly working in Java, were mostly collecting specimens and information with the hope of finishing their systematic work when they returned to the Netherlands. Unfortunately, this never happened, as both died much sooner than anticipated: Kuhl after only nine months in Java, and Van Hasselt following him two years later.[36] Both of them, together with their companions Gerrit van Raalten, a taxidermist, and the artist Gerrit Laurens Keultjes, amassed an astonishing amount of specimens, field notes and drawings. Three years after they had first set foot on Java, only Van Raalten survived. The results of Kuhl and Van Hasselt's efforts were never published, with the exception of extracts from their letters to Temminck, Professor Van Swinderen from Groningen and Daniel Jacob van Ewijk (the civil servant in the department of Education, Art and Science at the Ministry of Home Affairs who had

[35] Reinwardt, *Redevoering van C. G. C. Reinwardt*.

[36] The history of the Natuurkundige Commissie is still awaiting to be written, but substantial information about it can be found in Greshoff, "Kuhl en Van Hasselt"; Klaver, *Inseparable Friends*; Sirks, "Indisch natuuronderzoek"; Veth, "Overzicht van hetgeen."

played a decisive role in changing the instructions given to the Natuurkundige Commssie in the 1830s).[37]

Initially, Kuhl and Van Hasselt had ambitious plans. They wanted to write a treatise on the fauna of Java, using the material collected during their time in the field and the Leiden collection, including specimens collected by Reinwardt.[38] They were confident of their knowledge and so they started carrying out part of the systematic work while still on Java. Kuhl and Van Hasselt wrote to Temminck: "Hardly a day goes by without making a new Genus or designating a new Species, and we still collect a great deal, which we cannot examine now and which we intend to research once we are in Europe."[39] Their zoological notes consist mostly of descriptions of the species they collected, with their scientific name, references (if known), localities, observations on behavior, description of external morphology and extensive anatomical notes. Very often, the scientific name given to the animal was followed by a *Mihi*, or a *Nobis*, the Latin equivalents of "mine" or "ours," which, placed after a species name, indicates that the author of the manuscript is describing and naming the species for the first time. Kuhl and Van Hasselt were sure that they were describing species new to science. This seems quite a bold assumption, taking into account how isolated they were (news could take months to reach them) and that they had very limited access to scientific literature. Indeed, many of the species they described as new were simultaneously or shortly afterwards described and published elsewhere. They relied, however, on their superb knowledge of the fauna and flora of Java, gathered while in the Netherlands, Berlin, London and Paris. Their proficiency was even more impressive given their ages: both were then in their early twenties. They had no other books than those they had brought with them, and a self-made atlas of the animals and plants known at that time, a compilation of plates from "the best natural history writers" representing "an almost complete *Systhema Natura* in plates."[40] Van Hasselt's library, for example, consisted only of Raffles' *History of Java* (1817), Sonnerat's *Voyage aux Indes orientales et à la Chine* (1782)

[37] The letters were published in several issues of the *Annales Générales des Sciences Physiques* from Brussels (1821); *Algemeene Konst- en Letterbode* from Haarlem (1821–1824), *Isis oder Encyclopädische Zeitung von Oken* (1822), and in the *Bulletin des sciences naturelles et de géologie* from Paris (1824). A list of these letters can be found in Klaver, *Inseparable Friends*, 57-63.

[38] Greshoff, "Kuhl en Van Hasselt," 66; Klaver, *Inseparable Friends*, 29; Veth, "Overzicht van hetgeen," 28.

[39] Heinrich Kuhl and Johan C. van Hasselt to Temminck, 18 July 1821; published in Heinrich Kuhl and Johan C. van Hasselt, "Pjihorjavor, aan den voet van den Pangerango, 18 Julij 1821," *Algemeene Konst- en Letterbode* 1, no. 7 (1822).

[40] As indicated in the will of Johan Conrad van Hasselt, 2 October 1823, Naturalis Biodiversity Center Archives, Archive Natuurkundige Commissie, MMNAT01_AF_NNM001001046_008. The atlas is not in the Naturalis archives. It is possible that it remained in Bogor, or that it has been lost. My thanks to Dr. Andreas Weber from the Department of Science, Technology and Policy Studies at the University of Twente, the Netherlands, for bringing this interesting piece of the archives to my attention.

and the first volume of Johannes van den Bosch's *Nederlandsche bezittingen in Azië, Amerika en Afrika* (1818).[41] Hardly comprehensive, and not very helpful for their intended zoological treatise.

Temminck's opinion was that Kuhl and Van Hasselt's plans, the description and classification of Java's fauna, should be postponed until they had returned to the museum, an environment far better furnished to carry out the comparative work that was—and still is—the basic practice of systematics. After Kuhl's untimely death (three days short of his twenty-fifth birthday), Temminck wrote to the minister of Public Education, National Industry and the Colonies: "To make good field notes, to collect everything and to take the utmost care possible for the collections, as often as possible dispatch shipments to the Motherland, this is the primary instruction for a naturalist in the tropical regions."[42]

Temminck had seen how Kuhl was trying to do it all at the same time and in doing so, he left things unfinished, his field notes were hastily written, almost stenographically, and badly preserved specimens were lost. It was just impossible to use the same specimen for anatomical observations, describe it as a new species, make drawings and then prepare it to be shipped and preserved in a cabinet for systematic study. Kuhl had found it difficult, it seems, to focus on only one thing at a time, which made him, in Temminck's eyes, a bad collector: "I do not want to deny it and the results show it, that Kuhl was not the right man to enlist for the expansion of a museum collection."[43] This was not meant to belittle Kuhl. On the contrary, Temminck thought very highly of him. But Kuhl could not restrain his insatiable curiosity to investigate *everything* and at the same *time* in the same *space*, that is, while in the field, and Temminck lamented that "he could have done far more useful work in Europe, but he considered such a job to be too limited, however broad it may seem to others."[44]

The only way to fulfill Kuhl's potential would have been, according to Temminck, for him to have settled in Bogor, surrounding himself with all the facilities and instruments he needed, recruiting an army of helpers and assistants, where he could have become the head of a research center. But even then, Kuhl would have needed a network of correspondents in Europe to whom he could send his notes and drawings for comparison with the material in the European cabinets.[45] But Kuhl's situation was

[41] Will of Van Hasselt, 2 October 1823, Naturalis Biodiversity Archives, Archive Natuurkundige Commissie, MMNAT01_AF_NNM001001046_007.
[42] Temminck to the minister of Public Education, National Industry and the Colonies, 21 March 1822; quoted in Veth, "Overzicht van hetgeen," 29.
[43] Temminck to the minister of Public Education, National Industry and the Colonies, 21 March 1822.
[44] Temminck to the minister of Public Education, National Industry and the Colonies, 21 March 1822.
[45] Temminck to the minister of Public Education, National Industry and the Colonies, 21 March 1822.

infinitely more precarious, and the scene Temminck sketched, which sounds like a local natural history museum, was at that time far from attainable.[46] Incidentally, a few years later, in 1835, the General Governor and the Bataviaasch Genootschap der Kunsten en Wetenschappen (Batavian Society of Arts and Sciences) were lobbying for the foundation of a natural history museum in Java. Temminck fiercely opposed the idea, in the first place because the climate would practically guarantee that the specimens would rapidly decay, but it is not inconceivable that Temminck, already having economic difficulties to run the Leiden museum, was not keen on having to compete for money and specimens with a second museum, and one so far from his reach. The Batavian Society finally set up the Museum Zoologicum Bogoriense in 1894.[47]

The members of the Natuurkundige Commission were appointed by the Dutch government and viewed by Temminck mainly as naturalist explorers, having as one of their main tasks observing and collecting minerals, animals and plants—at least, until the colonial government changed its policies after 1830. But Temminck also saw their time in the field as a stepping stone towards a career in systematics once they were back at home. He encouraged any man who aspired to become a member of the Commission to be skilled in this particular discipline. The way to achieve this was, seemingly, to spend considerable amounts of time working with natural history collections.

Kuhl for example, had been sent to London and Paris for additional training, after completing his education in the Netherlands first as a student of Van Swinderen and later spending some months with Temminck helping to identify his specimens during the winter of 1818–1819.[48] The training he received was focused on a two-step approach: the first one consisted in observing, identifying, collecting, preserving and shipping animals and plants for further study, and enriching the Leiden collections. The second step required the comparison and arrangement of the specimens using collections and literature as a reference, which would eventually result in publications in systematics. While the first step was carried out in the field, the second required a natural history cabinet and an extensive library. The young members of the Commission were actually expected to be able to excel in both, at least until it became painfully clear that their life-expectancy was exceptionally short in the tropics.

The contrasts in goals and methods between field work and cabinet study had already been the source of tensions in Paris decades before the Natuurkundige

[46] See also Gijzen, " 's Rijks museum"; Klaver, *Inseparable Friends*.
[47] Veth, "Overzicht van hetgeen," 88; see also Hans Groot, *Van Batavia naar Weltevreden; Het Bataviaasch Genootschap van Kunsten en Wetenschappen, 1778–1867* (Leiden: Brill, 2009).
[48] Klaver, *Inseparable Friends*, 13.

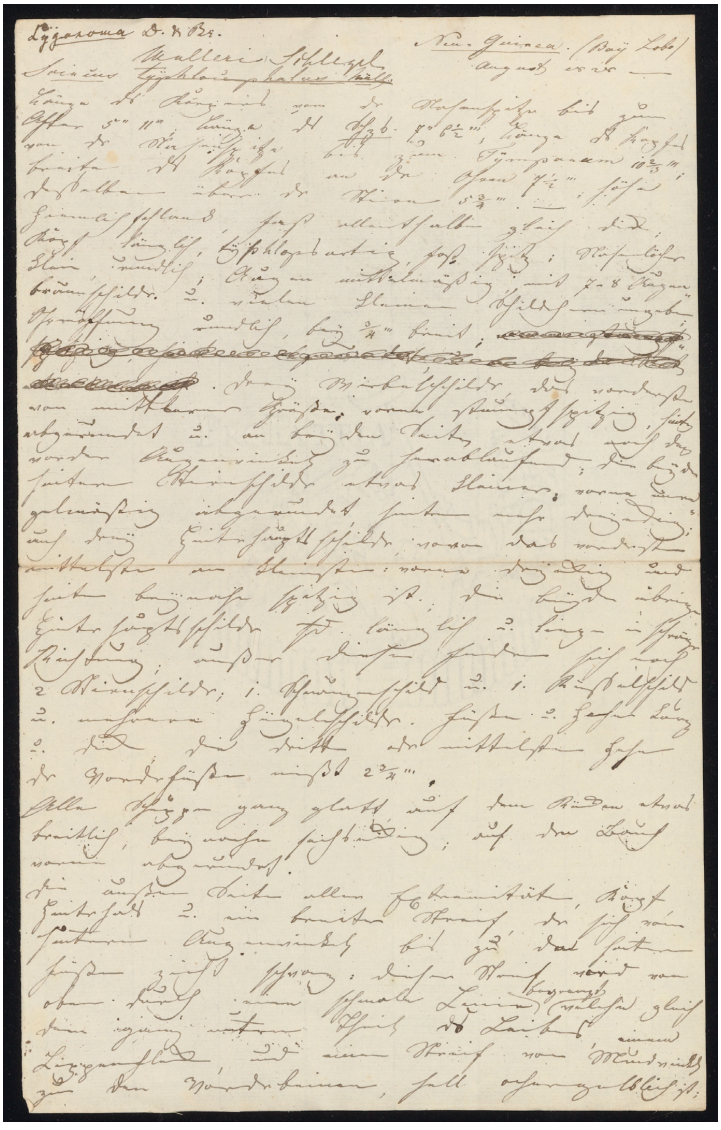

FIGURE 6.1. An example of Heinrich Kuhl's fieldnotes.

Commissie had been conceived. In 1807, Georges Cuvier wrote a review of Humboldt's fieldwork report, making a very clear distinction between the "field naturalist" and the "sedentary naturalist." Cuvier noted that the field naturalist was able to see the wonders of nature in full, observing the living beings in their own environment, but these observations were forcibly brief in time and confined to the place where the *voyageur* was at that particular moment: "He [the field naturalist] is thus deprived of the possibility of comparing each being with those like it, of rigorously describing its

characteristics, and is often deprived even of books which would tell him who had seen the same thing before him." But on the other hand:

> A thousand things escape him [the sedentary naturalist] about the habits and customs of living things which would have struck him if he had been on the spot. Yet these drawbacks have also their corresponding compensations. If the sedentary naturalist does not see nature in action, he can yet survey all the products spread before him. He can compare them with each other as often as is necessary to reach reliable conclusions. He chooses his own problems; he can examine them at his leisure. He can bring together the relevant facts from anywhere he needs to. The traveller can only travel one road; it is only really in one's study (*cabinet*) that one can roam freely through the universe, and for that, a different sort of courage is needed, courage which comes from unlimited devotion to the truth, courage which does not allow its possessor to leave a subject until, by observation, by a wide range of knowledge, and connected thought, he has illuminated it with every ray of light possible in a given state of knowledge.[49]

Cuvier's main point was that "usually, there is as much difference between the style and ideas of the field naturalist, and those of the sedentary naturalists, as there is between their talents and qualities," while arguing that it was the museum scientist who led natural history towards the truth. In passing, he made the case that the true hero is not the valiant *voyageur* (much admired by the general public), but the tenacious and knowledgeable sedentary naturalist.[50] Cuvier's review of 1807 seemed to be specially aimed at discrediting Humboldt's work and to claim that it was his own work that would lead to the truth. Perhaps the mutual antipathy of these two authoritative figures and the Muséum politics played an important role in Cuvier's review.[51] Humboldt had a very different view of the subject: he believed that it was his all-encompassing work, multidisciplinary in a way, that would lead man to understand nature.

Dorinda Outram has referred to this particular passage. She focuses her discussion of the excerpt on the meaning of space for the understanding of natural history, mostly on the *distance* between the sedentary naturalist and his objects of study. She stresses the

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[49] Georges Cuvier, "Analyse d'un ouvrage, de M. Humboldt, intitulé: Tableaux de la nature ou considérations sur les deserts, sur la physionomie des végétaux, et sur les cataractes de l'Orenoque," in *Fonds Cuvier 3159* (Paris: Library of the Institut de France, 1807); quoted and translated by Outram, *Georges Cuvier*, 62-63. See also Outram, "New spaces in Natural History," 259-61. However, I believe that the correct translation for *cabinet* should be "natural history cabinet" or "collection," as the term *cabinet* was generally used as short for *cabinet d'histoire naturelle*.

[50] Cuvier, "Analyse d'un ouvrage, de M. Humboldt"; quoted and translated by Outram, *Georges Cuvier*, 62-63.

[51] See, for example, Coleman, *Georges Cuvier, Zoologist*; Outram, *Georges Cuvier*.

influence of different experiences of space on two types of naturalist (the field naturalist and the sedentary one), leading to different practices of natural history. She writes: "The field naturalist is seen as highly responsive, engaging with each passing incident in the natural world around him, erecting few or no defences against the passage of rapid, immediate impressions into his inner world. The sedentary naturalist, on the other hand, is seen as preoccupied with both physical and psychic distance, and with the belief that out of distance comes truth. In doing this, Cuvier is engaging natural history with a new cultural value."[52] However, there is an additional and crucial difference between the Humboldt-style *naturaliste-voyageur* and Cuvier: they were occupied with different subjects, which required different methods. When Outram writes "Muséum work in natural history needed close physical control involved in the preparation of delicate specimens" to illustrate the need of the museum naturalist for order and a "guarded inner space," she is referring more to the conditions for practicing systematics and comparative anatomy, than to the differences between field and museum work. These disciplines do, indeed, require physical control over the specimens, but phytogeography or meteorology, for example, do not. The distinction is an important one, especially if conclusions are drawn for the history of natural history: the tensions between Cuvier and Humboldt, or Reinwardt and Temminck, do not only relate to the *space* in which they were working, or their experience of an inner and an outer world, but also to the *disciplines* on which these naturalists were focusing.

Systematics and its counterpart disciplines, anatomy and physiology, relied on *comparison*, hence Cuvier's and Temminck's insistence on the necessity of working not in the field, and not in the colonies, but in a cabinet of natural history in Europe. Humboldt's methods were different because, simply put, he was practicing a different discipline of natural history altogether. His work was mainly a geographical and physical study of nature, based not only on observation but mostly on measurements, and these could only be made in the field. There were different kinds of field naturalists, as there were different kinds of sedentary naturalists, as a consequence of the breaking up of natural history into several disciplines. Kuhl and Van Hasselt, for example, were in the field with systematics as their main goal. They were busy with discovering, describing and naming new species, which were then arranged in the natural system. This was clearly not Humboldt's main concern. But when he did turn his attention to new species, Humboldt's field notes were remarkably similar to those made by Kuhl

[52] Outram, "New spaces in Natural History," 262.

and Van Hasselt, indicating that the practice of systematics in the field was undertaken in a more or less standardized way.[53]

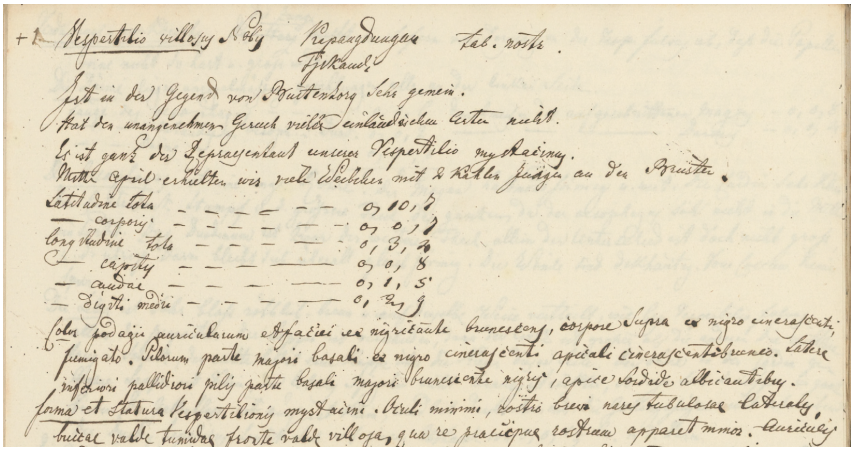

FIGURE 6.2. A description of a species of bat by Kuhl and Van Hasselt, *Vespertilio villosus* Nobis. This is a copy of Kuhl's original notes made for safekeeping, possibly by Gerrit van Raalten.

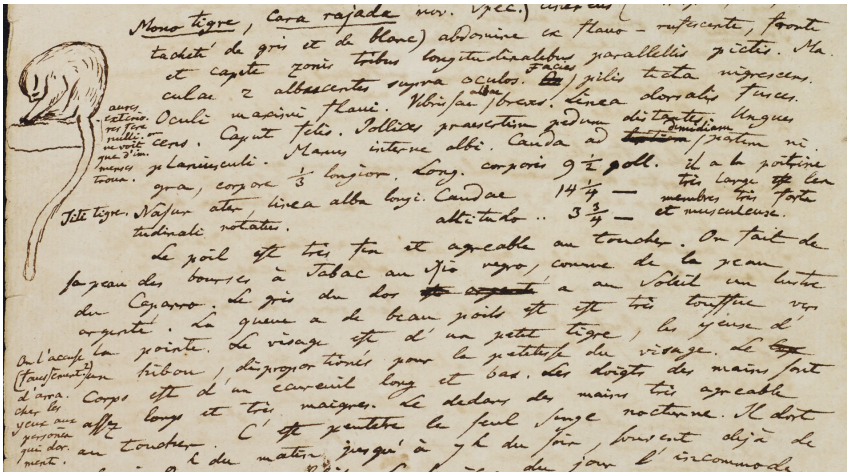

FIGURE 6.3. Field notes of Alexander von Humboldt: a description of night monkey, (*Simia trivirgata*), or *Mono tigre* (Spanish for Tiger monkey)

Unlike Cuvier and Humboldt, Temminck and Humboldt were on good terms. They corresponded sporadically, mostly to ask each other advice on particular issues for their

[53] Humboldt's manuscripts can be consulted online via the Staatsbibliothek zu Berlin, Handschriftenabteilung; Nachlass Alexander von Humboldt (http://kalliope-verbund.info/DE-611-BF-24046. Accessed October 25, 2018)

books. Temminck asked Humboldt for information one could only gain in the field, and Humboldt asked Temminck for facts only he had access to in large collections. In 1822, Temminck sent Humboldt a plate by Nicolas Huet of the Andean condor, intended for the *Nouveau recueil de planches coloriées*. Huet's watercolor had probably been made in the Kaiserliche Hof-Naturalienkabinett in Vienna.[54] Well aware of the limitations of describing stuffed specimens, Temminck asked the German naturalist for feedback on the accuracy of the plate, as Humboldt had seen the bird during his travels. Humboldt had described the bird in 1811.[55] The Andean condor's head was a tricky thing to draw from museum specimens, as it has skin folds that inevitably change form and color after the process of stuffing, and Temminck therefore asked the one man who he knew had seen the condor alive, and had drawings of it made in the field.[56] In a footnote to his description of the condor, Temminck reminded the reader of the problems one encountered studying stuffed animals, and the need of field observations to come to the aid of the sedentary naturalist:

> It is necessary to point out to those who compare our plate with that published by M. von Humboldt, that the drawing made by this scholar and retouched by Barrabant pictures the head and neck drawn from a living individual; in the plate attached here, these same parts were drawn from a stuffed one. Before publishing it I submitted my engraving to M. van Humboldt; this scholar finds that the occiput is too raised, the back is too arched and the transverse wrinkles of the neck are not at all visible; all these defects are the result of a deficient preparation of the skin in the mounted individual.[57]

Temminck and Laugier decided not to alter the original design by Huet, but included Humboldt's comments in their description, in a footnote. Not satisfied with this, Temminck wrote an *Addition à l'article du Catharte Condor* with the description and a plate of the female Andean condor, and a detail of the head of the male. This time, the plate was drawn after a living bird from the "Ménagerie du Jardin du Roi."[58] The

[54] Raat, "Humboldt and Temminck."

[55] Alexander von Humboldt and Aimé Jacques Alexandre Bonpland, "Essai sur l'histoire naturelle du Condor, ou du Vultur Gryphus de Linné," in *Recueil d'observations de zoologie et d'anatomie comparée, faites dans l'Océan Atlantique, dans l'intérieur du Nouveau Continent et dans la Mer du Sud, pendant les années 1799, 1800, 1801, 1802 et 1803*, vol. 1 (Paris: F. Schoell et G. Dufour, 1811), 26-30.

[56] Humboldt to Temminck, [February–June 1822], Naturalis Biodiversity Center Archives, Archive C. J. Temminck, NAT_ARC_TEM_01613-15.

[57] Temminck and Laugier de Chartrouse, "Catharte Condor. *Cathartes gryphus* Temm.," in *Nouveau recueil de planches coloriées d'oiseaux*, vol. 1, 35, pl. 133 (livraison 23). For the dates of publication of each livraison, see Dickinson, " 'Nouveau recueil de planches coloriées' of Temminck & Laugier."

[58] Temminck and Laugier de Chartrouse, "Addition à l'article du Catharte Condor," in *Nouveau recueil de planches coloriées d'oiseaux*, vol. 1, 40, pl. 494 (livraison 83).

differences between the drawing based on the Vienna specimen and the one made after a living specimen are striking.

Occasionally, Humboldt also asked Temminck for advice, appealing to his extensive knowledge of which kinds of animals were to be found where—the kind of knowledge one gathers from natural history collections. After all, Temminck did formulate a law on the geographical distribution of animals. Accordingly Humboldt approached Temminck while preparing the second volume of *Cosmos*, asking for examples of the same kind of animals inhabiting separate regions:

> The second volume of the Cosmos, which will appear in a few months, will include the subject of zoological geography, the analogies and the contrasts between the great continental landmasses; the islands and neighboring continents; the forms that replace each other in America and Asia; the species of mammals and birds at great distances that we can certainly assume to be identical. Is there a bird that is known to be present everywhere, are there identical birds in the tropics of two continents, e.g., Africa and America? Are there identical mammals and birds in the northern and southern temperate regions? Ignorant as I am, I would like to be precise in the few pages I will dedicate to animal Geography. The sources I need are not easily accessible to me. I would like to have a few spicy examples for these questions. What you so easily can provide, is solid gold.[59]

Temminck was happy to help, and attached to his letter some notes on the matter. He also planned to send Humboldt the first volume of the *Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique*. Unfortunately, Temminck's notes seem to be missing, and Humboldt never published this zoological essay.[60]

Just as the process of stuffing animals influenced their description and hence, their classification, the preparation of plants for the herbaria also had major consequences for systematics. Botanical specimens are particularly susceptible to physical change after preparation: dried plants are glued to sheets of paper, losing in the process their original form and color. Often, botanical specimens are missing important features like flowers, fruits or roots. What might seem an insurmountable stumbling block for botanists was actually incorporated in their classification systems from the beginning, and the main tool for botanical systematics was, as it was for zoology, comparison. This is why botanists like Joseph Hooker also contended, as Temminck and Cuvier did, that the

[59] Humboldt to Temminck, 16 August 1846, Naturalis Biodiversity Center Archives, NAT_ARC_TEM_01616-17.

[60] Raat, "Humboldt and Temminck," 30. There are no copies of Temminck's notes on biogeography in the Naturalis Biodiversity Center Archives.

FIGURE 6.4. Plates of the Andean condor from Humboldt and Bonpland's "Essai sur l'histoire naturelle du Condor." In *Recueil d'observations de zoologie et d'anatomie comparée, faites dans l'Océan Atlantique*, plates VIII ad IX (1811).

FIGURE 6.5. The Andean condor as illustrated in Temminck and Meiffren Laugier's *Nouveau recueil de planches coloriées d'oiseaux*, vol. 1, Pl. Col. 133 and 494 (1838). The detail of the head was made from a living specimen, while the plate on the left was made from a stuffed specimen.

place for systematics was the herbarium, in the metropolis. Hooker particularly disliked the proliferation of genera and species. He pointed out how local botanists were prone to describe as a separate species what actually was, in Hooker's view, a variety:

> the local botanist looks closer, perceives sooner, and often appreciates better, inconspicuous organs and characters, which are overlooked or too hastily dismissed by the botanist occupied with those higher branches of the science, which demand a wider range of observation and broader views of specialities; and there is no doubt but that the truth can only be arrived at through their joint labours; for a good observer is one thing, and the knowledge and experience required to make use of facts for purposes of generalization, another: minute differences however, when long dwelt upon, become magnified and assume undue value, and the general botanist must always receive with distrust the conclusions deduced from a few species of a large genus, or from a few specimens of a widely distributed plant.[61]

For him, local botanists lacked an overview of the whole range of species and varieties of the plants they were studying. Furthermore, using living specimens instead of dried ones was a source of misinterpretation for the colonial botanist. It led him to focus on minute and unimportant details. Using as an example the classification of a particular fern from New Zealand, Hooker wrote: "In this (and in many similar cases) he [the colonial botanist] must bear in mind that I have examined many hundreds of specimens of the plant, gathered in all parts of the south temperate hemisphere, and have found, after a most laborious comparison, that I could not define its characters with sufficient comprehensiveness from study of its New Zealand phases alone."[62] The classification systems of local floras evidenced the tension between the field naturalist and the herbarium botanist; or, as Jim Endersby puts it, between "the empire's center and periphery."[63]

The differences in approach and subjects between field and collection naturalists were further complicated by the fact that *field naturalist* was not a single, unequivocal category. Not all of them were out there doing the same thing. Temminck had built a network of collectors scattered all over the Dutch colonies, trading posts, consulates and embassies. Some were fellow naturalists, some were hunting aficionados, and others learned to collect on the job. Temminck's network was a heterogeneous mix of people. Some could be rightfully called field naturalists, doing specific research in the field.

[61] Joseph Dalton Hooker, "Introductory Essay," in *The Botany of the Antarctic Voyage of H.M. Discovery Ships Erebus and Terror in the Years 1839–1843 under the Command of Captain Sir James Clark Ross. II, Flora Novae-Zelandiae*, vol. 2 (London: Reeve Brothers, 1853), xiii-xiv.
[62] Hooker, "Introductory Essay," *Flora Novae-Zelandiae*, vol. 2, xiii-xiv; Endersby, *Imperial Nature*, 155.
[63] Endersby, *Imperial Nature*, 154.

Others were engaged dilettantes with considerable knowledge, while some were only collecting for Temminck. To guide all of them, Temminck wrote a manual with precise instructions on how to kill, preserve and send every kind of animal.[64]

Different people were exploring and collecting nature in quite different ways, which is partly a reflection of the fact that natural history was breaking up into separate disciplines, and partly the result of the way the European expansion took place and how each country tackled the exploration of its colonies. This last point is a complicated, multifaceted aspect of the history of natural history that, at least for the Netherlands, needs to be investigated more in-depth.[65] In addition the distinctions between various kinds of field naturalists are blurred not only because of their disparate activities and interests, but also because, as they worked, if they survived long enough in the tropics to learn and develop, their knowledge, goals and methods also grew and developed, and the meaning of terms like collector, field naturalist, colonial naturalist or *naturaliste-voyageur* was constantly changing. Therefore, any comparison between the field naturalist and the sedentary naturalist requires specification and should take into account that the goals, subjects and methods of all of them varied according to their field of expertise, experience and relation to colonial and imperial governments. When it came to systematics, the cabinet naturalist was the one with the upper hand in influencing the discipline. He had access to large collections and enjoyed the bird's-eye view needed for the classification of the huge diversity of nature. Stevens notes that "[t]here was indeed such a split [between field naturalists and the closet naturalists], but during the first seventy years of the nineteenth century it was closet naturalists who occupied most of the paid positions at universities, herbaria, and academies, and it was their approach that prevailed."[66]

The place to practice systematics was therefore the natural history collection, not the field. In the Netherlands, the collections suitable for systematics were not to be found in the universities, which were specifically designed for teaching and practicing comparative anatomy and physiology. Systematics was practiced in 's Rijks Museum in Leiden and other natural history cabinets. Each of these natural history collections contained specimens prepared and ordered in such a specific way as to be useful to its intended users: anatomical preparations for the professors, stuffed specimens for the systematists. This was, however, not as clear-cut as Temminck had desired, as 's Rijks

[64] Temminck, *Voorschrift*.
[65] See, for example, Van Berkel, Van Helden, and Palm, *History of Science in the Netherlands*; Boomgaard, "The Making and Unmaking of Tropical Science: Dutch Research on Indonesia, 1600–2000"; Goss, *The Floracrats*; Honig and Verdoorn, *Science and Scientists in the Netherlands Indies*; Weber, "Hybrid Ambitions."
[66] Stevens, *Development of Biological Systematics*, 207.

Museum was also supposed to provide the Leiden University with specimens for teachers and students. The University of Groningen had a large, systematically ordered collection very suitable for taxonomy. So much so, that men like Kuhl had been trained in Groningen, under Van Swinderen's care. Even so, natural history collections in the Netherlands were, generally speaking, divided into systematic collections, with Leiden at the forefront, and the academic collections for anatomy and physiology, like the one at Leiden University. Hieke Huistra has demonstrated how the way of using anatomical collections—a hands-on approach where preparations were meant to be handled—was similar in Western Europe, even though there were local differences.[67] Whether the differences between university and museum collections were the result of the universities' tradition of teaching natural history as applied to medicine, a situation particular to the Netherlands, or a consequence of the authority of specific key figures like professor Brugmans or Temminck, needs further exploring.

In all events, in other countries the situation could be very different from the Dutch one. The Muséum National d'Histoire Naturelle in Paris, for one, was unlike the Leiden museum in almost every possible respect. Between 1800 and 1850, the Muséum was an open, public space, with zoological and botanical gardens, combining academic teaching and research, a place where comparative anatomy and systematics shared avenues and offices, and where different views of classification were exposed in exhibition galleries and hotly debated in public lectures.[68] By 1832 the scientific staff of the Parisian museum was made up of titular professors occupying thirteen different chairs. Many of them were also simultaneously employed in various remunerated posts in different institutions, mostly academic institutes and Écoles. This made the museum researchers visible and very present in the educational system. They were also involved in the Academy of Sciences and allowed to enjoy several salaries (*cumul*).[69] Besides the obvious financial advantage of multi-tasking, the professors had access to a larger public and to a greater number of colleagues and societies. None of this was possible in Leiden, where Temminck's views dominated the research, the galleries, and access to the collections for the general public as well as for academics and students. The Leiden museum was isolated by the divorce between the Universities and the museum, especially from students and scientific communities. It evolved on its own, and its core business was, and has remained for almost two hundred years, systematics.

[67] Huistra, *Afterlife of the Leiden Anatomical Collections*, 159.
[68] Outram, "New spaces in Natural History," 249-65; Limoges, "The Development of the Muséum d'Histoire Naturelle of Paris, c. 1800–1914."
[69] Limoges, "The Development of the Muséum d'Histoire Naturelle of Paris, c. 1800–1914," 215.

The situation in Leiden was similar to that in other European museums, like those in Vienna, Berlin and London, which had also been focusing on systematics since their beginnings. The question of the relation between universities and natural history museums is a very interesting one to explore. It would help to discern how systematics, its evolution and its status were related to institutional politics within and without the museums. In Germany, the Zoologische Museum was part of the University of Berlin, founded in 1810. Karl Illiger was its first director, and after his death in 1813, he was succeeded by Hinrich Lichtenstein. Both men worked on systematics, and both corresponded and exchanged specimens with Temminck during their respective directorships. The Berlin museum was also an academic collection, tied to the university's curriculum, as well as a public institution.[70]

In Victorian Britain, the situation was slightly different. While men of independent means put their personal fortunes at the service of science, paid scientists were regarded as having a lower social status.[71] Hugh Strickland was the epitome of gentlemany science. While Strickland remained in close association with the University of Oxford, and his collection was bequeathed to the Museum of Zoology of the University of Cambridge after his tragic death (he was hit by a train while examining geological strata along the railway, at the age of forty-two).[72] Strickland's work on systematics had considerable influence during the first half of the nineteenth century. He worked mostly in his private collection, while he had access to other British natural history collections as well. Strickland benefitted from corresponding with a huge network of peers, but he was not employed in a museum or a university. For the botanist Joseph Hooker, however, gentlemany science was not an option, and after being rejected for the Chair of Botany at the University of Edinburgh in 1845, he decided not to further pursue a university post. At the university, botany was considered a minor department of the medical profession, not a discipline in its own. Hooker therefore declined a chair at Glasgow University (the same chair his father William Hooker had held) and instead accepted a job as botanist for the Geological Survey of Great Britain in 1846. After almost a decade of travelling and publishing, he finally became assistant-director of the Royal Botanic Gardens in Kew, and its director in 1865. Thus Hooker's place as a systematist

[70] T. G. Ahrens, "The Ornithological Collections of the Berlin Museum," Auk 42 (1925): 241-45; Lynn K. Nyhart, *Modern nature: the rise of the biological perspective in Germany* (Chicago: University of Chicago Press, 2009), 46; Erwin Stresemann, "Die Entwicklung der Vogelsammlung des Berliner Museums unter Illiger und Lichtenstein," *Journal für Ornithologie* 70 (1922): 498.

[71] David Allen, "Amateurs and Professionals," in *The Cambridge History of Science. Vol. 6: The Modern Biological and Earth Sciences*, ed. Peter J. Bowler and John V. Pickstone (Cambridge: Cambridge University Press, 2009), 15; Endersby, Imperial Nature, 8-12.

[72] William Jardine, red. *Memoirs of Hugh Edward Strickland. With a Selection from his Scientific Writings* (London: John Van Voorst, 1858); Rookmaaker, *Calendar of the Scientific Correspondence*.

was also outside the university, as a result of his personal circumstances, as well as of the universities' tradition of including botany in the medical sciences.[73]

The conditions under which each of these men worked varied greatly and were determined by very different factors, from the status of their disciplines within the universities, to their personal fortunes, to the political situation in their respective countries.[74] The institutional history of each discipline is relevant, as whether or not systematics was being practiced and taught at the universities had direct consequences for higher education and the continuity of the field, in the education of students and the interaction between students and professors. Therefore, the institutional base of systematics matters. The divorce between the University of Leiden and 's Rijks Museum was not without consequences for Temminck. It also meant that, besides competing for governmental funding and collection specimens, Temminck was working from an isolated position within the Netherlands, as there were just a handful of systematists in the country. Most of them worked under Temminck in the Leiden museum. Temminck's network consisted mainly of fellow systematists, collectors and field naturalists, but he had little or no contact with students and professors in other disciplines, and no influence at all in higher education. It also seems that Temminck kept aloof from Dutch learned societies, like the Hollandsche Maatschappij der Wetenschappen in Haarlem. Perhaps his focus on systematics, quite exceptional in the Netherlands, was the main reason for this. Temminck was also spending spent a lot of time on the museum administration and struggling for resources, which was another consequence of the separation of the museum from the university.

During the last quarter of the nineteenth century, when the universities started enlarging their courses of comparative anatomy and physiology to accommodate the new experimental zoology, 's Rijks Museum van Natuurlijke Historie continued to carry out its systematic work, secure in its own tradition and independent from laws and resolutions on education and university research programs.[75] The Leiden museum was still in competition with universities and laboratories for funding and status, but the institution prevailed and set the basis for modern taxonomy, while fulfilling its role as a repository of specimens.

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[73] Endersby, *Imperial Nature*, 11.

[74] An overview of these and other factors can be found in Bowler and Pickstone, *The Modern Biological and Earth Sciences*.

[75] Jacob van der Land, ed. *The History of Natural History in Leiden* (Leiden: Naturalis, 2001). For more information on museums as sites for science, see John V. Pickstone, "Museological Science? The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology and Medicine," *History of Science* 32, no. 2 (1994); Sally Gregory Kohlstedt, "Museums: Revisiting Sites in the History of the Natural Sciences," *Journal of the History of Biology* 28, no. 1 (1995).

Temminck's podium

Reconstructing the whole intellectual, political, cultural and institutional landscape in which Temminck lived and worked would require an extensive examination of the Dutch as well as the European context, which would greatly surpass the scope of this chapter. However, a look at how Temminck communicated, to whom and from where may provide a sketch of his surroundings. The effect of his environment on his views and work may become apparent.

The most obvious feature of Temminck's landscape is 's Rijks Museum van Natuurlijke Historie in Leiden. The museum had been founded by king Willem I as part of his strategy of enhancing the scientific and political influence of the country, but just about a decade after its foundation, the museum was already struggling for funding. This had an enormous effect on Temminck's position, who was overwhelmed by administrative tasks, lobbying for funding, and trying to deal with the material pouring in from the Dutch East Indies. But even before the museum lost the support of the government, the king's strategy to nationalize science and uplift the museum was already backfiring, and resulted in the isolation of its scientists, rather than international prestige. In particular his idea that the results of Dutch science should be published in Dutch created a huge hurdle for both the Natuurkundige Commissie and Temminck.

The king's instructions for the Natuurkundige Commissie commanded that "no description of the objects observed or sent, nor observations of natural phenomena, will be published in a foreign language nor sent to foreign societies nor scholars, except with permission from the Minister [of Public Education, National Industry and Colonies] and after previous publication by one of the learned societies or journals of this Kingdom."[76] The king was determined to claim for the country any new discoveries made by the Commission, but the Dutch language was not one commonly understood outside the low countries. French was the scientific language of the time, so this decision included in article no. 3 of the royal decree did not help in promoting the Commission or the museum. If the Dutch discoveries could not be read, spread and shared outside the Netherlands because of the language barrier, how could the work of the members of the Commission and the museum staff be noted, let alone recognized? Confronted with this dilemma, Temminck decided to bypass the inconvenient article no. 3 whenever possible.

As thousands of specimens and no fewer pages of field notes and drawings arrived from the Indies, Temminck, short of staff and work piling up, had to decide how to deal with the material. One of the first things Temminck did was to publish extracts from

[76] Royal Decree no. 251, 29 April 1820, art. 3; Veth, "Overzicht van hetgeen," 22; Striekwold, Robbert J., "Naam maken: wat de dood van twee negentiende-eeuwse wetenschappers ons leert over de natuurhistorie," *Ex Tempore* 37, no. 3 (2018): 217-218.

Kuhl and Van Hasselt's letters in two journals, the *Annales Générales des Science Physiques*, published in Brussels, in French, and the *Algemeene Konst- en Letterbode*, which appeared in Haarlem, in Dutch. Many of the letters that were published in Dutch were later translated (and at times slightly edited) by Temminck and published in the Parisian *Bulletin des Sciences Naturelles et de Géologie*.[77] Disclosing their letters was an attempt to distribute Kuhl and Van Hasselt's discoveries as quickly as possible. Considering that these members of the Commission were not returning home to publish their findings themselves, Temminck decided to distribute the material among the experts that could publish them. He would deal himself with the mammals and the birds, and Heinrich Boie was in charge of the amphibians, while De Haan took care of the mollusks, together with the Baron André Étienne J. d'Audebert de Férussac—a French naturalist specialized in mollusks.[78] But there were no Dutch experts that could describe and classify the thousands of fishes and insects collected by Reinwardt, Kuhl and Van Hasselt between 1815 and 1821. Temminck proposed that Valenciennes and Cuvier worked on the fishes. For the insects, Temminck had the celebrated entomologist and engraver from Nürnberg in mind, Jacob Sturm.[79]

Achille Valenciennes, from the Zoological Laboratory of Reptiles and Fishes of the Paris museum, was working with Cuvier on an ambitious project, a *Histoire Naturelle des Poissons* which, in the end, took up twenty-two volumes. Valenciennes visited the Leiden museum twice, in 1824 and in 1827, to study the collection of fishes, many of them still undescribed.[80] While in Leiden, Valenciennes made drawings of the specimens as well as copies of the original sketches from the Commission, and selected some specimens to be sent to Paris as a loan for further study (the return of this loan proved afterwards to be rather difficult and Schlegel had to go to Paris himself to retrieve the fishes).[81] Naturally, Cuvier and Valenciennes published their results in French, against the explicit wishes of the Dutch government. Invoking the famous Article no. 3, Daniel Jacob van Ewijck, from the Ministry of Public Education, National Industry and

[77] A complete list of the published letters of Kuhl and Van Hasselt can be found in Klaver, *Inseparable Friends*, 57-63.

[78] Coenraad J. Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 3 December 1824, Naturalis Biodiversity Archives, Jaarverslagen.

[79] See Coenraad J. Temminck, Report to the Ministry of Public Education, National Industry and the Colonies, 3 December 1824, Naturalis Biodiversity Archives, Jaarverslagen; Gijzen, " 's Rijks museum," 40.

[80] T. R. Roberts, "The Freshwater Fishes of Java, as Observed by Kuhl and van Hasselt in 1820–23," *Zoologische Verhandelingen* 285, no. 1 (1915);

[81] Gijzen, " 's Rijks museum," 224.

Colonies, reprimanded Temminck in no uncertain terms for this flagrant violation of the royal decree—three times.[82]

Apparently unconcerned, Temminck went ahead with his original plans. Cuvier and Valenciennes described the fishes held in the Leiden museum. Temminck himself worked on the collection of mammals and published the *Monographies de mammalogie*, in French. The first volume appeared in 1827, in Paris, and the second volume appeared simultaneously in Leiden and in Paris in 1835. More than eight hundred species of birds were described and depicted in the *Nouveau recueil de planches coloriées d'oiseaux*. About two hundred of them had been collected by the members of the Natuurkundige Commissie.[83] Temminck being the author, it seems that the Ministry did not object to his works being published in French.

Temminck always chose to write his more extensive treatises in French, and only short articles were published in Dutch.[84] But then again, he later translated most of his Dutch articles into French and incorporated them in his more comprehensive publications. He did so with his essays on the Japanese fauna and with some articles on bats, later included in his *Monographies de mammalogie*. The French language was, after all, the predominant scientific language in Europe, and Temminck was not only decidedly Francophile, but first and foremost, seriously committed to reaching out to the international scientific community. Almost all Leiden curators published preferably in French as well. Boie had produced a manuscript on reptiles and amphibians (based mostly on Kuhl and Van Hasselt's notes and specimens) entitled *Erpétologie de Java* before leaving for the Indies himself as a member of the Natuurkundige Commissie.[85] Willem de Haan wrote several essays on insects, the *Mémoires sur les Métamorphoses des Coléoptères*, the first of which appeared in 1835.[86] Hermann Schlegel used German (for example, *Abbildungen neuer oder unvollstandig bekannter Amphibien*, 1837–1844) and French for his scientific publications.[87] Temminck cannot possibly have been pleased

[82] Van Ewijk to Temminck, 9 May 1825, 28 May 1825 and 24 December 1825; National Archives of the Netherlands, The Hague, Binnenlandse Zaken, nummer toegang 2.04.01, inventarisnummer 4859; Striekwold, "Naam maken," 217.

[83] Letter from Temminck to the minister of Public Education, National Industry and the Colonies, 24 November 1836; quoted in Veth, "Overzicht van hetgeen," 84.

[84] See Appendix II, Bibliography of Coenraad Jacob Temminck.

[85] Boie's manuscript was never published. It had been sent to Brussels for printing, but it was lost during the Belgian Revolution in 1830 (Holthuis, Rijksmuseum, 29). The manuscript, including the plates, was eventually somehow returned to the Leiden museum and is now kept in the Naturalis Biodiversity Center Archives.

[86] See also Vrolik, "Levensberigt van Wilhem de Haan."

[87] After the middle of the century, and especially after becoming Temminck's successor as director, Schlegel focussed on the Dutch fauna and wrote mostly in Dutch. Significantly, these works were not only

when, in 1839, the king commanded the publication of a comprehensive work on the natural history of the East Indian colonies, demanding that it be written in Dutch: the V*erhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen*.[88]

Abroad, the long-expected *Verhandelingen* were met with a mixture of satisfaction and disappointment. The choice of language was criticized, and its limited scope lamented. Strickland remarked: "This superb work contains figures and descriptions of many new species from the remote islands of the Malay archipelago; and it is only to be regretted that so valuable a publication should be compiled in a language with which few men of science out of Holland are acquainted." In that same report, Strickland noted the work by Schlegel and lamented: "There is a paper by M. Schlegel on the supposed absence of nostrils in the genus *Sula,* in the *Tijdschrift voor Natuurlijke Geschiedenis*, 1839, of which, from being unacquainted with the Dutch language, I regret my inability to give a summary."[89] Obviously, it was not in the best interest of the Leiden museum and its scientists, nor of the Dutch government, to insist on publishing in Dutch.

But perhaps the greatest obstacle for Temminck in communicating with his peers abroad was the format in which his works appeared. In forty-seven years, he published (as author and editor) fourteen book titles, a total of twenty-six volumes, most of them monographs on ornithology and mammalogy. In contrast, during these four and a half decades, he wrote only sixteen journal articles, most of them in Dutch. His first articles appeared in French in the *Annales Générales des Sciences Physiques et de Géologie*, edited jointly by the Frenchmen Jean-Baptiste Bory de Saint-Vincent and Pierre Auguste Drapiez, and Jean-Baptiste van Mons, from the Académie royale des Sciences et Belles-Lettres in Brussels. After the Belgian Revolution, which had shaken him to his core, Temminck turned to the *Bijdragen tot de Natuurkundige Wetenschappen* and to Van der Hoeven and De Vriese's *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie*.[90] Temminck clearly preferred to write extensive and detailed books, which he kept revising. He spent a very long time—thirty-five years, to be precise—perfecting and polishing just one title, the *Manuel d'ornithologie*. This single-mindedness was exactly

intended for fellow naturalists: Schlegel also wrote for students of natural history. See A. A. W. Hubrecht, "Hermann Schlegel," *De Gids* Jaargang 4 (1884); Schlegel, "Levensschets van Hermann Schlegel."

[88] Husson and Holthuis, "The dates of publication of 'Verhandelingen' "; Fransen, Holthuis, and Adema, "Type-catalogue of Decapod Crustacea."

[89] Strickland, "Report on the Progress," 188, 207.

[90] In 1831, Temminck had nothing but harsh words and contempt for Brussels: "The enrichment of the Academies and of that ungrateful Brussels, of those mutinous cities of Belgium, whose memorial pillars still stand despite the superstitious Vandalism, will do service to the civilization of a stupid and fanatic people; at last the works of natural history, through which the arts were cultivated, were without hesitation put under legal protection by their rebellious hands." In Coenraad Jacob Temminck, "Algemeen overzigt van de orde der Cheiroptera, en Monographie van de geslachten Harpyia en Cephalotes," *Bijdragen tot de natuurkundige wetenschappen* 6 (1831): 316, footnote.

what gained him a reputation as a thorough, comprehensive and meticulous worker. On the other hand, it kept him stuck with the same subject for decades. Despite his reputation, this preference turned against him as journals became more and more the favored place to publish, communicate and debate, especially after 1840.[91] An anonymous British reviewer did not hesitate to refer to him as "the wary and tardigrade Dutchman" (sloths were at the time known as *Tardigrada*).[92] Bonaparte, who had lamented the fact that the *Monographies de mammalogie* contained many double descriptions summed it up as follows:

> The same naturalist [Temminck] has resumed, after a long interval, his very useful Monographs of Mammalia, among which the most anxiously expected was that intended to clear up the genus *Vespertilio*, more especially as the publication of his researches on these animals had been retarded more than twenty years. As long ago as 1830, I remarked in my *Osservazioni sulla seconda edizione del Regno Animale del Cuvier*, "I shall abstain from saying more on the Chiroptera (of America) to which I at one time gave my attention, but afterwards entrusted the specimens which I had collected to the learned Temminck, who is in a position to make a better use of them than I can do." We may therefore conclude, that he has devoted very little time to this subject during these twenty years, for notwithstanding his immense materials, and the aid which he has received from every side, the work would have afforded us but little light if its defects had been less prominent.[93]

Temminck's sluggish pace meant that he was losing touch with developments in systematics, at least, for popular groups of birds and mammals. Charles Darwin worked for nearly eight years on barnacles, and his monograph was widely celebrated.[94] Besides Temminck's preference for exhaustive and in-depth monographs, there might be other reasons for his absence from the domain of journals. The most obvious one is lack of time. He was painstakingly working on his books and managing a national museum, a task that was not without its challenges and accompanying headaches. On top of that, the ever-growing museum lacked, despite its towering size and prestige, its own journal.

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[91] In 1845, Strickland listed no fewer than forty-two journals of interest for ornithologists, indicating that there even were "many others." (Strickland, "Report on the Progress," 200).

[92] "A Retrospect of the Literature of British Ornithology, from the Close of the 17th Century to the Present Time," *The Analyst: a Quarterly Journal of Science, Literature, and the Fine Arts* 3, no. 3 (1836): 94.

[93] Bonaparte, "Observations of the State of Zoology," 21-22.

[94] Charles Darwin, *A Monograph on the Sub-Class Cirripedia, with Figures of all the Species.*, 2 vols. (London: Ray society, 1851-1854).

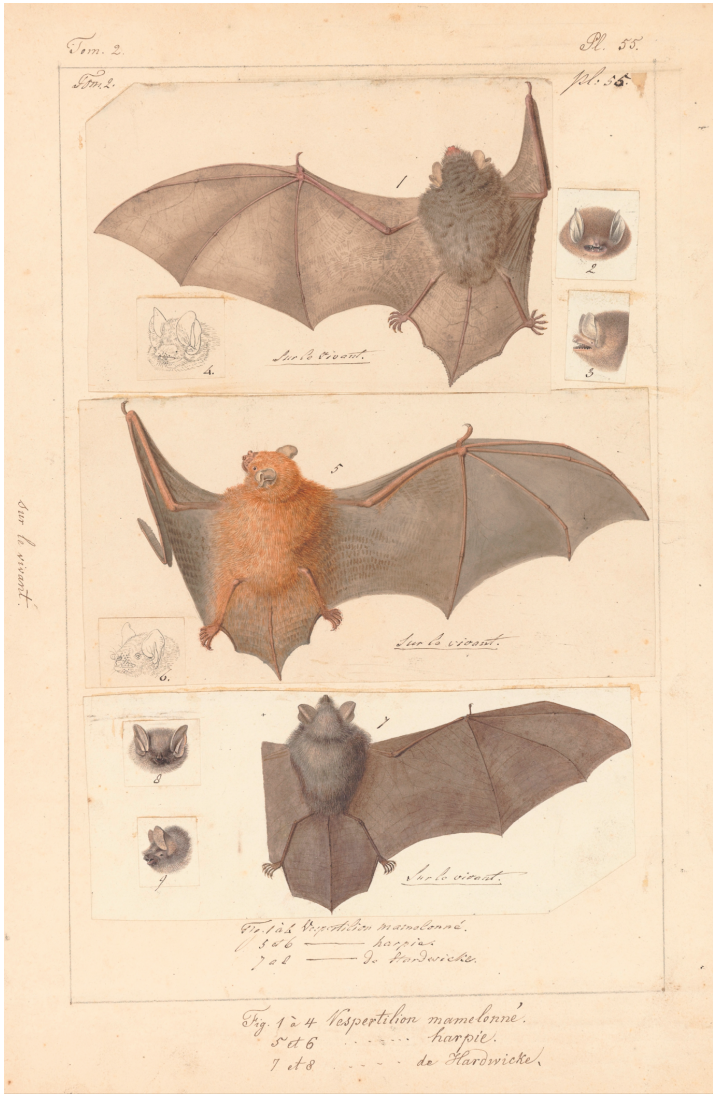

FIGURE 6.6. Preliminary design for plate no. 55 of of Temminck's *Monographies de mammalogie*. For his descriptions of new species of *Vespertilio* bats, Temminck used the field notes and drawings made by members of the Natuurkundige Commissie.

The fact that the Leiden museum did not have its own journal was not because of lack of interest on Temminck's part. He had envisioned the *Rijksmuseum* to be modelled after the Paris *Muséum*, and such a vision included, quite naturally, a museum journal. Temminck had already picked a title, *Annales du Musée d'histoire naturelle des Pays-Bas*,

but it was never to be.[95] Oddly enough, the Dutch government did not support this idea, even if it provided scientific advertisement for the museum, and did provide financial aid. In fact, during Temminck's directorate, the only funding the museum received for scientific publications was in the form of the purchase of copies of books. For example, in the case of the *Fauna Japonica*, the government agreed to buy a number of copies as a means of financial support, but the publication was largely paid for by Siebold himself, regardless of the glaring fact that all five volumes were written by the Leiden museum's staff.[96]

Most curators there were either publishing in journals or paying for their works privately, as Temminck did. Some received a small financial subsidy from the government. Schlegel even took on the adventure of publishing a work entitled *Abhandlungen aus dem Gebiete der Zoologie und Vergleichende Anatomie*.[97] The enterprise did not last long. Only two issues were published, one on cetaceans in 1841, and a second one on falcons in 1843. The exact reason for the discontinuation of the work is unknown, but as Schlegel continued to be very active and interested in this particular subject, Schlegel's running out of funds seems to be a plausible explanation. The Leiden museum did not edit its own journal until 1879, under the direction of Schlegel, and tellingly, in English, entitled *Notes from the Royal Zoological Museum of The Netherlands at Leyden*, or *Notes from the Leyden Museum* for short.

The paucity of articles in journals by Temminck was accompanied by another conspicuous fact: it seems that he did not give any public lectures, nor did he contribute in a noticeable way to the activities of the Dutch learned societies. He was a member of forty different societies and institutes, from the Imperial Society of Naturalists of Moscow to the Zoological Society in London and the American Philosophical Society in Philadelphia. To get a sense of how impressive this network is, note that Strickland's Report of 1844 listed thirty-four scientific societies that were in some way or another occupied with ornithology.[98] Temminck made use of some of these societies' platforms to publish a few articles and corresponded with an extensive network of naturalists from all around the globe. But his contributions in the form of articles or lectures were very limited. His focus remained fixed on the production of extensive, detailed

[95] Holthuis, *Rijksmuseum*, 69; Veth, "Overzicht van hetgeen," 79.
[96] Holthuis, *Rijksmuseum*, 39.
[97] Hermann Schlegel, *Abhandlungen aus dem Gebiete der Zoologie und vergleichenden Anatomie* (Leiden: A. Arnz & comp., 1841–1843). Holthuis (*Rijksmuseum*, 69) noted that Schlegel published his *Abhandlungen* "at his own risk," implying that he had no financial support from the government and that it was Schlegel's own project.
[98] Strickland, "Report on the Progress," 200.

monographs. In the Netherlands, where it had been relatively easy for Temminck to participate in meetings with his peers, it seems that he only did so very sporadically.

In October 1838, Temminck read one of his papers in the meeting of the First Class of the Koninklijk Instituut van Wetenschappen (the same institute that had rejected his application for membership thirty years before), and a second one in 1841.[99] And that was it. Both papers were published in Dutch journals, in 1838 and 1841 respectively, and were translated into French.[100] Interestingly, both papers dealt with the mammals of Japan and how their position in the classification systems supported Temminck's law of geographical distribution. This is remarkable, as it means that the only time Temminck chose to present something to the Koninklijk Instituut, it was not on systematics. He was introducing his only attempt to tackle a purely theoretical topic, a general law, which he based on the newly discovered Japanese mammals. A reason may be that morphological descriptions do not lend themselves to being read in front of an audience, and are better presented on paper, with illustrations, tables, and all kind of comparisons and references.

Systematics, it may seem, was not a suitable topic for the meetings of learned societies. This is not to say that there were never any presentations on zoological or botanical questions. To give just one example, during the thirteenth meeting of the First Class of the Koninklijk Instituut, the members presented essays on subjects as diverse as the form of the pelvis of the woolly mammoth, the structure of the carpal bones of the orangutan, how to extract pigments from the indigo plant, and the mammal fauna of Japan.[101] Talks solely on systematics were rare, which may also have influenced the visibility of the field within the learned societies in the Netherlands. At all events, Temminck was not a particularly engaged member of any society. Whether this was a consequence of his specialization in technical, dry systematic research, a consequence of his dislike of an animated social life, or a combination of both, remains unclear. Remarkably, in his letters Temminck never discussed difficult issues nor did he share new discoveries with any of his correspondents. His network kept him informed of new publications; it served him mostly to exchange information and specimens, but it was not his podium for debate. But then again, Temminck was a reserved man. Perhaps he

[99] The First Class was concerned with the natural sciences as broadly as one can interpret the term, including mathematics, chemistry, astronomy, zoology and botany, anatomy and physiology, geology, medicine and pharmacy.

[100] Temminck, "Faune des Iles de la Sonde et de l'Empire du Japon," *Fauna Japonica*, vol. 1; "Zoogdieren van Japan"; "Over eenige geslachten van Zoogdieren, een deel der Fauna der Japan uitmakende," *Verslagen en mededeelingen uitgegeven door de vier Klassen van het Koninklijk Nederlandsche Instituut van Wetenschappen, Letterkunde en Schoone Kunsten* (1841); "Urotrichus."

[101] Held on August 31, 1841 in Amsterdam, see *Verslagen en Mededeelingen, uitgegeven door de vier Klassen van het Koninklijk-Nederlandsch Instituut van Wetenschappen, Letterkunde en Schoone Kunsten*, vol. 4 (1841).

guarded his new discoveries more zealously after his bitter experiences with Vieillot, Boitard and Knip.

There is yet another issue that characterizes how Temminck communicated. He rarely explained the principles underlying his classifications, as if his views were somehow self-evident. As we have seen from the debates he was involved in, he only offered extended explanations when compelled to defend himself against direct criticisms, like those from Vieillot and Vigors. But then again, in Temminck's time, so did most naturalists. In particular, those dealing with zoological classification were not in the habit of explaining their views in extended chapters or articles.[102] There are just a few exceptions to this, such as Hugh Strickland, who devoted essays to the species and genus concepts, helped define terms like *affinity* and *analogy*, and wrote on the methods to achieve a natural classification in ornithology.[103] Likewise, the botanist Joseph Hooker explained the classificatory principles on which his works were grounded, mostly in essays that preceded his floras.[104] In 1853, Hooker wrote on the need of explaining one's "general theoretical views on the origin, variation, and dispersion of species":

> it is very necessary for those who set themselves up as systematists, to give their individual impressions upon these important and obscure subjects, the elucidation of which is one great object of their studies. Not only may a naturalist's views be supposed to represent the result of his accumulated experience, but his mode of treating his subject must in many cases be influenced by them, however much he may try to avoid it. For instance, it is natural to suppose that an observer who believes species to be arbitrary divisions of a genus, dependent on the naturalist's choice of characters, will adopt widely different conclusions as to their limits and origin, from one who regards them as distinct creation; and he who denies that a plant which grows spontaneously in England and New Zealand can have originated from one common parent, will reason differently on the subject of migration and dispersion from him who holds an opposite view. Now the actual amount of knowledge we possess on such subjects is so very limited, that few experienced

[102] Mayr, "Illiger and the Biological Species Concept"; Farber, *Emergence of Ornithology*; Stevens, *Development of Biological Systematics*; Endersby, *Imperial Nature*.

[103] Illiger, "Einige Gedanken über die Begriffe"; Strickland, "Observations upon the Affinities and Analogies of Organized Beings"; Strickland, "On the True Method of Discovering the Natural System in Zoology and Botany."

[104] For example, Hooker, "Introductory Essay," *Flora Novae-Zelandiae*, vol. 2; *Flora Indica: being a Systematic Account of the Plants of British India, together with Observations on the Structure and Affinities of their Natural Orders and Genera* (London: W. Pamplin, 1855); *On the flora of Australia: its Origin, Affinities, and Distribution being an Introductory Essay to the Flora of Tasmania* (London: Lovell Reeve, 1859).

> naturalists are inclined to pronounce positively upon them, whilst the majority offer no opinion at all.[105]

Whether Temminck assumed his views were obvious once the reader looked at his classifications, or thought that he had explained them sufficiently, is hard to say. But his approach to general explanations (or rather, the lack thereof) was more the rule than the exception among naturalists. Carefully articulated premises for classification, such as the idea of continuity or the fixity of species, are rare. The theories of the naturalists from this period, with a few exceptions, have to be pieced together from their classification systems and the introductory sections of their works.[106] This is also true for the genus concept, the definition of *relation* between groups, or interpretations of geographical distribution of species. This failure to provide general explanations for natural diversity was intimately related with the general aversion towards any incursion into the realm of natural philosophy. Systematists were very weary of theories and hypothesis, and, as we will see in the next chapter, this would have consequences for the status of their discipline, especially after the 1840s.

Ultimately, Temminck's chosen means for communication, the languages and platforms he chose to publish in, the public he had in mind, his relation with the learned societies and his network of peers, all had their influence on how much and how often he communicated, his visibility, the width of his circle and his scientific authority.

[105] Hooker, "Introductory Essay," *Flora Novae-Zelandiae*, vol. 2, i-ii.
[106] See also for example, Mayr, "Illiger and the Biological Species Concept," 167; Stevens, *Development of Biological Systematics*, 133.

CHAPTER SEVEN

Classification and natural history: 1800–1850

After our examination of the scope, theories, methods and geography of Coenraad Temminck's work and the ups and downs of his authority, the question that remains to be explored is: how do Temminck's discussions of systematics fit within the wider domain of the natural sciences? In other words, what was the role and status of systematics within natural history between 1800 and 1850? In order to tackle this point, we first need to define natural history itself. There are several possible approaches: looking at the definitions of natural history given by historians of science, looking at the definitions of—and attitudes towards—natural history of the naturalists themselves during this period, and exploring the ideas of the general public, patrons, institutions and government officials. All these are necessary to better understand the development of systematics, but in this chapter I will focus on the views of natural history and its branches of their practitioners, which is necessarily only a partial view. However, a look into the available definitions of natural history from the period between 1800 and 1850 will suffice to demonstrate that defining *natural history* is more difficult than it may seem. Defining it was by no means resolved half way through the nineteenth century, and it may still not be resolved. As Stevens remarks: "In order to talk about natural history in this era, at the very least one must qualify the use of the word. There is no monolithic natural history in the nineteenth century."[1]

Defining *natural history*

When Temminck published his first monograph on pigeons and gallinaceous birds in 1813, he justified the time and effort that had gone into his work by appealing to religious and utilitarian arguments. Temminck claimed that the study of natural history,

[1] Stevens, *Development of Biological Systematics*, 218.

or, more precisely, the "étude des trois règnes de la nature," brought not only joy and inner peace, it also brought its practitioner closer to the Almighty and kept young people safe from unspecified but tantalizing "séductions."[2] He also listed the advantages that natural history brought to men and society. Among other benefits, it allowed man to know himself and the workings of his internal organs, it made it possible to domesticate various species of animals for his profit and pleasure, it helped in finding fertile grounds for his crops, it helped him to navigate around the globe and brought him the most useful gifts, like additional foodstuffs and medicines. In this sense, that of usefulness, the study of pigeons and gallinaceous birds was of particular interest, being indispensable and of the greatest service to society, especially to the elite: this order of birds includes game birds, fowl and poultry.[3]

These kind of spiritual and utilitarian considerations preceding a work on natural history were common in late eighteenth and early nineteenth century books, but after 1813 Temminck would never again write an introduction like this. Just two years later, without a word on the benefits of ornithology, neither for the spirit nor for society, Temminck presented his *Manuel d'ornithologie* as what it actually was: a systematic work on birds to increase the knowledge of the European avifauna. His aim, he said, was to correct the errors and gaps in the existing works, deal with the nomenclatural chaos and improve the description of genera, and without much ado, offered an Index of the treated genera. Although Temminck dispensed with the spiritual preambles, he did highlight the utility of natural history on several occasions, and for different reasons. In 1835, for example, he wrote: "We seem to forget that the study of nature, apart from its intrinsic importance from the moral and scientific point of view, greatly influences civilization and industry, driving its springs, many of the arts and the propagation of enlightenment to all classes of society."[4]

But what did Temminck actually mean by natural history? He was never very explicit about what natural history actually included, or did not include, nor the place his work had in it and its relation to the other branches of natural history, like physiology or paleontology. From the *Discours préliminaire* from the *Histoire naturelle générale des pigeons et des gallinacés*, however, we can deduce that, for Temminck, natural history comprised anatomy, systematics, applied botany, physiology, geology and geography, but not astronomy.[5] A quick and by no means exhaustive look at some other definitions from this period, from 1790 to 1840, reveals that natural history was not as

[2] Temminck, "Discours préliminaire," *Pigeons et gallinacés*, vol. 1, 7, 9.
[3] Temminck, "Discours préliminaire," *Pigeons et gallinacés*, vol. 1, 13-14, 16.
[4] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xxxvi-xxxvii.
[5] Temminck, "Discours préliminaire," *Pigeons et gallinacés*, vol. 1, 7.

well-defined a concept as its widespread use suggests.[6] Naturalists disagreed on what natural history was, what branches of the natural sciences were to be included in it, and whether or not it was part of their work to delve into philosophical considerations and *a priori* theoretical thoughts. The relative importance of each of its branches was also far from established. As we will see later on, the issue of delimiting the scope of the naturalist's domain greatly depended on whether one believed that the natural system could be achieved by the *practice* of classification, without a theoretical framework, or not at all.

In 1817, Georges Cuvier expressed his concern about this lack of consensus in defining natural history and felt the need to clear it up: "Few people have an accurate idea of natural history, it seems necessary to start our work by clearly defining the goals of this science and establishing the distinct limits between natural history and its related sciences."[7] He defined natural history, or "physique particulière" as the study of natural objects, including minerals and living beings, while the other natural sciences included the "physique générale" (physics, optics, astronomy and meteorology), and chemistry.[8] All these branches of the natural sciences pursued one goal, the discovery of the general laws governing nature, but each did so by different means and methods. Cuvier's classification of the natural sciences can be found almost literally in other textbooks from the beginning of the nineteenth century, like in John Stark's *Elements of Natural History* (1818) or Jan van der Hoeven's *Handboek der dierkunde* (1827).[9]

Jean-Baptiste de Lamarck held similar ideas regarding the scope of natural history. For Lamarck, it was the branch of natural sciences that pursued "the general and detailed knowledge of our globe and all its products born or made on its surface and its interior."[10] He excluded physics, chemistry and astronomy from natural history, and divided it into three big fields: zoology, botany and mineralogy.[11] For the first two fields, the study of living beings, Lamarck introduced the term *biology*—in quite the same sense we use it today.[12] Zoology encompassed comparative anatomy, physiology, the

[6] See the references previously given in the Introduction, "A brief review of historiography."
[7] Cuvier, "Introduction," *Règne Animal*, vol. 1, 1.
[8] Cuvier, "Introduction," *Règne Animal*, vol. 1, 2.
[9] John Stark, "Introduction," in *Elements of Natural History: Adapted to the Present State of the Science, Containing the Generic Characters of Nearly the Whole Animal Kingdom, and the Descriptions of the Principal Species*, vol. 1 (Edinburgh: W. Blackwood, 1828); Van der Hoeven, "Inleiding," *Handboek der dierkunde*, vol. 1.
[10] Jean-Baptiste de Lamarck, "Sur l'Histoire Naturelle en général," *Journal d'Histoire Naturelle* 1 (1792): 3-4.
[11] Lamarck, "Sur l'Histoire Naturelle en général," 4.
[12] Jean-Baptiste de Lamarck, *Hydrogéologie, ou Recherches sur l'influence qu'ont les eaux sur la surface du globe terrestre; sur les causes de l'existence du bassin des mers, de son déplacement et de son transport successif sur les différens points de la surface du globe: enfin sur les changemens que les corps vivans exercent sur la nature et l'état de cette surface* (Paris: Agasse et Maillard, 1802), 188.

description of life histories, geographical distribution and classification.[13] With regards to methodology, Cuvier and Lamarck agreed, if in nothing else, that physics, optics and chemistry were sciences based on experimentation and mathematical calculations, while natural history was based solely on observation and comparison, although it made use of the principles governing the rest of the natural sciences.[14]

The botanist Augustin P. de Candolle had a slightly different view of the matter. For example, he considered natural history to fall within the experimental sciences, together with physics and chemistry, all intimately linked and depending on each other's progress. Similarly, entomologist William Sharp MacLeay had also questioned whether natural history was a science of observation only, as it also depended on experience, while chemistry could not be considered only a science of experience, but one of observation, too. He also wondered whether mineralogy shouldn't be included in chemistry instead of in natural history. Much of what had been discovered in that field depended on calculation, and its affinity with chemistry was, for him, more evident than its affinity with natural history.[15] For de Candolle, astronomy, geology, mineralogy and meteorology were all branches of natural history dealing with inanimate matter, while zoology and botany were the branches studying living beings.[16] He also explained that, as a consequence of the differences between animals and plants, anatomy played the most important role in zoology, but botany had to settle for external characters and geographical distribution. De Candolle divided botany into three main subdisciplines: *glossology*, dealing with the terminology of the parts of plants; *taxonomy*, or the theory of classification; and *phytography*, the "art of describing plants in the way most useful to the progress of science." Interestingly, he regarded the "Botanique descriptive" and the "Synonymie Botanique" as "applied branches," in other words, as a practical field within botany.[17] De Candolle also considered vegetal physiology and pathology, and all applied disciplines like agriculture and botanical pharmacy, as branches of botany. All these disciples were, as Lamarck and Cuvier remarked, related to each other.[18]

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[13] Jean-Baptiste de Lamarck, "Discours préliminaire," in *Philosophie zoologique, ou exposition des considérations relatives à l'histoire naturelle des animaux; à la diversité de leur organisation et des facultés qu'ils en obtiennent; aux causes physiques qui maintiennent en eux la vie et donnent lieu aux mouvemens qu'ils exécutent; enfin, à celles qui produisent les unes le sentiment, et les autres l'intelligence de ceux qui en sont doués* (Paris: Baillière, 1809), 1-2.

[14] Lamarck, "Sur l'Histoire Naturelle en général," 8-9; Cuvier, "Introduction," *Règne Animal*, vol. 1, 4-5, 7.

[15] William Sharp Macleay, *Horae Entomologicae or, Essays on the Annulose Animals*, vol. 1 (London: S. Bagster, 1819), 174-75.

[16] Candolle, "Introduction," *Théorie élémentaire*, 3, 8-9.

[17] Candolle, "Introduction," *Théorie élémentaire*, 19.

[18] Candolle, "Introduction," *Théorie élémentaire*, 16-19.

The study of mankind posed similar problems. Jan van der Hoeven for instance, published—besides many other things—a series of articles on the natural history of man. In the first of these articles he warned the reader: "*Anthropology* should not be confused, as sometimes happens, with the natural history of man."[19] The former, he explained, covered a bigger area and it included the latter. Natural history dealt with the differences between man and animal, as well as with the differences between "people and people," that is, between racial and ethnic groups.[20] In order to address the first issue, comparative anatomy and physiology were essential, while the study of the different human groups required knowledge of the races populating the earth. The natural history of man was an "anthropological science," but was not Anthropology itself.[21]

The term *naturalist* was as elusive as *natural history* was. Entomologist William Sharp MacLeay wrote in 1821:

> Naturalists, it is said, may be classed like the objects of their study into genera and species; and in this classification places may be found for the comparative anatomist and physiologist to the mere collector who hoards a shell or pebble, simply that he may be gratified in the possession of that which his neighbour wants. The variety of pursuits embraced in the comprehensive term Natural History, is without doubt multifarious; but it may be questioned whether the title of *naturalist* be merited by the cultivator of any one or two of these pursuits, or indeed by any person who deems even the most ignoble of them unworthy of his attention.[22]

Temminck saw himself as a naturalist, but of what kind? He had turned from a 'mere collector' into an ornithologist working on bird systematics, to become the founder and director of one of the most prestigious natural history museums in Europe. Perhaps the failure to pin down what 'naturalist' actually meant, lay not so much in semantics but in the assumption that the role of the naturalist was static, as was the case for the field naturalist. But definitions did not need to be too complicated. For Temminck, a naturalist was an "observateur de la nature"—not terribly precise, but undeniably inclusive.[23] Temminck was not as keen on definitions as academics were. His books were not text books for students, he wrote for fellow naturalists dealing with the classification and life history of birds, so he offered no classical definition of the terms he

[19] Jan van der Hoeven, "Bijdragen tot de natuurlijke geschiedenis van den mensch. 1ste Bijdrage," *Tijdschrift voor natuurlijke geschiedenis en physiologie* 1 (1834): 87.
[20] Van der Hoeven, "Bijdragen tot de natuurlijke geschiedenis van den mensch," 88.
[21] Van der Hoeven, "Bijdragen tot de natuurlijke geschiedenis van den mensch," 89.
[22] Macleay, *Horae Entomologicae*, vol. 1, 327.
[23] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, lviv.

employed, as one can find in the writings of Cuvier or Van der Hoeven. Not incidentally, as both were lecturers with appointments in academic institutions. For a professor and author of textbooks, explications are mandatory. But Temminck had no obligations regarding teaching, the museum took no part in the activities of Leiden University and had no influence in it. Nor did Temminck wish to have any. His systematic monographs were written for systematists, not students, so quite possibly, defining natural history or explaining at length his classification methods seemed to be a superfluous exercise.

These few and admittedly random examples indicate that, although most early nineteenth century naturalists agreed on what natural history roughly was, the concept was not definite. For most of them, natural history was a branch of the natural sciences that included zoology, botany and mineralogy or, as most naturalists put it, the study of animals, plants and minerals. Zoology in particular dealt with the description, classification and arrangement of living beings, as well as with the discovery and description of their life histories and geographical distribution. Besides the scope and arrangement of each branch of the natural sciences, there remained three other points of discussion that proved to be much more significant for the practice of natural history. Firstly, should natural history include philosophical or theoretical discourses? Secondly, what was the status of anatomy and physiology in zoology? Thirdly, what was the status of classification and nomenclature in relation to the other branches of natural history?

The issue of philosophical arguments

The acceptance of philosophical considerations in natural history was, by far, the most prickly of the three questions. Some examples will suffice to illustrate the tension between the exponents of some form of natural philosophy and the adherents of a more empirical approach. From Lamarck's and Geoffroy Saint-Hilaire's ideas on organic evolution to the *Naturphilosophen* and the Quinarians, there was a variety of theoretical proposals during the first half of the nineteenth century. Although locally popular at some point or other, none of them were to last, and none of them provided naturalists with a framework that was both predictive and generally applicable in zoology and botany. As a result, systematists grew increasingly weary of *a priori* theories. MacLeay admitted as much when presenting what would be known as the Quinarian System: "This part of my work […] takes more the character of an hypothesis, and as such

deserves more suspicion."[24] Yet he was quick to clarify that this was not an hypothesis in the "Newtonian sense," but one "entirely dependent upon observed facts which its object is to connect," He added, though, that there were just not enough observations yet to remove the hypothesis-label.[25]

Cuvier's theory of the *conditions d'existence* and the principle of correlation of characters might be the most striking exception to the systematists veto against *a priori* theories. Interestingly, his theories never came to be perceived as philosophical, for several reasons. Firstly, Cuvier, an authoritative figure in and outside the Muséum, claimed that his findings were based on observation and comparison—just as MacLeay did. And authority mattered, at least until the 1840s. Secondly, Cuvier's ideas did provide systematists with a reliable starting point for the classification of animals, one that when applied to the higher taxonomic categories, gave classifications stability and predictability, hinting at the naturalness of these categories. Finally, his opposition to organic evolution as proposed by Lamarck and Geoffroy Saint-Hilaire reaffirmed the image of Cuvier as someone opposed to speculative philandering. As Paul Farber observes: "Most naturalists, however, were not very philosophical, and the impressive elucidation of what appeared to be an order in nature gave them the confidence that a natural system would be forthcoming. Perhaps more than anyone the person who did the most to reinforce this view was Georges Cuvier whose comparative anatomy was widely perceived to be the tool that would make the study of animals into a rigorous science."[26] So the validity of Cuvier's theories remained largely undisputed in zoology. Cuvier had his challengers, though.

Lamarck, for one, saw the search of universal laws as an integral part of natural history. So did Cuvier. But according to Lamarck, natural historians should also be enquiring into the causal principles behind the forms they observed, and into the relations between living beings and their environment. He believed that most naturalists were neglecting to do this:

> It would be a real hindrance for the natural sciences to persist in seeing only the observed objects, their form, their size, their external parts, even the smallest, their color, etc.; and if those dedicated to such studies refrain from rising to higher considerations, such as to investigate the nature of the objects they study,

[24] Macleay, *Horae Entomologicae*, vol. 1, 167.

[25] Macleay, *Horae Entomologicae*, vol. 1, 167. Macleay quoted Newton: "Quicquid [enim] ex phaenomenis non deducitur, hypothesis vocanda est" (Whatever is not deduced from the phenomena, has to be called an hypothesis). See William Thomson and Hugh Blackburn, eds., *Sir Isaac Newton's Principia: reprinted for Sir William Thomson ... and Hugh Blackburn* (Glasgow: J. Maclehose, 1871; reprint of the third edition 1726), 530.

[26] Farber, *Emergence of Ornithology*, 81; see also Stevens, *Development of Biological Systematics*, 197-209.

> the causes of the modifications and variations to which these objects are subject, the relations of these same objects among themselves, and with all the others that we know, etc.[27]

Lamarck thus considered that both zoology and botany included two closely dependent fields: philosophy, devoted to the development and discussion of the principles of biology, and observations, the descriptive and classificatory part, based on observation and comparison.[28] Although some naturalists agreed with Lamarck on the need of a philosophical basis for natural history, his *Philosophie Zoologique* and his transmutation theories were controversial and in the end, ridiculed. Cuvier himself considered Lamarck's incursions into philosophy nothing short of capriciousness: "A system established on such foundations may amuse the imagination of a poet; a metaphysician may derive from it an entirely new series of systems; but it cannot for a moment bear the examination of any one who has dissected a hand, a viscus, or even a feather."[29] The Cuvierian view endured.

Severe criticisms of the theories proposed during this period (Lamarckism, numerical classifications, *Naturphilosophie*) made systematists cast aside any theoretical approach to classification and focus on a more empirical approach to the study of natural diversity.[30] Amongst them was Temminck, who considered Cuvier's work as a "light to be followed," but further despised any incursion into the realm of philosophy.[31] In this Jan van der Hoeven wholly agreed with Temminck. Van der Hoeven noticed the tendency of the human mind to look for order and how it resorts to hypotheses, too impatient to first gather the necessary facts. But science should be based firstly on accurate and comprehensive knowledge, and then "the true theory will follow it, without anybody knowing how and when, and the solid building of science will be erected on the broad and firm basis of experience, to remain standing when the fairy castles of systems and opinions have evaporated and have disappeared from memory."[32]

Karl Illiger's thoughts went in the same direction. He pointed out the necessity of enlarging the bulk of described species as the only means available to increase the empirical basis for the naturalists' observations, and therefore the way to confirm or reject the existing systems, "for we can never have enough observations if we want to

[27] Lamarck, "Discours préliminaire," *Philosophie zoologique*, 12-13.
[28] Lamarck, "Sur l'Histoire Naturelle en général," 8-9.
[29] Georges Cuvier, "Biographical Memoir of M. de Lamarck," *Edinburgh New Philosophical Journal* 20 (1836): 15.
[30] Farber, *Emergence of Ornithology*, 140-41; Mayr, *The Growth of Biological Thought*, 203; Stevens, *Development of Biological Systematics*, 222.
[31] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xv, in response to Quinarianism.
[32] Van der Hoeven, "Bijdragen tot de natuurlijke geschiedenis van den mensch," 91.

use them as bases for entirely reliable conclusions."[33] Remarkably, the initial departing point of quinarians like William Sharp Macleay was quite similar, or so he claimed: "In natural philosophy a system has usually indeed been considered as synonymous with an hypothesis; but the two ideas expressed by these words have of late been very properly distinguished by observing that though a mere fiction or hypothesis may explain phænomena, yet a system is a certainty that must be deduced by these."[34] MacLeay's quinarian system was, for him, not an hypothesis, but the result of the discovery of the elusive natural system—after all, he noted, "the strength of this beautiful theory" was irrefutable because "different persons have respectively stumbled upon it in totally distinct departments of the creation."[35]

The line separating hypothetical conjectures from theoretical premises was quite blurred during this period. Although Temminck emphatically defended the idea of an empirical, observation-based approach in systematics, rejecting any *a priori* construction, he did embrace typological thinking as the basis for his genera and therefore, as the foundation of his classificatory practice. His law on the distribution of genera around the globe was also born from this type concept. Temminck argued that his law was based on the observation of the facts, as MacLeay did for the quinarian system, but this was not the case. It was an hypothesis, based on the *idea* of morphological types and the extrapolation of a few observations. The Belgian botanist August Drapiez, for example, grasped the strong philosophical background of Temminck's classification in the *Manuel d'ornithologie*, which was, apparently, in strong contrast with the luxurious iconographic works: "The work we are reviewing here is, in this respect, beyond reproach, and the second edition, which closely followed the first, proves that to the present day, these studies have a truly philosophical purpose."[36]

Temminck had tried to marry the type concept to a perception of a continuous nature by meticulously identifying within each group, whether it was an order, a genus or a species, variations that deviated from the types and then deciding which type these variations resembled the most, and classified them accordingly. By 1840, Temminck had started doubting the possibility of delimiting genera and species in a clear-cut way, which led him to wonder if species as such even existed in nature and recognized the

[33] Illiger, "Einige Gedanken über die Begriffe," xxxiii; translated by Mayr, "Illiger and the Biological Species Concept."
[34] Macleay, "Horae Entomologicae," vol. 1, x.
[35] William Sharp Macleay, "Remarks on the Identity of Certain General Laws which have been lately Observed to Regulate the Natural Distribution of Insects and Fungi," *Transactions of the Linnean society of London* 14 (1825): 63. For a discussion of numerical classification in botany, especially in Victorian Britain, see Endersby, "Classifying Sciences."
[36] Drapiez, "Manuel d'ornithologie," 276.

problems posed by defining genera based on a morphological type concept.[37] This idea had forced him to try to define as precisely as possible the set of characters that should be used to delimit genera, and to keep his genera as big as possible (in the sense of the number of species it included). Nonetheless, he carried on, confident the truth would reveal itself with time and patience, even when his theoretical framework was being shaken by the sheer amount of forms and varieties being discovered each passing day.

While Temminck was convinced of the possibility of achieving a natural classification by this method, others, like Jussieu and Lamarck, concluded that continuity in nature implied, by definition, that any classification had to be artificial.[38] Which starting point one adopted inevitably led to different definitions of what constitutes a natural taxon, to a different methodology and correspondingly, to different classification systems. In any case, continuity was as much an hypothesis as were Temminck's morphological types. Over one hundred years later, Carl Hempel appropriately explained the relation between classification and assumed hypothesis: "If a particular way of analyzing and classifying empirical findings is to lead to an explanation of the phenomena concerned, then it must be based on hypotheses about how those phenomena are connected; without such hypotheses, analysis and classification are blind."[39]

In Britain, Hugh Strickland also openly declared his aversion towards philosophical ideas in natural history. In 1844, he envisioned a time when "more definite principles of classification may hereafter be discovered, and meantime all that we can do is to arrange our systems according to sound reason and without theoretical prepossession."[40] Temminck would have emphatically agreed. However, Strickland felt some sympathy for those taking the innovative road. He thought that the Quinarian system, however wrong, had taken ornithology further by helping define the terms *analogy* and *affinity*, as well as by promoting fruitful discussions, much in the same manner that alchemy had been the precursor of chemistry, and astrology of astronomy. When speaking of Lorenz Oken and his system of animal classification, based on the five senses of man as sketched in his *Grundriss der Naturphilosophie* of 1802, Strickland did celebrate his creativity: "This doctrine is far too fanciful to stand the test of common sense, but it is certainly very ingenious, and we may admit that *se non é vero é ben trovato*."[41] But

[37] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xix.
[38] Jean-Baptiste de Lamarck, *Encyclopédie méthodique. Botanique*, 8 vols. (Paris, Liège: Panckoucke, Plomteux, 1783–1808), 630; Stevens, *Development of Biological Systematics*, 25-28.
[39] Carl G. Hempel, *Philosophy of Natural Science*, Foundations of Philosophy Series (New Jersey: Prenctice Hall, 1966), 13.
[40] Strickland, "Report on the Progress," 217.
[41] Strickland, "Report on the Progress," 176.

Temminck could not bring himself to be amused by these ideas, while the botanist Joseph Hooker had reached, it seems, a boiling point: "I have been groaning over 'Rejuvenescence' que Diable! When is this German rubbish to end?"[42]

FIGURE 7.1. Portrait of Hugh Edwin Strickland (1811–1853), by Thomas Herbert Maguire.

In the end, Strickland ultimately got trapped in the same paradox as Temminck had been, but he did so knowingly. While claiming to steer clear from any metaphysical concepts, the foundation for his classification system was based on admittedly ill-defined concepts, including the concept of species and the notion of the essential characters used to define species. In 1841, in an article confidently entitled "On the true method of discovering the natural system in zoology and botany," he remarked:

[42] Joseph Hooker to Thomas Henry Huxley, 12 September 1854, in Leonard Huxley, ed. *Life and Letters of Sir Joseph Dalton Hooker, O.M., G.C.S.I. Based on Materials Collected and Arranged by Lady Hooker* (London: John Murray, 1918), 425. Hooker had just read a translation of Alexander Braun's *Betrachtungen über die Erscheinung der Verjüngung in der Natur* (Leipzig: W. Engelman, 1851), or the "Rejuvenescence of Plants." Also in Endersby, *Imperial Nature*, 217.

> It is probable that most naturalists at the present day have an instinctive belief in the existence of a natural system in Zoology and Botany, but there are very few who if questioned on the subject could give any clear explanation of the grounds of their belief, of the nature of that system, or of the mode by which a knowledge of it may be attained. The uncertainty which hangs over the subject is doubtless owing to the obscure and metaphysical nature of some of the principles involved, and still more to the vague conceptions and crude theories which have been promulgated on the subject.[43]

And immediately after that, he added: "The postulate with which I commence the inquiry is, to let it be granted that there are such things as species, distinct in their characters and permanent in their duration." After admitting this, he then proceeded to define the natural system as an arrangement of species according to the resemblance of their essential characters. Nevertheless, he omitted to define species or what made a character essential, except that the latter question was linked to "an estimate to the physiological importance" of the characters, that is, in a Cuvierian sense.[44]

Despite the fact that zoological and botanical classification were, necessarily, based on a set of basic assumptions, often unquestioned, natural philosophy and systematics remained formally separated niches for most naturalists. Cuvier's views were universally accepted as empirically proven, with the exception, possibly, of catastrophism. With the arrival of the Lyell's *Principles of Geology*, published in three volumes between 1830 and 1833, this particular discipline launched itself into the theoretical, speculative arena after decades of controversy, when geologists had sought to avoid discussions by focusing mostly on stratigraphy. According to James Secord, the *Principles* was "the most thoroughgoing vindication of geology as a sophisticated and philosophical enquiry."[45] Botany was in a similar predicament as zoology. Joseph Hooker, for example, strongly wished for new ideas to arrive that would take botany out of its impasse. In 1856, in a review of Alphonse de Candolle's *Géographie botanique*, he lamented "the vagueness of its principles, the inexactness of its methods, the puzzling complexity of its phenomena, and the purely speculative character of those hypotheses upon which all inquirers base their efforts to explain its facts and develop its laws."[46] Until the time came that botany would overcome such shortcomings, Hooker

[43] Strickland, "On the True Method of Discovering the Natural System in Zoology and Botany," 184.
[44] Strickland, "On the True Method of Discovering the Natural System in Zoology and Botany," 184.
[45] James A. Secord, *Visions of Science Books and Readers at the Dawn of the Victorian Age* (Chicago: University of Chicago Press, 2015), 144.
[46] Joseph Dalton Hooker, "Notices of Books. Géographie Botanique Raisonée [...] par M. Alph. de Candolle. Concluding remarks," *Hooker's Journal of Botany and Kew Garden Miscellany* 8 (1856): 249.

mainly worked on defining the principles on which his classification system was based, focusing mostly on genera, orders and classes.[47]

Classification was not atheoretical. As Paul Farber puts it in *The Emergence of Ornithology*: "The lack of agreement on the foundations of a natural system, even on the method of establishing such foundations, should not cause us to overlook the fact that it was such a search that occupied a significant portion of naturalists throughout the ornithological world."[48] Temminck was convinced that by elaborating on Cuvier's methods and enlarging and refining classifications, one could finally build the natural system, the perfect classification with objective groupings and a stable nomenclature, that reflected the true and divine order in nature. Yet, Temminck's work was bound by his own concepts of species and genera, typological thinking and the method he used to weight the characters to delimit any taxonomic group. So were all naturalists working on zoological classification. Their classifications were based on particular concepts (genus, species, essential characters, affinity, the natural system), but not necessarily on a well-articulated explanatory theory about the overall structure of the natural world. Even for those who avoided *a priori* hypotheses, the understanding of cause and effect, of the diversity they saw, its geographical patterns, the origin of (and reason for) similarities between groups, all of this was based on these pre-existing concepts. But universally accepted theories remained elusive.

The general mood was one of expectation, a period of waiting for that moment when naturalists could take a step back from their classifications and see, visualize, the true, natural order according to which groups were arranged and species related to each other—not unlike a painter taking a step back from a giant mural, or somebody finishing a colossal jigsaw puzzle without having beforehand a picture of what it represents. In other words, around the 1840s there was a general belief that more knowledge was needed, not more hypotheses. The understanding of the big picture would come from more specimens, more data on their geographical distribution, especially from those unexplored corners of the planet, and more research on anatomy and physiology. No theory would instantaneously answer all their questions about the general organization of the natural world. With their classification systems, Temminck, Strickland and Hooker were recognizing an order that was already there, a structure slowly being uncovered, while Oken and MacLeay used their knowledge to create a new one that might explain nature; but in general, systematists were looking for explanations in their classificatory systems and in the physical objects that constitute

[47] Endersby, *Imperial Nature*, 211-13.
[48] Farber, *Emergence of Ornithology*, 113-14.

them. The rise and great popularity of experimental biological sciences might be partly a consequence of this expectation.

The status of anatomy and physiology

Anatomy and physiology were disciplines that had been closely linked to medicine for something like two hundred years , but they had only recently been applied to systematics, mainly thanks to the work of Cuvier and Geoffroy Saint-Hilaire. Most naturalists, if not all, agreed in including physiology and anatomy under the umbrella of natural history, especially zoologists—at least, during the first half of the nineteenth century. After that, things quickly changed.

Karl Illiger pointed out in 1800 that Cuvier's principles were to be taken as a starting point for choosing the characters to define species and genera. Most weight should be given to physiologically important characters, those fundamental for the vital functions of the organism (*Lebensverrichtungen*).[49] Similarly, as we have seen earlier, Temminck thought that these two fields were "the fundamental sciences and starting point" for the construction of zoological classifications, and he focused on elaborating on the groups laid down by Cuvier.[50] Likewise, zoologist Henri Milne-Edwards from the Muséum (as devoted to Cuvier's principles as Temminck), defined anatomy and physiology "as the foundation of Natural History."[51] Similarly, for the entomologist John Obadiah Westwood, comparative anatomy was so important that he defined entomology as "that branch of zoology which treats of the insect tribes, as restricted by the knowledge obtained by the elaborate researches of modern comparative anatomists."[52] After Cuvier, then, zoology was based on anatomy and physiology, complemented by systematics, the life histories and the distribution of animals. It seems surprising then, that whether physiology and anatomy truly belonged within natural history could be an elusive question. Yet it was, possibly because these disciplines had been connected to medicine for much longer than they had been connected to zoology or botany.

We can have a glimpse of the different views of the relations between the natural sciences—in the broadest sense—by looking at the subjects included in natural history journals. For example, in 1824, an all-embracing journal of natural sciences had been

[49] Illiger, "Einige Gedanken über die Begriffe," xli.
[50] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xv-xvii.
[51] Henri Milne-Edwards, "Cours Élémentaire de Zoologie. Notions préliminaires," in *Cours élémentaire d'histoire naturelle. A l'usage des Collèges et des Maisons d'Éducation, rédigé Conformément au Programme de l'Université du 14 septembre 1840. Zoologie* (Paris: Fortin, Masson et Cie, 1841), 11.
[52] John Obadiah Westwood, "Introduction," in *The Entomologist's Text Book. An Introduction to the Natural History, Structure, Physiology and Classification of Insects, Including the Crustacea and Arachnida* (London: W. S. Orr and Company, 1838), 3.

launched in France, the *Annales des Sciences Naturelles: comprenant la physiologie animale et végétale, l'anatomie comparée des deux règnes, la zoologie, la botanique, la minéralogie et la géologie.* The editors of the *Annales* explained that botany and zoology had divergent classification methods as a direct consequence of the anatomical differences between plants and animals. Zoologists were able to classify animals by means of comparing their internal organs and using the characters most relevant to their survival, therefore grouping them according to their similarities. Botanists, however, had been obliged to use external characters and the sexual system of Linnaeus, because of the obvious lack of such internal organs in plants. Therefore, the editors noted, zoological anatomy was focused on function, but botanical anatomy studied form, and while animal physiologists concentrated on pathology, vegetal physiologists worked basically on chemistry. As a consequence, zoology was far from standardized and animal classification seemed to be in disarray. Ichthyologists, ornithologists, conchologists and entomologists were all using their own systems, oblivious of the classification principles used by others. Botanists, within their constraints, had achieved a uniform system of classification, but anatomists treated plants as if they had no organic functions, and chemists studied plants as if they had no organs. And as a result, the editors concluded, the two organic kingdoms had been drifting apart from the beginning. The same was true for the geological sciences. Hence the need of a journal encompassing all disciplines.[53] This summary by the editors of the *Annales* offers an accurate snapshot of the difficulties of settling methodology and standardizing processes within natural history.

Meanwhile, in London, the editorial board of the *Zoological Journal* was debating whether certain articles should or should not be included in the first issue of their magazine, which was due to appear in October 1824. In the Introduction, they stated that they considered comparative anatomy, zoological classification, monographs on particular groups, animal chemistry and "palaeontography" as the most important subjects, in this particular order. Comparative anatomy "claims a very high rank in Zoological researches.[...] It has, at length, in great measure rescued one branch of natural history from the confusion and absurdity in which, whilst the structure of the habitation only and not that of the inhabitant was considered, its arrangements were involved."[54] And yet, the board chose a subject completely different to open their first

[53] Jean Victor Audouin, Adolphe Brongniart, and Jean-Baptiste Dumas, "Introduction," *Annales des Sciences Naturelles: comprenant la physiologie animale et végétale, l'anatomie comparée des deux règnes, la zoologie, la botanique, la minéralogie et la géologie* 1 (1834).

[54] Thomas Bell, John George Children, James de Carle Sowerby et al., "Introduction," *The Zoological Journal* 1, no. 1 (1824): iv.

issue. It began with an article entitled "An inquiry respecting the True Nature of Instinct, and of the Mental Distinction between Brute animals and Man," by John Oliver French. The essay explored the relation between consciousness, rationality, morality and intelligence. Hardly the stuff one might expect in a British zoological journal now, but Fréderic Cuvier had also dedicated quite some time to the study of the limits between instinct and intelligence, and he even designed an experiment using, rather unexpectedly, beavers as subjects.[55] Regarding French's essay, the editors of the Zoological Journal noted: "It necessarily enters into the detail of facts purely Zoological and in the highest degree interesting—and if the main question be metaphysical, it is from natural history alone that its ingenious author derives his arguments in discussing it."[56] Apparently, philosophical and moral considerations were interesting enough to be considered in zoology, as long as they did not affect methodology nor the classification systems.

Ten years later, in the Netherlands, Jan van der Hoeven and his friend, the doctor and botanist Willem Hendrik de Vriese, launched a new journal devoted to natural history, and they struggled with the same questions. The new journal was meant to be a continuation of the *Bijdragen tot de Natuurkundige Wetenschappen* (Contributions to the Natural Sciences) which had stopped being published two years before, in 1842. The *Bijdragen* covered all branches of the natural sciences, from natural history to astronomy, hydrology, chemistry and even engineering. The title of their new journal was rather succinct compared to its French counterpart. They entitled it *Tijdschrift voor Natuurlijke Geschiedenis*, or Journal of Natural History, indicating already a substantial reduction of the number of subjects they were willing to include in it. In the introduction to the first issue, the scope was described as follows: "natural history of the three kingdoms, plant and animal anatomy and general physiology."[57] Articles on pathological anatomy were also welcome because animal anatomy was closely related to human anatomy. Essays on applied and medicinal botany were equally interesting and fell within their scope. The editors concluded that, in the end, they would not make any "fearful choice," as their goal was only to promote science and all scientific research was, in one way or another, of practical interest.[58] But after the first year, the editors considered it wise to change the title of the journal into a slightly expanded one: *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie*, adding physiology to the original title and, with that,

[55] Pierre Flourens, *Résumé analytique des observations de Frédéric Cuvier sur l'instinct et l'intelligence des animaux* (Paris: C. Pitois, 1841); David Rains Wallace, *Mountains and Marshes: Exploring the Bay Area's Natural History* (Berkeley: Counterpoint, 2015), 104.

[56] Bell, Children, de Carle Sowerby et al., "Introduction," vi.

[57] Van der Hoeven, "Voorberigt," *Tijdschrift voor Natuurlijke Geschiedenis* 1, no. 1 (1834): ii.

[58] Van der Hoeven, "Voorberigt," i-ii.

divorcing physiology from natural history. In a *Naschrift*, or Post Scriptum at the end of the first volume, Van der Hoeven and De Vriese declared that nothing had changed from the original plan, but the title was extended "to avoid misunderstandings."[59] Unfortunately, the editors did not elaborate on the nature of these misunderstandings, but their amended title does reflect at least the existence of doubts on the inclusion of physiology and anatomy in natural history, which was apparently regarded as mostly descriptive and classificatory.

If Van der Hoeven and De Vriese set physiology apart from natural history, the German professors Carl Theodor von Siebold, from the Freiburg University, Ernst Heinrich Ehlers, from the University of Erlangen, and Albert Kölliker, from Würzburg, went a step further. They founded the *Zeitschrift für wissenschaftliche Zoologie*, or Journal for Scientific Zoology, in 1848 (only four years behind the *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie*). They introduced their new journal as follows:

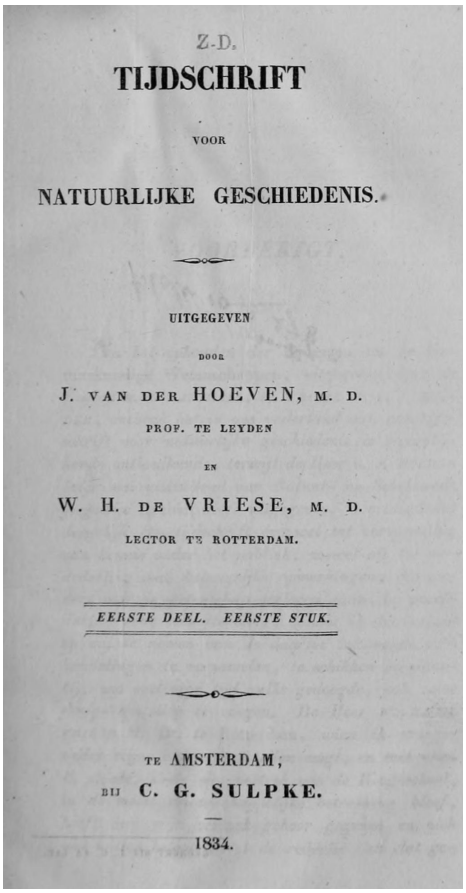
> We desire to give our journal the most scientific character possible [...] To this purpose we exclude all announcements of new genera and species that do not relate to this task, unless these offer us a more thorough-going insight into plant and animal structure, into the life history of animals and plants, or in the lawful organization of the organic realms.[60]

The editors remarked that there was clearly a distinction to be made between "simple notes and natural history news" on the one hand and "the truly scientific side of botany and zoology" on the other. Anatomy and physiology received undisputedly the stamp of "scientific," but classification and nomenclature fell short, apparently. Morphological studies were no longer included in natural history, which was synonymized with classification, as Van der Hoeven and De Vriese had done. This was a significant shift, as Lynn Nyhart puts it: "When researchers choosing to separate themselves from natural history identified the part (taxonomy) with the whole (natural history), they made invisible much of the intellectual work that gave taxonomic work its life."[61]

This process started to gather momentum in the 1850s and this would continue during the second half of the nineteenth century; it had a profound effect on the status of both the experimental sciences and systematics. By 1900 the notion that natural history was mainly occupied with classification and life histories was ingrained in the

[59] Jan van der Hoeven and Willem Hendrik de Vriese, "Naschrift van het eerste deel," *Tijdschrift voor Natuurlijke Geschiedenis* 1, no. 1 (1834).
[60] Ernst Heinrich Ehlers, Albert von Kölliker, and Karl Theodor Ernst von Siebold, "Prospectus," *Zeitschrift für Wissenschaftliche Zoologie* 1, no. 1 (1848); quoted by Lynn K. Nyhart, "Natural History and the 'New' Biology," in *Cultures of Natural History*, ed. Nicholas Jardine, James A. Secord, and Emma C. Spary (Cambridge University Press, 1996), 429.
[61] Nyhart, "Natural History and the 'new' biology," 429.

scientific and public minds, and biology became the term that encompassed all disciplines dealing with living beings, just as natural history had been in the 1800s, but in those days also including geology and mineralogy.[62]



Z.D.

TIJDSCHRIFT

VOOR

NATUURLIJKE GESCHIEDENIS.

UITGEGEVEN

DOOR

J. VAN DER HOEVEN, M. D.

PROF. TE LEYDEN

EN

W. H. DE VRIESE, M. D.

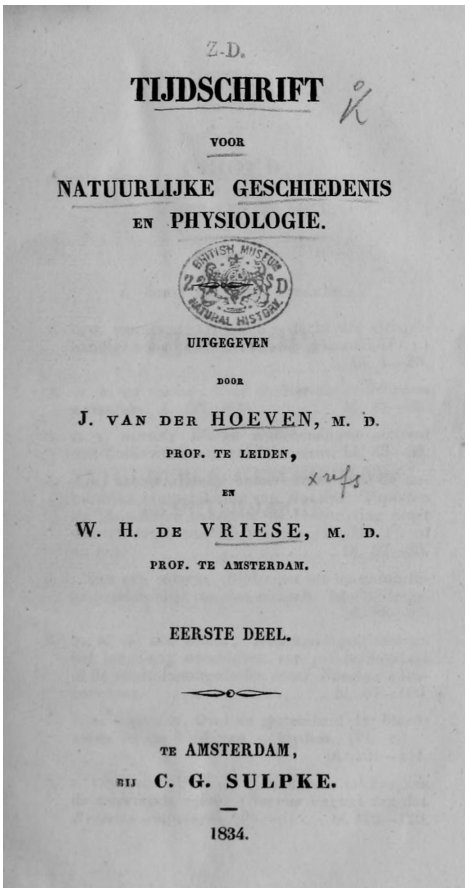
LECTOR TE ROTTERDAM.

EERSTE DEEL. EERSTE STUK.

TE AMSTERDAM;

BIJ C. G. SULPKE.

1834.



Z.D.

TIJDSCHRIFT

VOOR

NATUURLIJKE GESCHIEDENIS

EN PHYSIOLOGIE.

UITGEGEVEN

DOOR

J. VAN DER HOEVEN, M. D.

PROF. TE LEIDEN,

EN

W. H. DE VRIESE, M. D.

PROF. TE AMSTERDAM.

EERSTE DEEL.

TE AMSTERDAM,

BIJ C. G. SULPKE.

1834.

FIGURE 7.2. *Left*: Title page of the first issue of the *Tijdschrift voor Natuurlijke Geschiedenis. Right*: The same journal's title page for the first volume, including issues one and two, with its new title, now including *Physiologie*.

[62] For literature on the decline of systematics toward the end of the nineteenth century up to today see for example W. Ford Doolittle, "The Practice of Classification and the Theory of Evolution, and what the Demise of Charles Darwin's Tree of Life Hypothesis Means for both of them," *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 364, no. 1527 (2009); Kevin de Queiroz, "Systematics and the Darwinian Revolution," *Philosophy of Science* 55, no. 2 (1988); Mayr, *The Growth of Biological Thought*, chap. 6; James A. Secord, "The Crisis of Nature," in *Cultures of Natural History*, ed. Nicholas Jardine, James A. Secord, and Emma C. Spary (Cambridge University Press, 1996); Stevens, *Development of Biological Systematics*, chap. 9.

It is very well possible that the editors of the *Annales des Sciences Naturelles* had pointed to the source of the problem, or at least one of them. The different methods used in botanical and zoological studies, mainly in systematics, physiology and anatomy, may have been responsible for the confusion about the exact meaning of each of these disciplines. The boundaries of anthropology and even the very definition of what being *human* meant were also blurry. Some defined natural history by the object of its research, others by its goals, and then others did so by focusing on methodology. To complicate matters more, there was no consensus on whether theoretical or idealistic premises should be accepted as a valid starting point. The experimental sciences were on the rise, and classical terms like natural history were being re-defined. All these issues had far-reaching consequences, because the status of each discipline determined its place within the natural sciences, the authority of its practitioners and the scientific institutions they related to, its public image, its stability and its progress.

Systematics within natural history

Peter F. Stevens describes the practice of botany at the turn of the nineteenth century as "ahistorical natural history," that is, as mainly occupied with description and classification: "as the nineteenth century began, botany proper and classification were near synonyms; they excluded physiology and certain kinds of anatomy and were distinct from philosophical botany. And classification was seen by many naturalists themselves as an endeavor that owed little to theoretical considerations."[63] Stevens also notes the diminishing prestige of botanical systematics both among naturalists and the general public, but the situation was different for zoology.[64] At the turn of the nineteenth century, zoology included other disciplines besides classification—not only in theory but also in practice. The highly praised work of Cuvier on comparative anatomy and paleontology, Lamarck's and Geoffroy Saint-Hilaire's theories of organic change, the German *Naturphilosophie* and the British Quinarian system, pathological anatomy, physiology and ethology, were all included in zoology. What is more, all of them contributed in some manner to the development of zoological classification. This situation lasted until the second half of the nineteenth century, when things started to shift and natural history acquired a different meaning rather quickly. So, what happened? What was the status of zoological classification within natural history before the 1850s, amidst all this activity? Was it the main focus of naturalists, only part of it, or just a practical tool?

[63] Stevens, *Development of Biological Systematics*, 208.
[64] Stevens, *Development of Biological Systematics*, 209-12.

Between 1800 and 1850, there were two main currents of thought regarding the status of systematics within natural history or, in other words, two different attitudes towards it. Within the first one, systematics was seen as a refinement of the groundwork of comparative anatomy and paleontology laid by Georges Cuvier, and it was regarded as the sure path to uncover the true organization of nature. Although based on anatomy, systematics was considered to be a discipline in and of itself. A second group of naturalists saw classification and nomenclature as a practical tool for natural history, and not as a discipline on its own. But again, nothing was as simple as this apparently straightforward dichotomy seems: systematics was either a discipline, or a tool. It all depended on a single fundamental question: should the point of departure for classification be natural philosophy? Other issues in systematics (its goals, methods, practice, the subject of its study, or a combination of all of them) were influenced by this primary question.

Adherents of the first perspective, who considered systematics to be a true discipline of natural history, included, as expected, Cuvier himself, but also Karl Illiger, Coenraad Temminck and Hugh Strickland. Cuvier made the distinction between anatomy and systematics quite clear in 1805 when he wrote:

> The development of methods is the goal of natural history itself. Anatomy receives them, as it were, ready-made. It is from them that anatomy takes its first directions: but soon it illuminates them with its own light; anatomy is the best test for their truth; it is by applying a method of natural history to anatomy that we are able to judge whether or not it is in accordance with nature.[65]

By "methods" Cuvier was referring to the natural classification systems arrived at by following his principles of correlation and the *conditions d'existence*. Anatomical laws and classification systems emerged independently and each of them could be used to test the truthfulness of the other, that is, to see whether they were reflecting nature's organization. In practice, however, Cuvier focused mostly on comparative anatomy to characterize the higher ranks of animal taxa, without working out the details of the lower groups like genera and species.[66] Or, as MacLeay put it, a touch disappointed: "no person of such transcendent talents and ingenuity ever made so little use of his observations towards a natural arrangement as M. Cuvier."[67] Finishing what Cuvier left in the pipeline was the task Temminck had set himself to carry out, for the birds and the mammals.

[65] Georges Cuvier, *Leçons d'anatomie comparée*, vol. 1, 64.
[66] Farber, *Emergence of Ornithology*; Coleman, *Georges Cuvier, Zoologist*, 67.
[67] Macleay, *Horae Entomologicae*, vol. 1, 326.

Illiger, Temminck, Milne-Edwards and Strickland all thought this was the way to go in systematics, Cuvier-style. By borrowing from anatomy the knowledge needed to weight the characters for their classifications, which gave each anatomical feature its physiological importance, they could construct the natural system and elaborate on the basic groups defined by Cuvier. Comparative anatomy would guide them in their major groupings, while systematics would either prove or disprove the solidity of these higher taxa. It was at the very base of systematics, but comparative anatomy was *not* synonymous with systematics. Temminck remarked repeatedly that while his classification methods were built upon the principles of comparative anatomy, osteology and physiology, this was not sufficient on its own. The following passage gives a hint of Temminck's feelings on systematics being an independent discipline:

> Many anatomists find themselves hindered in their research because they have neglected to study the characters provided by zoology: they believed that comparative anatomy alone would guide them in their studies of the secondary levels [lower taxa]; and they have lost sight of this auxiliary science because of their underlying belief in the importance of anatomical research. Their research cannot be of use to us today, as it is often impossible to determine with exactitude on which species of animal they based their observations, while those that are still carrying on without the help of any basic notions of zoology are not contributing to this field, which pursues the perfection of the natural system.[68]

Here, Temminck used the term *zoology* as a synonym of systematics. In it, he included the careful comparison of external characters, the scrutiny of varieties (geographical as well as variations due to age and sex), life histories and geographical distribution, all indispensable for defining the lower taxa, especially genera and species.

Strickland's *Desiderata* from his 1844 "Report on the State of Ornithology" tells us that his thoughts went along the same lines. While comparative anatomy provided naturalists with the most important precepts, they still needed more ecological, behavioral and geographical information. Anatomy alone, as important as it was, was insufficient to achieve the main goal of systematics: the uncovering of the still hidden natural system.[69] Nonetheless, Strickland wished for a better understanding of bird anatomy and suggested that someone—a student, he specified—should make an arrangement of birds based on their anatomical characters alone. If such a Cuvierian classification agreed with one based on external characters, "its reality and truth" would

[68] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xv.
[69] Strickland, "Report on the Progress," 177, 219.

then be proven, he concluded, just as Cuvier had done almost forty years before in the first volume of his *Leçons d'anatomie comparée*.[70]

Lamarck, on the other hand, stressed the concepts of transmutation and continuity, and from this perspective, he inevitably had a different idea of systematics than Temminck. By putting continuity in the foreground, classifications had to be, necessarily, artificial constructs. The supraspecific taxa (genera, families, orders and classes) did not exist in nature, they were instruments to facilitate the study of nature.[71] Each grouping was defined according to a series of agreements amongst naturalists in order to manage diversity and understand each other, but he prophesied that, with time and more specimens, the limits between groups, even those that seemed to be totally isolated from others, would disappear.[72] For Lamarck, classification was a tool, and the process of creating it, was guided by conventions. His focus was on his theories explaining the diversity of living beings, in cause and effect, in relationships. In all probability, Lamarck did not think that by itself the classifying effort merited a high status within natural history.

At the other side of the channel, the quinarians also hoped that classifying living beings would lead them to filling the gaps they now saw in their model of nature. But these were not the same gaps that Lamarck had perceived. For the quinarians, the puzzle consisted in completing their perfect mathematical circles, each with five groupings in it. Therefore, the quinarians' hope of filling the gaps was fundamentally different than Lamarck's. Quinarians believed in the existence of a model in nature, a geometrical arrangement that included separate and well-defined groups, and their classification was a representation of this order in nature. Lamarck, on the other hand, was classifying a natural world that he perceived as continuous, and the groupings he made were therefore never meant to be a reflection of nature's structure: there was no other structure than a linear succession of beings that evolved up a ladder of complexity. But for both, as their approach to classification was set up *a priori*, systematics on its own, without a philosophical component, was not a scientific discipline, it was a means to an end. Macleay, for example, lamented that classification as such had become the goal of many naturalists:

> The almost exclusive attention which has of late years been unfortunately lavished on Nomenclature and Systematic Arrangement—on the means in short,

[70] Strickland, "Report on the Progress," 219.
[71] Lamarck, *Philosophie zoologique*,, nouvelle éd., 33-34.
[72] Lamarck, *Philosophie zoologique*, nouvelle éd., 26. Beside this passage, Charles Darwin noted in his copy of Lamarck's book: "Fallacy common to Swainson & Macleay," edition of Charles Darwin's Reading Notes by Di Gregorio & Gill (Darwin Manuscripts Project: darwin.amnh.org). See also Macleay, *Horae Entomologicae*, vol. 1, ix-x.

> and not on the end of the science—has with ignorant persons diminished the importance of the study of Natural History itself. Let us hope that the slur will be soon entirely obliterated by those naturalists who have already shown that they are not to be deterred from the investigation of affinities by great names, because, forsooth, these may have preceded them in the annals of science.[73]

He insisted that "nomenclature is not a department of natural history, but only a convenient instrument whereby an acquaintance with it may the more easily be cultivated."[74] Vigors could not have agreed more.[75]

In the meantime, in the Netherlands, Jan van der Hoeven was working on the definitions of natural history and its subjects for his own textbook on Zoology, the *Handboek der dierkunde, of Grondbeginsels der natuurlijke geschiedenis van het dierenrijk*, first published in 1827. Regarding systematics, for which he used the term "Taxonomia," he considered it to be a *kunst*, a skill or art—as opposed to a scientific practice.[76] Van der Hoeven discussed the importance of achieving a natural classification system using Cuvier's definitions of *méthode* and *analyse*, but in his view, classification was not a scientific discipline as such, however indispensable. In France, Milne-Edwards shared this line of thought with Van der Hoeven. He had defined anatomy and physiology "as the foundation of Natural History," although he found them on their own insufficient to really understand the natural order, not unlike Temminck or Strickland. To "know" animals and plants, one had to study the relations between living beings as well, describe the "peculiarities they offer, which can be used as characters," learn about their geographical distribution, and then name and classify them.[77] But Milne-Edwards saw classification as a method, a tool that helped zoology (which he broadly defined as "the Natural History of Animals") move forward, and by helping distinguish between different kinds of animals, it "pour soulager la mémoire" (to unburden one's memory).[78] Concerning its importance in natural history, he wrote:

> The introduction of natural methods for the classification of living beings is one of the greatest services rendered to natural history: it has changed the image of

[73] Macleay, *Horae Entomologicae*, vol. 1, 10.
[74] Macleay, *Horae Entomologicae*, vol. 1, 24.
[75] Vigors, "Observations on the Natural Affinities," 180.
[76] Isaac Marcus Calisch and Nathan Salomon Calisch, *Nieuw woordenboek der Nederlandsche taal; bevattende: de meest gebruikelijke woorden, spraakwendingen en spreekwoorden* (Tiel: H. C. A. Campagne, 1864), 667.
[77] Henri Milne-Edwards, *Cours élémentaire d'histoire naturelle*, 281-91.
[78] Milne-Edwards, "Cours Élémentaire de Zoologie. Notions préliminaires," in *Cours élémentaire d'histoire naturelle*, 11.

> this science and has made compelling that part of botany and zoology that had been up to now the most arid.[79]

The relevance of classification, for him, was closely linked to its being based on "natural methods," that is, classification systems based on anatomy and physiology (as opposed to artificial classifications), but it was nonetheless a tool for zoologists to move forward in understanding nature.

There was yet another field of study contending for leadership in natural history, and it proposed a whole new approach to the study of nature. Its highest representative was Alexander von Humboldt. He stressed unity and relations, cause and effect, and what we would now call a multidisciplinary approach. The laws of nature were to be discovered in a steady process of field work, observing, measuring and mapping phenomena. This was a line of work that had altogether different subjects of study and was being practiced mostly in the field, so that, as we have seen in the previous chapter, comparisons can be problematic.[80] Humboldt recognized the importance of systematics as "la base principale de l'histoire naturelle descriptive," suggesting that he did not regard it as a discipline within natural history, but as an instrument. He described descriptive botany as indispensable for the advancement of botanical medicine, culture, art and even philosophy, but it was, he noted, not less relevant to establish the *Geography* of plants, which he understood as a field in itself.[81] In practice, this meant that, from his point of view, systematics was mostly useful because it could be used for medicine, geobotany and other disciplines.

In the Netherlands, no-one embraced Humboldt's approach more than Caspar G. C. Reinwardt. Reinwardt's inaugural lecture as a professor at Leiden University was a tribute to field work in the Humboldtian sense, where attention to the relations between the earth, living beings, the climate and man were central for anyone aiming at understanding nature. Museum workers were limited in their knowledge and perceptions, their objects of study having been removed from nature and with that, lost their context.[82] His discourse stressed the importance of measuring, observing and analyzing cause and effect. For Reinwardt, as for Humboldt, systematics was a lesser endeavor and, although it had its place from a practical point of view, it played a minor role in the advancement of science.[83]

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[79] Milne-Edwards, *Cours élémentaire d'histoire naturelle*, 288.

[80] See also Outram, "New spaces in Natural History"; Laura Dassow Walls, *The Passage to Cosmos. Alexander von Humboldt and the Shaping of America* (Chicago: University of Chicago Press, 2009).

[81] Alexander von Humboldt and Aimé Bonpland, *Essai sur la géographie des plantes: accompagné d'un tableau physique des régions équinoxiales* (Paris: Levrault, Schoell et compagnie, 1805), 13.

[82] Reinwardt, *Redevoering van C. G. C. Reinwardt*, 23.

[83] See also Weber, "Hybrid Ambitions," 187-92.

Perhaps the most extreme position regarding the status of systematics was that of another Dutch scholar, the Leiden professor Sebald Justinus Brugmans, who had such a contempt for systematics that it verged on aversion. Although he had obtained his doctor's degree from the University of Groningen by studying and classifying minerals from the region of Groningen, he slowly turned against systematics to favor applied research. So much so, that in a lecture at Leiden University of 1787 he advocated more research on the role plants played in nature, their function and their usefulness, and while recognizing the advances made by "systematics in botany," he claimed to be much less interested in their names and classification.[84] Brugmans promoted a more accurate study of the local flora, and he warned his colleagues that he did not mean "a catalogue of herbs or a mere index, nor a simple Flora, as it is called."[85] He wanted research on every kind of plant, what soil it grew on, its relation to other living beings and to man. Or as Hans de Jonge summarizes it, "the message was, less systematics and more research on the utility of plants."[86]

Brugmans was convinced, it seems, that no classification system would ever lead to knowledge of nature, or worse: "the zeal for system is the grave of truth," as his biographer dramatically phrased it (*systematis ardor veritatis sepulcrum!*).[87] However, Brugmans could not get rid of all classification, if only because he needed some structure for his lessons at the University and he had to name the plants. He just followed the by then already outdated *Systema Vegetabilium* en *Philosophia Botanica* of Linnaeus.[88] Incidentally, his dislike for systematics did not seem to trouble his relation with Temminck. In 1813, after receiving a copy of Temminck's *Histoire naturelle des pigeons* Brugmans wrote to him: "All ornithologists are in your debt for this beautiful Monograph, and all will eagerly await its continuation."[89] Temminck had always been welcome to work in Brugmans' collection whenever he needed to collect anatomical information from Brugmans' skillfully made zoological preparations.

Stevens notes that around 1830, systematic botany had lost much of its allure and

[84] Sebald Justinus Brugmans, *De accuratiori plantarum indigenarum notitia maxime commendanda, habita Leidae ... MDCCLXXXVI: altera valedictoria, de natura soli Frisici exploranda, dicta Franequerae ... MDCCLXXXVI* (Leiden: S. et J. Luchtmans, 1787), 6; Hans de Jonge, "Sebald Justinus Brugmans (1763–1819)" (Master's thesis, Leiden University, 1999), 26.

[85] Brugmans, *De accuratiori plantarum indigenarum notitia maxime commendanda*, 10.

[86] De Jonge, "Sebald Justinus Brugmans (1763–1819)," 26.

[87] Abraham Capadose, *Lofrede op Sebaldus Justinus Brugmans*, vol. 7, Werken der Hollandsche Maatschappij van Fraaie Kunsten en Wetenschappen (Leiden: Hollandsche Maatschappij van Fraaie Kunsten en Wetenschappen, 1822), 165.

[88] De Jonge, "Sebald Justinus Brugmans (1763–1819)," 35.

[89] Brugmans to Temminck, 24 December 1824, Naturalis Biodiversity Center Archives, Archive C. J. Temminck, NAT_ARC_TEM_00254.

scientists were more excited about experimental research than about descriptive work.[90] For zoology, things were more complicated. Because the search of the general order in nature was the central preoccupation in natural history during this period, one might have expected that it was this goal that would define systematics as a discipline. This was not the case. Naturalists decided upon the status of systematics as a scientific discipline not by its main goal (the natural system), but by its methods: empirical or philosophical. If one believed that a natural system was to be attained by descriptive and classificatory zoology, within agreed rules and by Cuvier's anatomical principles, then yes, systematics was a scientific discipline. But if the pursuit of the natural system was guided by *a priori* hypotheses, then no, systematics was not a true discipline but a tool to test one's natural philosophy. The elaboration of a general model of the organization of nature required first an overview of nature, and then the specialist examination of one or a few groups. It also involved defining the relations between species and higher taxa, and looking at cause and effect. None of this is necessary in an empirical process, where, at least in Temminck's case, it borrows its philosophy and the definitions of concepts from Cuvier's comparative anatomy. It is because this extra intellectual exercise is necessary for the search for the natural system that natural philosophers could not see bare systematics as a discipline. Among them were Lamarck, MacLeay, Swainson, Oken and Van der Hoeven. The main requisite to raise systematics to the status of a scientific discipline was, therefore, not the search for the natural system, but the rejection of philosophy as a method to uncover it.

The status of any particular classification system (not of systematics itself) depended, on the other hand, on whether or not it approached that ideal, the ever evasive natural system. A natural classification as defined by Temminck and Strickland (based on anatomical and physiological characters, complemented with external characters, life histories and geographical distribution), was regarded as the highest achievement. A natural system uncovered by similar methods but based on an *a priori* model of nature—the quinarian system, for example—also ranked very high in the eyes of naturalists. Yet, the road to the natural system was long and bumpy, and even if classifications still did not reveal the expected natural order, there was hope that with more information and new specimens, these classifications would become natural.

These in-between classifications were seen by naturalists as temporary tools, a work-in-progress in the anticipation of more knowledge and material yet to come.[91] If the system was good enough, it would hold against new discoveries and become a natural

[90] Stevens, *Development of Biological Systematics*, 209-15.
[91] Temminck, "Introduction troisième partie," *Manuel d'ornithologie*, 2 ed., vol. 3, xi; Strickland, "Report on the Progress," 177.

one. The construction of artificial systems was, however, a very different thing altogether. When a classification was based on one or a few characters chosen almost at random, it was regarded as a lesser, although useful, product of natural history. A commonly used analogy during this period for the artificial system was that proposed by Georges Cuvier: an artificial classification was like of a "dictionary," where words are arranged alphabetically and not according to their meanings.[92] An artificial system was useful for finding the species within the systems (one can easily find words in a dictionary), but it provided no insights into the relations between the organisms. Therefore, the relevance of a particular classification system depended on whether it was made for practical purposes like a dictionary, or it was a stepping stone towards a final natural classification. But as the methods in classification and nomenclature were being constantly improved, standardized and polished, the relative importance of the classification systems was in constant flux.

The issue of the status of systematics during the first half of the nineteenth century, at least in zoology, is more complex that one might think at first sight. Natural history was being fragmented into several disciplines, each with its own set of goals and practices, and systematics was indeed losing the hegemony it had held during the eighteenth century, which is not the same as saying that it had the lowest of statuses. Since the work of the Parisian professors Cuvier, Lamarck and Geoffroy Saint-Hilaire, zoological systematics was flourishing. Museums, monographs and journals multiplied, and systematists became a paid pool of professionals.

In Victorian Britain, the tradition of gentlemanly science lingered, and as Jim Endersby notes, "only a gentleman could be philosophical." Therefore, in Britain the status of classification was necessarily related to gentility: "although the mathematical sciences were the most prestigious and best-rewarded, numbers alone did not bring status […]. It was more important that a discipline be considered 'philosophical.' "[93] Systematics was in turmoil, both in Britain and in continental Europe. The natural system seemed to be around the corner but it was nonetheless still frustratingly intangible, the tensions between field and museum work—and between amateurs and professionals—also contributed to changing the discipline's position. Towards 1850, systematics had become a more democratic field and, as a result, the platforms used by systematists to communicate also changed. Disagreements about natural philosophy and the general reluctance to tackle the question of universal laws would ultimately accelerate the decline of the status of systematics.

The breaking up of natural history into subdisciplines brought various changes in its

[92] Cuvier, "Introduction," *Règne Animal*, vol. 1, 9-10.
[93] Endersby, "Classifying Sciences," 64.

wake. With the emergence of a physical natural history *à la* Humboldt, the predominance of anatomy and physiology, and the relatively new experimental sciences, systematics had to compete for visibility, resources and hegemony.[94] Stevens describes a very similar situation in classificatory botany, although the decline of its status between 1800 and 1850 was more pronounced than that in zoology.[95]

The main question was, it seems, whether all these disciplines of natural history were regarded as complementary to each other, as Temminck or Strickland did, or seen as subordinate to each other. In that case, the pecking order was far from established towards 1840, and by the end of the century, systematics had fallen almost to the bottom of the ranking list. This would have a profound impact on systematics in the twentieth century. The status of a discipline determines where, when and by whom it is being practiced, it delimits the way it is being communicated, the channels it uses, how it contributes to scientific debates, the available resources, and whether or not it is being taught and practiced in higher academic institutions. The more prestige a field has, the more attention and resources it receives, and one effect will be that knowledge and skills can be passed on, not only through publications and specialized journals, but also through the curricula of the universities, molding the next generation of practitioners. The consequences of the low status of systematics towards the 1850s are still felt today.

[94] Farber, *Emergence of Ornithology*; Nyhart, "Natural History and the 'New' Biology"; Stevens, *Development of Biological Systematics*.

[95] Stevens, *Development of Biological Systematics*, 216-18.

Conclusions

"Taxonomy is described sometimes as a science and
sometimes as an art, but really it's a battleground."

Bill Bryson, *A Short History of Nearly Everything*.[1]

When Louis Napoleon was still King of the Netherlands, Temminck was denied admittance to the Koninklijk Instituut van Wetenschappen. The reason for Temminck's exclusion was, seemingly, his lack of formal academic training. True, Temminck was tutored at home and had never set foot in a university as a student. But by 1836, he was finally admitted to the First Class of the Koninklijk Instituut. Temminck was by then waving in one hand two honorary doctorates (one from the University of Groningen and another from the University of Jena) and in the other a bundle of royal distinctions and awards. He was also none other than the Director of 's Rijks Museum van Natuurlijke Historie, with collections that ranked amongst the best in Europe. He had published titles that had given him international prestige. Twenty years later, however, his fame was diminishing and his authority dimming. His peak-shaped career has been looked at from different angles, each author emphasizing a different phase in his life, leaving us with incomplete and contradictory stories. But Temminck's career is best understood when put in the context of the development of systematics and only if looked at in its entirety. From this perspective it becomes clear that his path, his priorities and his status depended directly on the path systematics was taking. This epilogue uses the analysis provided by the previous chapters to evaluate the question of systematics as an emerging discipline within natural history.

During the first decades of the nineteenth century, Temminck received most praise for straightening out the chaotic nomenclature in ornithology and for his clear, unambiguous definitions of genera in his first monographs. The accuracy and consistency with which he upgraded existing ornithological works gained him a place on the international stage. Standardization was, after all, an important, if not the most important, pursuit in systematics during the nineteenth century. This is what Farber

[1] Bill Bryson, *A Short History of Nearly Everything* (London: Doubleday, 2003), 319.

means by noting that Temminck's main contribution to ornithology was to increase the rigor of zoological classification. Zoological nomenclature was in such disarray that it became one of the most intensely discussed subjects in systematics. The first rules for nomenclature set down by Linnaeus and amended by Fabricius and De Candolle were widely acknowledged, but at the turn of the nineteenth century these rules were becoming increasingly deficient. Naturalists were making exceptions as they went, especially to the principle of priority, and there was no agreement on how to proceed when a species had been labeled several times. The process of working in ever-growing collections confronted Temminck with a body of literature that was incomplete, heterogeneous and sometimes unreliable. He proceeded to match the original descriptions of Linnaeus, Pallas, Brisson, Levaillant, Illiger, Meyer, Latham and other naturalists with the specimens they had used, which were dispersed all over Europe. He did so by traveling for months from cabinet to cabinet, while building an extensive network of correspondents, something he would have never been able to do had he not been born into a patrician family. Years of effort paid off, and his first monographs included indexes of species with complete synonymies and literature references, which were generally welcome and exceedingly useful for others coming after him.

There were, however, a number of points that ignited heated discussions. In the first place, Temminck overruled the principle of priority on several occasions: if a name didn't match with the characteristics of the species (for instance, if the description had been based on juveniles), if a name placed a species somewhere on the planet where it did not occur, or when the description had been based on damaged specimens. In such cases, Temminck re-christened the species to correct the errors. The rub was, some naturalists, such as Fréderic Cuvier or George Robert Gray, did not agree with him and admitted no exceptions to the rule of priority, while others, such as William Swainson or Thomas Hosfield, thought it appropriate to change any incorrect epithets—especially, if these were not their own. The fact that even such a seemingly simple rule as the principle of priority (the first name ever given to a species prevails) stirred such debates reveals how complicated the issue of standardization was and how seldom naturalists agreed. Several efforts to standardize the nomenclature were made during the first half of the nineteenth century, but success was not possible until naturalists found a way to solve their individual differences as a community, that is, when the BAAS institutionalized the code of nomenclature as proposed by Strickland, Darwin, Owen and nine others. This was not a mere technical matter: any change meant that one's credibility and authority was being questioned.

Which name is given to which species might seem a problem of lack of agreement on regulation, but names are linked to descriptions, and groupings based on the wrong

descriptions make the ensuing classifications confusing. Names are important because they transmit ideas and reflect relations between varieties, species, genera, and so on. The disputes over nomenclature reflected different views about the definition and significance of each of these categories. and any challenge to a naturalist's proposed arrangement touched on much deeper questions. Classifications were meant to mirror the natural order, which, after all, was the main goal of systematics: to understand the natural diversity and God's plan behind it. There was a general expectation that in the end an order would be revealed in the apparent disarray of forms. This natural order was an intuitive idea and naturalists were confident that laws similar to those for, say, planetary harmony would eventually be forthcoming. How to achieve this, however, would keep naturalists occupied for decades.

Temminck was convinced that the study of the collections and the practice of classification, when combined with knowledge about the life histories and geographical distribution of animals, would eventually reveal nature's order, in the same way that a beautiful autumn landscape appears when one completes a jigsaw puzzle. Temminck's first incursions into systematics, however, had never been fueled by the urge to answer philosophical questions nor been the result of pondering the divine blueprint of nature. His first classifications had a more prosaic origin: he wanted to bring order to his father's collection of stuffed birds. Theoretical questions emerged later from the problems he encountered while carrying out *practical* work: identifying species to catalogue his collection, finding similarities between groups of birds to arrange them in the cabinets, treating birds skins with arsenic soap to preserve the characters he needed for identification, and browsing the literature for that one bird he could not name, finally to discover it had never been described before. From this experience, he understood that knowledge emanated from the very act of classifying, and consequently his was a thoroughly hands-on method that left no room for natural philosophy or any hypothesis made *a priori*. Most of Temminck's peers agreed: Carl Illiger or Hugh Strickland, for instance, promoted patience and careful work. Other naturalists, however, believed that the natural classification system should derive from a theoretical approach, and not the other way around. Amongst them, we find the quinarians and the *Naturphilosophen*. In any case, it was the search for order in nature that dominated systematics in Temminck's time, and for many, its discovery required the standardization of rules, methods and definitions.

A particularly difficult issue naturalists faced when attempting to uncover order was the circumscription of "natural" groups. In general, the principle of continuity was accepted and while Cuvier's four *embranchements* applied to the higher ranks in zoological classification, species and varieties of related organisms formed a continuum

that was increasingly difficult to cut up into natural and not arbitrary groups, especially when it came to genera. As we have seen, Temminck believed that a genus comprised a natural group of species that belonged together as manifestations of an ideal type, the basic form of organization. Species were manifestations of this mold with some variations from the original plan. Temminck's *type* was also a fixed category, as immutable as the species were. It carried with it the key to unlock the organization of nature: his understanding of the type as a blueprint induced Temminck to look above the levels of species and variation and to focus on shared similarities between different faunas. This led him to formulate a law concerning the geographical distribution of animals—similar *types* can be found along the same latitude on the globe. His general law remained virtually unnoticed, but Temminck's more descriptive work presented a relatively new panoramic view for naturalists after him to study those regions. Temminck's *Coup-d'oeil* and *Fauna Japonica* were very valuable precisely because they provided a birds-eye view of the faunas of the Sunda Islands and Japan. He laid the foundation for other naturalists like Murray, Wallace and Darwin to develop their own interpretations.

We should note here that Temminck's type concept as an organizing category is not necessarily at odds with his idea of continuity in nature: without groupings, nature becomes shapeless, while Temminck believed nature to be structured. He found continuity between species belonging to different genera. Similarly, his belief in separate acts of divine creation was useful to explain the geographical patterns of distribution, but it did not imply that he saw nature as made up of discrete groups. What Temminck's writings suggest is that he believed not in a linear chain of beings but in a web, a reticulum of related groupings, although Temminck never offered a clear description of how he perceived nature. His classificatory work and his law of the patterns of distribution of mammals reveal that, despite the emphasis he put on defining groups, his focus actually was on relationships, similarity and the overall organization of the fabric of nature, stressing continuity above divisions. This also explains Temminck's reluctance to split big genera, and the fact that his interpretation of the distribution of mammals around the globe was the opposite of that of Buffon, Humboldt and de Candolle: different forms occupied different regions, separated by insurmountable barriers. They focused on fauna's made up of different species where Temminck saw faunas comprising similar genera.

But what is a *genus*? In order to deal with the question of how to define genera, Temminck advocated the use of a few characters, carefully selected, that were to be used for all genera of a particular class. He spent years perfecting this selection, considering which to use for genera and which for species, and testing it throughout all his

groupings. He followed Cuvier's principles of the correlation of parts and of subordination of characters, trying to figure out which characters were most important for the survival of a particular group. In this way, he succeeded in defining genera in a uniform manner, with a limited set of characteristics. Each genus so defined was an unambiguous entity, but necessarily big because of the use of a small number of characters for each one. Temminck resorted to *sections* to divide large genera into smaller groups, especially when he was not sure he had found the definite characters to make new genera. Vigors, on the other hand, preferred to split genera into smaller units and found the use of sections confusing and unnecessary. Breaking up the large Linnaean genera became a battlefield, like nomenclature, precisely because of this underlying belief that systems should reflect, in the end, the divine plan behind all these wonderful organisms. Only those naturalists who believed that classification systems were in fact an aid, a tool, not unlike a dictionary—that is, artificial by definition and necessity—felt free to divide big genera into small units and move species from one genus to another. Classifications should be, first and foremost, useful. Among these naturalists were Sebald Brugmans and Carl Reinwardt, who had a more holistic, but also more utilitarian approach to natural history. But generally speaking, the concept of genus and how to define it was a very charged issue. By 1844 Hugh Strickland still lamented, tellingly, that the general approach to defining genera was an intuitive one, a matter of convenience more than a natural principle, and Alfred Wallace concluded that the type was neither fixed nor eternal. Interestingly, in the end the search for perfectly defined genera even took Temminck to doubt the existence of types and even of species. Although the species concept had received considerable attention, the concepts of genus and type were decidedly essential in nineteenth-century systematics. They carried the basic premises for constructing the elusive natural system and ultimately, for understanding the natural order. When genera were seen as natural, fixed elements of nature, naturalists' needed to succeed in defining them. Otherwise, the natural system would never materialize.

It is important to stress that the idea of improving the foundations laid by Cuvier does not imply that zoological systematics up to 1850 was simply producing an increasingly complex version of Cuvier's system, as it were by way of some kind of long and fastidious book-keeping. The main issues of systematics were the integration of a myriad of diverse systems of classification, to arrive at universally accepted rules of nomenclature, to find a way to harmonize geographical patterns of distribution and classifications, to clearly define a method to set boundaries around genera and a satisfactory procedure to weight the characters used in classification. Standardization was crucial, although it had not yet been achieved by the mid-nineteenth century, but it

was slowly emerging as zoological systematics developed. Such efforts to set guidelines and methods for classification were concentrated in the hands of an expanding but definite group of naturalists, working in certain settings. For instance, Temminck's approach was definitely collection-bound, and it marked the course of 's Rijks Museum in Leiden. He never did any field work, nor did he feel the need to. His travels took him to explore other collections, not nature. Even the one theoretical work that Temminck ever published, his law on the geographical distribution of animals, was the direct result of comparing European and Southeast Asian mammals with Japanese ones while working in the Leiden collection. The very fact that the 's Rijks Museum was established as a separate institute from the University of Leiden, although not completely independent, was the outcome of Temminck's understanding that different disciplines needed different types of collections. Anatomical preparations were not suited to answer the questions of classification, and systematically arranged collections of stuffed specimens could never help the anatomist to figure out the working of the organisms. In the Netherlands, comparative anatomy was practiced and taught at the universities, systematics in the Leiden museum. This is relevant because this divorce practically excluded systematics from the universities and made it the core business of 's Rijks Museum—for nearly two hundred years.

Although the situation in Leiden was very different from that in the Muséum National d'Histoire Naturelle, where the professors also held posts at the academies, classificatory endeavors in Paris were also exclusively collection-based, the approach so fiercely defended by Cuvier when he tried to minimize Humboldt's contributions. Cuvier clearly stated the need of comparing at first hand a broad array of specimens and literature to arrive at useful conclusions, which could only be done in a collection, not in the field. Similarly, the tasks carried out by the members of the Natuurkundige Commissie in the field were different from those they planned to undertake when—and if—they returned to the Leiden museum. In the field, they were observing, collecting, preserving and shipping animals and plants. All of these activities, although essential, were preparatory. But the practice of systematics itself, which consisted of identifying, naming, describing and recognizing relations, was a comparative exercise. While the first step was carried out in the field, the second one required extensive collections and a comprehensive library. Access to large collections that provided a panoramic view of natural diversity was indispensable for classification, while Humboldtian naturalists necessarily needed the experience and the measurements from fieldwork to understand the interactions among organisms and their environment. In other words, naturalists were claiming different spaces for different practices. This also implies that *naturaliste-voyageurs* could be occupied with very different subjects while in the field, either with

the preliminary work for systematics, or other activities needed for what we today would call ecological studies. The categories *field naturalists* and *cabinet naturalists* need to be defined not only by the space they were working in, but also by the disciplines with which they were concerned. In general, naturalists were aware of these separate approaches and they also recognized they had different goals. Agreeing on which goal was the most desirable and important at the time was another matter altogether.

This localization of systematics was accompanied by a process of community building. Naturalists dealing with zoological classification were aggregating into a collective with its own dynamics, and platforms. By 1840, the time of champions like Linnaeus, Buffon and Cuvier was giving way to an altogether different model of organization. The transition was set in motion when the number of naturalists dealing with classification increased, especially in Britain. Societies, magazines and clubs were proliferating, and articles on the classification and reviews on systematics works were as numerous as other subjects in journals like the *Magasin de zoologie, d'anatomie comparée et de palaeontologie*, the *Annals of Natural History*, the *Magazine of Natural History*, or even in the all-embracing *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie*. This was the place to discuss, debate, criticize and review each other's works. This is a subject that needs to be explored further and that calls for comparative studies, but we have already had a glimpse of this process in the previous discussion on authority.

The example of Strickland's code of nomenclature shows how naturalists would not lightly accept one man's attempts to set rules, on nomenclature or any other matter, however good the reviews his work had received nor how high he stood in the chain of command of a museum, or any other institution. Community building implied, necessarily, community reviewing. Any proposed name, system of classification or general principle was open to discussion. Consensus was necessary, if ever elusive, for the much-needed process of standardization. Naturalists had to present very clear lines of thought and reasoning to defend their systems of classification. Temminck, Vieillot, Vigors, Swainson and Strickland, all needed their best arguments to convince each other of the correctness of their systems and their classification categories. They needed to have robust lines of reasoning, extensive knowledge of their fields and a sharp pen to respond to their reviewers. This situation, chaotic as it might seem at first glance, was the fertile ground from which systematics evolved.

Disputes were a necessary factor for the elevation of classification into a scientific discipline on its own. But after 1835, Temminck was noticeably absent from this arena. He continued publishing extensive monographs that took him decades to finish, partly because of his fixation on detail and partly because of his lack of time due to the management of the museum. He never took up the writing of short articles that dealt

with theoretical issues. He answered Vigors' criticisms about his use of *sections* with nearly a decade of delay. It took him more than twenty years to complete the second edition of his *Manuel*, the installments of *Nouveau Recueil* appeared over a period of twenty years, too, and he also needed fifteen years to complete the *Monographies de Mammalogie*. At that pace, it is hardly surprising that his manuscripts had already fallen out of line with the mainstream even before they were published. He published them nonetheless, inevitably introducing species already described by others. This delay prevented him from actively participating in the debates that took place in a fast tempo in zoological clubs and journals. Temminck's lack of urgency might seem a paradox, especially taking into account that he seemed very much aware of the need of resolving the chaos created by different zoological classification systems, but it makes sense in the context of his self-perception. He saw himself as part of an elite group of naturalists somehow authorized to study and comprehend nature: Cuvier, Illiger, Meyer, Latham, Wolf, himself… On top of this, Temminck felt a certain disdain for British naturalists or, at least, for British natural history. He routinely cast aside their work, even when Britain began to take the lead in natural history. Temminck was in the middle of this transition, as were Van Marum, Reinwardt or Strickland, but unlike the latter, he could not adapt. This, together with his failure to provide a well-articulated framework for his classifications and ideas on distribution patterns, gnawed away his authority.

There were a series of factors that influenced the quality and the quantity of Temminck's publications that were beyond his control. The most evident is the economic crisis that followed the first years after the foundation of the museum. Lack of money was a constant headache for Temminck, who had to spend an inordinate amount of time and creativity to obtain specimens, to publish his works, and to keep the museum and the Natuurkundige Commissie up and running. The problems the Commission faced during the thirty years of its existence also influenced Temminck's ability to deal with the material from the Dutch colonies. When specimens arrived at Leiden, they had often been separated from the corresponding manuscripts, so vital for the description of the specimens, and only letters and other scraps of information were available to work on. Also, the governmental decree ordering the publication of scientific results in Dutch, by Dutch nationals, did not help much in positioning the museum as a leading institute in Europe, even though that had been the intended result of the policy. But perhaps the most difficult of these obstacles was the change of the attitude of those in power towards museums.

Temminck had been close friends with the minister of Education, Industry and Colonies, dined with the Commissioner General for Public Education and rubbed shoulders with Louis Napoleon. But by the 1840s, his precious "national monument"

was referred to as "the monkey house" by Rudolph Thorbecke, arguably the most influential political figure in the country. Things had definitely changed. Stresemann's conclusion that Temminck did not have the intellect needed to deal with the treasures stored in the Leiden museum can be countered by the statement that Temminck's capacity to work on it was impaired by the economic and political changes, and seriously obscured by his method of slow, fastidious revision of classification systems, a method that at first, we should not forget, gave him his prestige. By 1840 a meritocracy was on the rise and quickly replaced the old autocracy to which Temminck had belonged for several decades.

The transformation of systematics during Temminck's life can be understood as the emergence of a new discipline, one that had been traditionally part of natural history and even synonymized with it. If we look at the definition of *discipline* I gave in the Introduction, we see how systematics gradually began to fit it. By 1850, systematics had a set of goals, methods, terms and concepts unique to its subject matter; there was a developing self-regulated social structure that, although struggling to establish order, was already crystallizing into what we now call a peer-review system. It had its own journals and societies, and a space in which to practice: the natural history collections. Naturalists seemed to be conscious of the fact that, with their efforts at creating structure and standardizing methods, they were forming a new discipline. Whether systematics was included in academies remains to be examined. In Dutch universities systematics was part of natural history and medicine courses, mainly because it was necessary for applied botany and comparative anatomy, but the *practice* of systematics remained the core business of the Rijksmuseum in Leiden. The collections laid down by the universities were, for this reason, substantially different in materials, objects, conservation and arrangement than those kept in Leiden. Further studies will be very useful in elucidating the relation between museum and universities, in the Netherlands as well as in other continental and British institutions.

The main drive behind the development of systematics was standardization, an increasing rigor and specialization, and the rise of a meritocracy. Temminck's influence in these processes faded away after the 1830s for the reasons mentioned above, but he did play a central role in the early decades of the 19th century in the standardization of names and methods, and by promoting the establishment of a museum independent of the university—dedicated exclusively to the practice of systematics. Taken together, these facts are, in my view, symptomatic of the process of discipline-building: standardization, community building and a particular location.

If systematics was developing into a separate discipline, how was natural history defined towards the mid-nineteenth century? There was no universal definition of

natural history nor an agreement as to which disciplines it should or should not include. Some naturalists included chemistry, physiology or behavioral studies in natural history, while others considered these to belong to the experimental sciences or natural philosophy. Within zoology, comparative anatomy was sometimes excluded from the scope of natural history, perhaps because it had been traditionally associated with medicine. Botany, on the hand, was often understood as a purely descriptive discipline; for naturalists in the 1850s, plants had no 'organs' to help elucidate the relation between form and function. In addition, new approaches were sometimes incorporated into natural history, like Humboldt's *Phytogéographie*. With the breaking up of natural history into a number of separate domains, the disciplinary pecking order shifted. Regarding systematics, its status depended not on its connection to anatomy nor on its promised reward, the understanding of the natural order. It depended on whether or not it relied on a hypothesis formulated *a priori* to achieve its goals. If systematics itself—the very act of describing and classifying—could eventually lead to explanations about order and causality, it was acknowledged as a true discipline. Naturalists who believed this to be the case defended systematics as independent of natural philosophy and free of any theoretical assumptions. Temminck, Illiger and Strickland, for example, were adherents of this idea.

On the other hand, systematics was sometimes regarded as a tool, an aid to help prove—or disprove—theories about the organization of nature. Lamarck, the *Naturphilosophen* and quinarians like MacLeay or Vigors considered the practice of classification as a useful instrument and therefore, for them systematics ranked very low among the other disciplines. For those naturalists who considered classifications and explanatory arguments as separate entities, systematics ranked very low in the hierarchy of natural sciences, while the reverse was also true: including theoretical explanations of the natural order in zoological classifications raised the status of systematics from a descriptive to an explanatory discipline. In other words, the status of systematics within natural history depended on whether it could by itself be an explanatory discipline, rather than only descriptive. It may even have been the case that Temminck formulated a law on the distribution of animals in an attempt to raise the status of systematics.

Curiously, the quinarians claimed that their system had been derived from evidence (we know now this could not have been the case), while Temminck and Illiger insisted on the hypothesis-free character of their classifications, although they were actually building upon the morphological *type* concept and the principle of continuity. In fact, all classifications were based, at some level or other, on predetermined underlying ideas and concepts like the species and genus concepts. In general, systematics was

subordinate to comparative anatomy and morphology while striving to provide natural history with some earth-shaking discoveries of its own. Further studies on the relation between natural philosophy and zoological systematics may shed more light on this question and help explain, among other things, the reception of uniformitarianism, or of the theory of evolution by natural selection and their influence—or lack of it—in the daily practices of systematists during the second half of the nineteenth century.

Taken together, the previous chapters provide a broad and detailed view of Temminck's career and the main developments in zoological systematics during his lifetime. We now can take a step back from the details and return to the three wider themes mentioned in the introduction: the development of systematics as a discipline, the rise of meritocracy in natural history and the status of systematics within natural history and natural philosophy.

Firstly, I suggest that systematics had, by the mid-nineteenth century, become a discipline within natural history. Systematists' main concerns by then were the standardization of rules and concepts and the pursuit of the natural system. Their main goals were to formulate the laws that governed nature, to understand how and why certain groups of organisms were seemingly related to others, and to find patterns in their geographical distribution. To achieve this, the most important point of departure was the concept of *genus*, not the *species.* The definition of a genus hinged on whether or not it was viewed as a natural entity, which was inextricably connected to the *type* concept. The concept of type depended, in turn, on each naturalist's idea of the divine blueprint for creation. Thus, I want to argue that the whole enterprise of systematics between 1800 and 1850 depended on the genus concept.

Secondly, I argue that the rise of meritocracy in natural history played a decisive role in pushing forward the development of systematics. As beliefs about the genus and the type concepts varied, classifications proliferated. Discussions were settled by argument and by debate, and the process of democratization of natural history cast aside those who claimed authority in the matter on the basis their past successes, their social status or in Temminck's case, both. As Britain took the lead in natural history, the social structure of the naturalist community changed, as did the way they communicated and the language they used to communicate. Systematics became of age by the mid-nineteenth century partly because of this development within the social infrastructure of natural history.

Thirdly and finally, the blurring of the boundaries between descriptive natural history and explanatory natural philosophy determined the hierarchy within natural history disciplines, especially systematics. Systematics had the status of a scientific discipline only if it incorporated philosophical elements and a conceptual framework to

explain nature's order. Without it, it was no more than a tool, a manual to help naturalists put some order into the natural world they were classifying. Cuvier's principles from comparative anatomy seemed to hold the key to unlock the order in the chaos, but as more and more animal forms were being discovered, the simplicity of the principles emanating from anatomy could only be of help for the larger groups: the classes and the families. The challenge that naturalists faced when trying to harmonize their classification systems with natural philosophy was exceedingly difficult. And as systematics proved unable to offer explanations of cause and effect, its status plummeted.

The consequences of the declining status of systematics towards the middle of the century are still felt today. In fact, systematics has been trying to gain prestige for the past two centuries by trying to incorporate into its domain the most pressing conceptual questions of the time. By the mid-nineteenth century, systematics pursued the discovery of order in nature and a century later, for instance, it attempted to redefine itself as Evolutionary Systematics, as the discipline to provide answers to evolutionary questions like the processes behind species formation and population genetics. Certainly, politics also played a role here. The prestige of any discipline is intimately linked to the amount of attention and resources it receives and the number of students it can attract. Similarly, the lower status of systematics has also resulted in the paucity of historiography: in fact, the history of the discipline has yet to be written. In the Netherlands, for example, there is a wealth of knowledge and much insight to be gained from studying figures like Hermann Schlegel or Samuel C. Snellen van Vollenhoven, leading systematists of their day. Additionally, the institutional histories of the Leiden University and the Leiden museum—in its passage from 's Rijks Museum van Natuurlijke Historie to the relatively new Naturalis Biodiversity Center—can provide valuable insights into the evolution of systematics through Darwinism up to molecular phylogeny and population dynamics. These studies would finally help putting the history of Dutch natural history on the agenda for further comparative research.

APPENDIX I

Quotations

Introduction

6 Temminck's werken over de vogelen leerden eene rangschikking die den grootsten bijval vond. Men stond verbaasd over de naauwkeurige beschrijvingen, de naauwkeurige synonymen en de menigvuldige opgaven omtrent de levenswijs en de zeden der vogelen, die alles overtroffen welke vroeger geleverd waren.

7 Den man, die zich tot een systematischen zoöloog van den hoogsten stempel zoude ontwikkelen.

14 Temminck's betekenis voor de wetenschap, speciaal voor de ornithologie en mammalogie, is groot. Hij publiceerde veel grondslaggevende werken en deed dit tot op hoge leeftijd.

CHAPTER ONE. From catalogues to monographs

1 Men wil u niet, mijn waarde Temminck, omdat gij geen geleerde zijt.

8 Je me rappelle avoir assisté dans mon enfance à un diner chez M. Ameshoff, qui, pour faire étalage de la magnificence de sa ménagerie, faisoit servir sur sa table, non seulement des Pauxis des Hoccos et différentes espèces de Faisans exotiques; mais aussi les Sarcelles à évantails de la Chine et les Canards de la Louisiane, se trouvoient sur sa table, lors de ce festin digne des tems d'Héliogabale.

17 De Administratieve Municipaliteit van Amsterdam […] gelast zyde, om alle nuttelooze en onwaardige plaatselyke Ambtenaren en Bedienden, van hunne posten te ontzetten, en dezelven met waardige en kundige Vaderlanders te voorzien.

25 Al vroeg was ik op en herdacht met vreugde het voorrecht dat ik weder genoot deze dag te beleven, zijnde onze trouwdag.

29 Hij was zeer sober in zijn levenswijze, ongemeen net en naauwkeurig op zijn kleeding en omgeving.

37 Je ne pouvois me lasser d'admirer celui de M. Temminck, trésorier de la Compagnie des Indes, & la brillante collection qu'il renferme. J'y remarquai une foule d'objets précieux que

je n'avois jamais vus en France. Tout m'y parut extrêmement rare, & de la conservation la plus pure.

42 M. Temminck, quoique jeune encore, est un homme à distinger de tous ces curieux qui, n'aimant que les espèces brillantes et à beau plumage, entassent à grands frais collections sur collections, sans aucun goût pour l'étude de la science.

43 Je dois à Le Vaillant et à ses écrits mes premières pensées et mon premier élan en histoire naturelle; ses ouvrages et ses conseils me servirent de guides dans l'étude pratique de cette science, et je me plais à reconnaître qu'il posa, à son retour d'Afrique, les premières bases d'une collection qui, passant depuis du père au fils, fait aujourd'hui le plus bel ornement du Muséum des Pays-Bas.

48 Etes vous toujours content de notre fino T.-, pour moi je ne le suis guére? J'ai reçu une lettre de Geneve de Mr. Gosse que n'est pas fort content non plus aussi que Mr. Boissiere [?], les echanges qu'il ont fait avec lui. Il parroit qu'il a attrappe tout le monde. Vous savez sans doute qu'il est president d'une Academie, directeur d'une Ecole de peinture, Chambellan du Roy et enfin Chevallier de Union. Dieu veuille que tous ses honneurs le changent un peu.

51 Allé vous maintenant etre 3-mois ou 6 et meme une année sans me repondre touchant mon argent il faut convenir que vous etes un diable d'homme.

53 Serait-ce pour s'être prononcé avec trop de franchise sur des écrits de ce genre, et pour avoir émis une critique sévère, peut-être souvent trop amère, que ce savant ornithologiste s'est vu réduit dans ses vieux jours au plus strict nécessaire, sans aucune espèce d'encouragement et sans cueillir le plus léger fruit de ses travaux, au milieu des récompenses, des grâces et des titres donnés à ses compatriotes, et accordés dans tous les temps au vrai mérite et aux hommes célèbres dont la France s'honore.

70 Il aura pour titre Histoire générale et complette des Gallinacés […] ou les Amateurs trouveront representés environt quatre-vingt individus nouveaux, de la plus–part desquels aucun Auteur n'a fait mention.

78 Tous les moyens mis en oeuvre pour en appeler contre un acte si arbitraire, furent sans effet, et ma voix ne put alors s'élever contre l'intrigue soutenue par des protecteurs puissants; les journalistes refusèrent de placer mes reclamations dans leur feuilles; même celle en réponse à l'article que le nouvel auteur avait fait publier par ces journeaux, me fut interdite.

79 Les désagréments que j'ai recueillis pour fruit de mon désintéressement envers les Editeurs doivent être mis au rang des évenemens familiers de nous jours.

80 Vous en devés être mécontent jusqu'à la faire réimprimer. D'ailleurs j'en félicite nous autres pauvres Ornithologistes, à qui un ouvrage somtueux est défendu, que Vos remarques sans doutes précieuses sur une classe intéressante nous seront par cela accessibles.

88 On va chercher dans les régions de la zone torride et vers les glaces des pôles des sujets à ajouter aux nombreuses espèces déjà connues, au moyen desquelles on augmente le catalogue de nomenclature sans aucun but d'utilité scientifique: stériles acquisitions, que les amateurs de curiosités peuvent estimer, mais qui seront encore long-temps étrangers pour le domaine de la science.

89 A cette fin l'ouvrage que je leur offre donne une description concise et exacte non-seulement de chaque espèce, mais aussi de ces variétés, tant de sexe que d'âge, ou simplement de celles qui sont accidentelles.

CHAPTER TWO. From collector to director

1 J'en dois l'hommage à la réunion des savants et des protecteurs zélés, dont les travaux tendent au noble but d'éclairer les sciences par les lumières de leur esprit, de les protéger et de les encourager.

20 Ondanks eene Franse post door mij uit pecuniare noodzakelijkheid is aangenoomen, deszelfs waarneeming mij niet heeft doen ophouden Nederlander te zijn.

33 …gebrek aan Lugt en Licht, de thans exteerende objecten aanmerkelijk doen deterioreren; vooral de Insecten, bij de welke men wel gedurig dien de te stooken, om de vogtige lugt te verwrijven, en om niet door den tijd Campignons op de tonnen te plukken.

34 Voor dit gebrek, behoeft men geen de minste vree te hebben bij eene expositie conform aan die van het Museum van Parijs, van Weenen en van Londen, en zo iets dergelijks moet ook zo ik vertrouw door den tijd in U plan vallen.

36 Hoezeer ik Reinwardt bijzonder Hoogacht, en aan Zijn Ed. door oprechte en hartelijke vriendschap op het naauwst verbonden ben; ik nimmer van Zijn Ed. de nietige en Subalterne Commissie van een Kabinet Opzichter of van een Conservateur, op mij zoude genomen hebben, hiertoe is de tijd mij te kostbaar. Ik dagt veel meer, gedurende zijne afwezigheid nuttig te kunnen zijn, en zo wel voor zijn belangens zorgende, iets wezenlijks voor de Studien der Wetenschappen en voor het bevorderen van dien te kunnen uitrigten.

De Goede Man, is mij geheel statig komen zeggen, dat Zijne Ouderwetse wijze van denken en inzien der zaken, hem dwongen om zich tegens mijn gevoelens en daden te moeten verzetten.

39 Le Souverain forme t'il le plan d'établir secondé par de tems propices un Museum voué aux sciences naturelles; et dans un pareil cas serait il porté à m'en confier la direction.

40 Les titres de notre respectable ami R. à l'employ de directeur, suffisent pour me faire renuncier à mon projet. J'ai communiqué à cet ami tous les details de ce plan, ainsi que vôtre lettre, afin de me mettre à l'abri du soupçon d'aviser par lui-même dans sa carrière.

44 Je suis le factotum de mes nombreuses collections, tantot général et tantot soldat. C'est moi qui dresse tous les quadrupèdes, les oiseaux et les poissons; aux passages des uns et des autres je varie mes courses tantot sur mer, le long du rivage, ou sour les bords de nos lacs ou de nos marais; toutes les nombreuses dépouilles d'animaux dont je me sers en troc ou en cadeau pour mes amis, sont préparées de ma main. l'hiver je m'occupe à dresser des quadrupèdes et des oiseaux exotiques que je reçois en robes sèches et quelquefois mal préparés. Je travaille alors à la classification de mes collections, à leur conservation, et le soir est destiné alternativement a mes occupations litéraires ou aux devoirs de la société. l'été je m'occupe de zoologie d'Europe et je tache de rendre service à mes amis et mes correspondants. C'est alors que je rassemble les matériaux que je travaille dans les longues soirées d'hiver. Vous me ferez peut-être la juste remarque, que si j'emploiais une main mercenaire je pourais, en payant, me décharger de la partie la plus desagréable du travail. Je n'ai cependant point encore pu parvenir à me procurer un bon aide; car dans notre pays le gout pour l'étude de la nature est nulle. La seule idole encensée par mes compatriottes est l'or, on trouve même presque ridicule de voir quelqu'uns d'occuper de science, autrement que par pur délassement et comme pour se reposer du travail de bureau.

45 De arme Reindert dezze zomer gehuwd zijnde, en zijn vrouw moetende kramen, is op het verdienen van iets meeder dan Drie Guldens bedagt.

47 …den Heer van Marum, alzo ik zedert nu ruim ses maanden zijn Ed. slegts twee malen heb gezien, en gesproken; en ik het raadzaamer heb gevonden het Veld van Eer te verlaten.

57 Je répugne un peu, à vous parler franchement, à risquer mes oiseaux uniques à un long voyage, dans lequel ils pouraient s'abîmer totalement, ou bien perdre de leur fraicheur et de leur pureté.

65 Car une collection, comme la votre, distinguée par le nombre d'espèces et la beauté d'exemplaires, le rend extrèmement difficile, de trouver quelque chose, qui soit digne d'y entrer.

71 Il est entendu que dans l'avertissement à la nouvelle édition de mon Manuel, votre nom sera cité comme de droit et vous paraitrez comme ayant cooperé à former l'ouvrage le plus parfait qui existera de l'histoire naturelle des oiseaux d'Europe.

78 Le jeune Kuhl de Hanau, attaché depuis peu a l'une de nos universités m'accompagnera et me sécondera aussi dans cette année par ses traveaux; c'est un jeun home dont je fais beaucoup de cas et que je veux diriger pour l'envoyer quelque jour faire des voyages dans les pays peu connus de nos colonies dans l'Inde.

84 II m'a été communiqué par M. Dupont l'aîné, qui l'avait reçu de M. Bonelli, pour savoir de moi si je le regardais comme une espèce nouvelle, et c'est depuis ma décision qu'il a été envoyé à M. Temminck. Ne croyez pas que je mets une grande importance à faire connaître le premier une espèce nouvelle; mais je dois éviter de passer pour un auteur qui s'approprie les faits des autres en changeant les noms, moyen employé très-souvent par certains savans.

85 La figure lithographiée et très en diminutif d'un sujet bien plus jeune que celui donneé pl. 288 de ce recueil, vient de paraître dans un nouvel ouvrage sur les oiseaux de proie d'Europe, sous le nom d'Aigle intermédiaire; l'auteur n'a sans doute pas su que nous avions fait mention de cet oiseau sous le nom indiqué ci-dessus.

95 J'ai taché de rendre nos traveaux en quelque sorte cosmopolites et les noms adoptés et sanctionnés dans d'autres musées ont en partie fait place aux etiquettes existantes, tous les noms de Illiger ont été adoptés et tous les noms de Vieillot rayés.

97 Ses connaissances et son titre d'auteur lui font attacher beaucoup d'importance à son nom d'espèce.

103 Chargé d'organiser les cabinets pour les Universités de Gand, Liège et Louvain, j'ai été forcé de donner à cette partie un tems assez considérable, ce qui même a été cause que je n'ai pu travailler pour moi; aujourd'hui que l'organisation de cette partie touche a sa fin, je reprends avec empressement le fil de mes précédentes relations…

104 Je n'ai point des étudiants à mes ordres comme les très illustres professeurs; Généralissime et à la fois soldat de ma collection, tout doit passer par mes mains.

105 De natuurlijke historie der dieren en delfstoffen, welke, voor zoo verre de dierkunde betreft, met anatomie comparata zal moeten vereenigd worden.

109 De natuur toont ons de volkomende éénheid en de onbegrijpelijkste rijkdom van verscheudenheden, zijn kent geen stelsel, geen verdeelingen, geene klassen noch soorten: neen!

110 Het [is] thans buiten bedenking dat de vergelijkende ontleedkunde de eenige vaste grondslag moet zijn zoo veel van Systematische als Philosophische beschouwing van het Dierenrijk.

113 Hij [Van Marum] nam in overweging, om bij de verzameling van opgezette dieren eene andere daarbij eigenaardig behoorende, meer wetenschappelijke verzameling van vergelijkende ontleedkunde aan te leggen, waarvoor hij in de Ontleedkundige School van Prof. Camper grooten lust en eenige hebbelljkheid in het vervaardigen van praeparaten verkregen had.

117 Ik laat de bezigtigers van het Museum ook altijd zoo geleiden, dat zij naar deze Systhematische orde de verzameling zien.

120 Ik heb mij in alles het nut der studerende jeugd tot hoofddoel gesteld, mij dus alle mogelijke moeite gegeven, om slechts zoo vele genera bij elkander te krijgen, als ik, in het korte tijdperk van zes jaren (want voor zes jaren was hier nog niets) kon magtig worden, om den Studenten een Systematisch overzigt te kunnen geven over de geheele wetenschap, mijns inziens het eerste doel der Akademische studiën.

123 Daareentegen, gelijk in stilstaande wateren zich gemeenlijk eenige vuilheid vertoont, zoo ook valt bij hen, die nimmer buiten de grenzen van hun geboorteland of eenig bijzonder oord gegaan zijn, maar, binnen dezelve besloten, zich tot de studie der Natuur begeven hebben, zekere onzuiverheid, laagheid en bekrompenheid van oordeel op te merken, waardoor zij, als zij somwijlen van hetzelfde een vrijer gebruik trachtten te maken, tot eene ontelbare menigte van dwalingen en beuzelarijen in de gansche uitlegging der Natuur vervallen zijn.

124 Ofschoon de waarheid hiervan buiten alle bedenking is, is dit nogtans een gemeen gebrek, zich door de gansche Natuurlijke Historie verspreidende.

CHAPTER THREE. National museum, national expeditions

3 Men had dan teffens een Nationaal Museum gesticht, als een kern aangelegt, om door zijne doubletten en door wel aangewende zorgen der directeuren, te kunnen strekken tot vermeerdering der Universiteits Cabinetten, en teffens ingerigt, om tot een voldoende vraagbaak te dienen, voor dezulken, welke zig in de onderscheide vakken der Natuurkunde door vergelijkingen de gewenschte volledige kennis trachten eigen te maken.

7 Een Museum te schichten, overeenkomstig met de waardij onzer verzameling, overeenkomstig den luister onzer Academie en de staat der Wetenschappen.

15 Hoe of sulks ook het plan moge zijn, zo is het nogthans billijk dat Reinwardt bij zijne terugkomst niet als ondergeschikt of als eventueele plaatsvervanger worde teruggeschoven.

16 Wordt er niets van een nationaal museum, of blijft de inrigting voortdurende gebrekkig, dan zal men mij niet ten kwade kunnen duiden, dat ik mijn begeerte en lust tot uitbreiding mijner natuurkundige kennis in een ander land voortzette.

24 Ik beware hem [deze brief] echter als de kiem bevattende van het thans gerealiseerde denkbeeld van een groot Museum der Natuurlijke Historie.

26 Het komt mij wijders voor, dat een Directeur der Botanische Tuinen, belast met het Professoraat van de Chimie, Botanie, Mineralogie, Vergelijkende Anatomie en alle Vakken der Zoologie, oneindig veel te doen heeft.

33 Geene, het zij pathologische hetzij phijsiologische praeperaten van de bijzondere organen der dieren, behooren tot den Omvang van dit Kabinet.

41 De graad, die ik bij mijne Promotie verkregen heb, en de rang die ik in andere opzigten in de Maatschappij bekleede, laten mij geen vrijheid om eene subalterne post te ambieeren.

48 Dat de Hr. Temm. Directeur van het Museum is en ik dus buiten den oorlog met Motten en Spekkevers kan blijven is mij waarlijk aangenaam.

58 In aanmerking nemende de aanstaande terugkomst van den heer Reinwardt en willende meer en meer bevorderen de kennis van de natuurlijke gesteldheid van de voortbrengsels onzer bezittingen in de Oost-Indiën.

De Heeren H. Kuhl […] en J. C. van Hasselt worden genoemd om […] de Nederlandse bezittingen in Oost Indië te bereizen, met het bepaalde doel, om de de wetenschappelijke kenis van de voortbrengselen der Natuur, in die landen, uit te breiden.

73 Deze zijn Kruidkundige nasporing zullen zich echter geenzins alleen mogen bepalen tot eene beschrijven van gedaante, nog tot de bepaling en onderscheiding van de geslachten en soorten der gewassen, maar zullen – aangezien door de Zending van den Heer Korthals naar Nederlands Indie, bepaaldelijk eene, voor de geweste, voor Nederland en voor Wederzijdsche betrekkingen onmiddelijk nuttige strekingen bedoeld wordt – eene meer algemeene, nuttige en vructhbare Kennis der gewassen tot oogmerk hebben.

74 Waarom heeft men aan K. [Korthals] niet vergund, naar zijne instructie te werken? Waarom zijn zijne tot Economie of Landbouw betrekkelijke, ingediende stukken afgewezen of onbeantwoord gebleven? Waarom de opzettelijk last, om zich niet dan met verzamelen bezig te houden? Zullen ook voor het Indisch Gouvernement moeten dienstbaar zijn?

78 De Directeur van 's RIjks Museum van Natuurlijke Historie te Leijden, adverteert bij deze, dat, hoezeer de galerijen nog niet zijn voltooid, en al de voorhanden zijnde voorwerpen niet kunnen geplaatst worden, er echter, aan diegenen, welke verlangen mogten hetzelve in dien staat te bezigtigen, daartoe gelegenheid zal worden verschaft, voor het afgeven van toegangsbilleten, welke te bekomen zijn op de Papengracht.

96 Men kan het dier daardoor beter in deszelfs natuurlijke gedaante herstellen; iedere uitwendig zigtbare spier en beengedeelte scherper en zigbaarder doen voorkomen, en daareenboven, behoeft men naar deze wijze de huid niet meer met gaten te doorboren; daar dezelve thans, om den vooraf, wel en naauwkeurig te gemaakten, vorm, als een gewaad wordt gespannen. De meerdere moeite, welke deze bewerking veroorzaakt, wordt rijkelijk opgewogen door den voortreffelijken uitslag.

102 Het is voor de wetenschap immer nuttig; meer dan een Exemplaar der voorwerpen van Natuurlijke Historie in bezit te hebben; zijnde overigens alle wel bewaarde voorwerpen derzelve, voor de verzamelingen van het Museum van gelijk aanbelang, zonder dat de mindere of meerdere schoonheid van kleur of vorm iets toe- of afdoet.

108 Uw Ed. zult my wel ten goede gelieven te houden, dat ik my de vryheid neeme, te vragen, welke Prijs UE. Inclineeren mocht te betalen voor Vogelen, viervoetige Dieren, insekten, Kapellen, visschen en slangen, misschien ook Bloemzaden en drooge Planten.

112 Zo heb ik in afwachting van antwoord de voorwerpen gekocht, en ben reeds in het bezit van dezelven, maar spreekt aan niemand dan aan Boié iets van dit gebeurde.

121 Moet men veronderstellen dat de natuurkundige wetenschappen in het Brittische Koningrijk met de meeste luister vrugten moeten vortbrengen. Wel verre van eene zo gunstig tijd-perk te nuttte te maken, waar in zij op de zeen den skepter zwaagde; hebben zij niets wezentlijks uitgerigt. Ouden verlamde instellingen, beuzelagtige gebruiken onnutte personen en niets wezentlijk uitrigtende genootschappen met oude privilegien omhuld kwamen telkens in den weg, en staan nog tegenwoordig in houding, om alle goede instellingen te verijdelen. Niets wezentlijks kan in Engeland voor de Natuurkundige Wetenschappen ondernomen worden en tot stand komen, zo lang een Aartsbisschop van Canterbury de Lord Maior van London en de Speaker of the house of commons de opper rangen uitmaken van het Brittische Museum; de president der Royal Society het regt komt hebben een chimist tot Directeur van de Zoologie te doen benoemen.

123 Om welke redenen laat ons het gouvernement altijd met Januari, Februari en maart zonder een penning disponibel: heeft men de gedachte dat wij als de woeschte [...] dieren de winterslaap houden of van onze opgegaarde voorraad leeven als de hamsters. Geen voorschoten en geen betalingen op de gehorige tijd, eene fraaye wijs om huishouding te maaken! Nu, een ieder schikke zig zo hij kan.

127 Zoo noemde hy b.v. het Museum van Nat. Hist., 'het apenhuis', het Herbarium den 'Hooizolder'.

128 Het Rijks Museum van Natuurlijke Historie blijft nog steeds zijnen teregt verkregen roem op eene lusterrijke wijze handhaven en die roem wordt betrekkelijk, in geen geringe mate verhoogd, door het in 't nog loopende verval, waaronder soortgelijke Inrigtingen in andere, zelfs groote Rijken, lijdende zijn. Zoo lang de Hemel mij leven en krachten schenkt, hoop ik het voorwerp, waaraan ik meer dan dertig jaren al mijn tijd en vlijt, met onverpoosde inspanning heb besteed, voor zulk een droevige toestand te behoeden, en ik zal daarin slagen, zoo lang ik mijne krachten mag geschraagd zien door de bescherming en ondersteuning der Regering, zoo als mij die, ik erken het dankbaar, tot den huidigen dag in ten deele geweest en waaraan het mij onder het krachtige bestuur van Uwe Exc. gewis ook is 't vervolg niet zal ontbreken.

131 Vous dire que je m'occupe des Gallinacés et des Oiseaux d'eau, c'est vous dire combien je pense à vous, car si vous ête le Papa (non Pape) de tous les oiseaux, vous ête le Génie des poules et des Goelands, dont les kirikiris étouffant les Lafayette, nous porterons vous et moi, je l'espère du moins, des blanches ailes de ces derniers à la plus lointaine postérité.

132 Et vivent les Gallinacés, les pigeons et les oiseaux d'eau! Ils reportent le vieillard au temps de sa jeunesse, et me font rajeunir d'un quart de siècle.

133 Un vétéran en déclin de sa carrière, mais qui se berce encore de l'espoir de mourir les armes à la main.

140 Comment oser se flatter de voir jamais en seul homme embrasser l'étude de l'ensemble de la création? Pour décrire avec précision, et d'après de la nature, une seule classe du règne animal, la vie de l'homme le plus actif suffirait à peine. Le meilleur moyen que les naturalistes puissent choisir pour faire connaître une serie de résultats des faits présentés en masse, paraît être celui de publications par *Monographies.*

141 Leur contenu [du Manuel et mon système] est basé sur l'examen le plus sévère de la nature, sans aucune espèce de compilation; toutes les espèces ont été vues et souvent comparées entre elles dans tous les cabinets d'Europe; voilà peut-être les seuls mérites de mon ouvrage, et la seule différence qui le distinguera de ceux publiés par des naturalistes sédentaires et de bibliothéque.

142 In 1846 ontmoetten wij hem op een pad, waar wij hem niet verwachten konden.

145 On a souvent blamé la nation hollandaise ainsi que son gouvernement, de leur *prétendue* réserve en tout ce qui concerne nos possessions d'outre-mer. J'avais à coeur de prouver que cette imputation n'avait pas le moindre fondement.

146 L'utilité de ces voyages de découvertes est de nos jours généralement reconnue; nous pouvons les recommander sous le double point de vue des progrès qu'ils font faire aux sciences, et de l'influence qu'ils peuvent avoir sur les destinées futures de nos lontaines possessions; même les prôneurs d'une stricte économie, et qui ne consultent le plus souvent que le côte positif des dépenses, seront dans la nécessité de convenir que celles, d'ailleurs dans tous les temps très-modiques que les gouvernements consacrent aux progrès des sciences, offrent immanquablement un but réel, immédiat et d'utilité publique.

CHAPTER FOUR. Patterns, laws and the type concept

2 Cette matière [la distribution géographique des animaux] riche en faits et en conséquences…

7 Les productions zoölogiques du Japon […] nous fournissent des preuves nouvelles sur la répartition geógraphique des êtres: elles servent à constater cette loi d'organisation animale, […] qu'il y a rapport d'organisation, de formes extérieures et de mœurs, entre le plus grand nombre des animaux qui habitent des latitudes correspondantes, quelque éloignées que puissent être entre elles les contrées où ils vivent et se propagent en liberté, sans que l'étendue plus ou moins vaste des mers qui les sépare, ait en cela, la moindre influence,

comme sans égard à la distance énorme qui éloigne ces contrées, les unes des autres, par une suite non interrompue de terres.

8 Cette loi est applicable, sous certains rapports, aux deux hémisphères, mais elle l'est plus strictement pour l'hémisphère septentrional, où existent des espèces plus exactement semblables entre elles, tandis que dans l'hémisphère méridional, les groupes et les espèces y sont repartis sur un modèle plus diversifié, quoique offrant, le plus souvent, une grande analogie dans les animaux qui vivent sous ces latitudes parallèles.

10 Onder de van Japan bekomene zoogdieren heeft men nog die soorten niet aangetroffen, wier opmerkelijke vorm werkelijk van de bekende grondvormen (*types*) verschillen, zoo als die in Australie gevonden worden, behalve eenigen, die slechts weinig van onze bekende geslachts-afdeelingen verwijderd zijn; kunnende al de overigen in de systematische afdeelingen der europesche en aziatische zoogdieren gerangschikt worden.

14 Wanneer men al deze geringe, plaatselijke onderscheidingen in aanmerking wilde nemen, om haar te doen strekken tot vermeerdering van het getal soorten, zoude zulks, vooral wanneer zij ter naauwernood zijn op te merken, het zekerste middel zijn, om den voortgang der studie gedurende een' langen tijd te belemmeren […]; van die vormen, welke door hel gezigt naauwelijks te onderkennen zijn; van eene kleingeestige, tot strepen herleide uitmeting; met één woord, van het invoeren van karaktertrekken, welke met het scalpel in de hand en door een met de loup gewapend oog, moeten worden opgespoord; terwijl het geheel der vormen van deze naamsoorten onmiskenbaar en op den eersten blik, ten duidelijkste al de voornaamste karaktertrekken erkennen doet, welke aan den typus van de eenige, ware soort eigen zijn.

16 Ce nouveau genre vient remplir une lacune très importante dans la série animale; il prouve, jusqu'à l'évidence, que plus le cercle de nos connaissances vient à dépasser les bornes jadis tracées, et que les découvertes nouvelles d'animaux dont nous n'avions jusqu'ici aucune notion se multiplient, plus aussi nous pouvons nourrir l'espoir de connaître, sous peu, tous les chaînons de cette chaîne non interrompue qui lie étroitement entre eux les groupes différents d'animaux, tant ceux anciens ou des siècles passés.

17 La vue d'une multitude d'individus de la même espèce, mais originaires de contrées différentes, nous indique clairement qu'il est souvent bien difficile de parvenir à déterminer strictement la limite entre les espèces analogues, et de dire positivement qu'il existe une séparation spécifique ou une démarcation bien tracée pour toutes les espèces que nous séparons comme telles. En résumé, l'existence des *Genres*, en donnant à cette dénomination l'explication conventionelle, me paraît un paradoxe : je suis même loin d'établir celle des *espèces* en axiôme.

20 Sans toutefois nier, que les espèces puissent avoir subi des altérations locales et se montrent sous de légères variétés; ce qui n'empêche pas que les dissemblances, par lesquelles ces

variétés sont caractérisées, ne soient pas assez tranchées, pour qu'on puisse les isoler des types et les classer comme espèces réellement différentes.

23 Il y a dans la nature un prototype général dans chaque espèce, sur lequel chaque individu est modelé, mais qui semble, en se réalisant, s'altérer ou se perfectionner par les circonstances; en sorte que, relativement à de certaines qualités, il y a une variation bizarre en apparence dans la succession des individus, et en même temps une constance qui paroît admirable dans l'espèce entière.

24 Le premier animal, le premier cheval, par exemple, a été le modèle extérieur et le moule intérieur sur lequel tous les chevaux qui sont nés, tous ceux qui existent et tous ceux qui naîtront, on été formés.

26 Quelle étrange erreur n'est pas celle, d'indiquer le Bizet ou Colombe Sauvage comme le père commun de toutes les différentes espèces de Pigeons, répandues sur la surface de la terre; voyons quelles sont les raisons qui ont pu porter M. de Buffon à statuer une loi que la nature désavoue presque à chaque individu? Je vais en faire connoître la cause; après quoi il me sera facile de prouver que la supposition de M. de Buffon est dénuée de toute vraisemblance. Le manque d'observations, faites sur la nature, est la principale source d'une erreur qui proflue d'une trop grande confiance dans son génie créateur; cette sécurité fatale pour la science a souvent perpétué les écarts d'un grand homme, dont on se plaît a juste titre, à respecter le mértie et à honorer les talents.

49 Les trois grandes iles des régions équatoriales qui forment, avec quelques autres de troisième et de quatrième rang, le groupe désigné sur nos cartes géographiques sous le nom d'archipel de la Sonde, offrent, par leur position et par leur sol fertile couvert d'une végétation vigoureuse, le point le plus favorable à l'étude des animaux de la zone tropicale de l'ancien continent; par leur grand nombre réuni dans ces lies, la comparaison devient plus facile; tandis que là, mieux que partout ailleurs, on peut obtenir des données certaines sur la répartition géographique des espèces.

51 Les *Phalangers* et les *Couscous*, animaux à bourse […] sont, pour l'ancien continent, ce que sont les *Sarigues* et les *Didelphes* dans les contrées parallèles du Nouveau Monde.

55 Il est donc plus probable que les élémens qui ont exercé leur influence sur la création ont reproduit les mêmes types à l'extrémité orientale de l'Asie et dans l'Amérique du nord, comme sous le climat de l'Europe.

57 La science qui conduit l'homme à lire dans les pages divines du livre de la nature, qui lui fait connoitre la partie animée et inanimée de la création qui élève insensiblement son ame exaltée à adôrer cet Être tout-puissant dont l'atôme rappèle l'existance.

59 La partie septentrionale nourrit toutes ces espèces, dont les representants ou les types identiques existent dans les autres îles de l'archipel: de l'autre côte de ces montagnes, ou à leur versant méridional, se montrent les premiers répresentants d'une Faune qui semble différente, ou au moins transitoire entre les espèces propres aux Moluques et les groupes australiens, qui semblent faire partie d'une création toute particulière.

62 Les *Phalangers* et les *Couscous*, animaux à bourse, qu'on ne voit nullepart dans les limites des îles de la Soende, fournissent ici [Celèbes] leurs premiers répresentants.

73 La végétation sur son sommet [of Gunung Bongsoe] porte tous les caràcteres des plantes alpestres d'Europe.

CHAPTER FIVE. Systematics wars

8 Je n'ai épargné ni travaux ni moyens pour mettre l'*Index général* au niveau des connaissances actuelles en ornithologie, c'est-à-dire, que je l'ai épuré, autant que possible, des emplois doubles, triples et souvent quadruples dont Gmelin, Latham ainsi que plusieurs ouvrages, plus récens encore, sont encombrés.

12 Un pillage un peu trop effronté, consistant à s'appropier les recherches et la nommenclature publiés par des auteurs contemporains, qui ne se trouvant point cités, voient les fruits de leurs conceptions altérés dans le sens des mots ou par une ortographie différente.

13 Il n'est guere permis de soupçonner que notre savant a cru de bonne foi qu'on passerait son pillage sous silence, et que sa nouvelle classification et sa nomenclature seraient citées comme les fruits de ses propres découvertes, et des conceptions de son génie.

17 Telle est la compilation que l'auteur donne pour le fruit de ses travaux, et comme un modèle que tous les ornithologistes présens et à venir doivent adopter. N'est-ce pas rappeler la fable du Geai?

18 Rassurez-vous, trop scrupuleux Vieillot! Je ne rappellerai point à mon tour d'autres allégories du bon La Fontaine…

19 Sans doute déjà quelques-uns de mes lecteurs ont rendu justice à la conduite de M. Vieillot, et peut-être on me blâmera de répondre à des puérilités; mais attaqué, comme je le suis, par un censeur qui vise à la célébrité, non moins par les prétentions littéraires que par les travaux scientifiques, je montrerai à mon tour de la suffisance en empruntant d'autres armes que les siennes.

21 …fruits de la misérable compilation du professeur Gmelin, qui a eu le talent de former, de la 13e. édition de Linné, le livre le plus indigeste qui existe: aussi tous ceux qui s'obstinent

encore à le suivre servilement, ne peuvent manquer de tomber dans les erreurs les plus grossières.

22 Suivant ma manière de voir, il est préférable de conserver à une espèce telle ancienne dénomination, qui la fait reconnaître de tout le monde, (la composition de ce nom fut-elle même barbare au point de ne dériver ni de racine Greque ni de la langue Latine), plutôt que d'en substituer une autre à la place, dont la composition mieux choisie et plus grammaticale, seroit susceptible d'occasionner la plus legère méprise; car rien n'est plus funeste au développement de l'étude des sciences naturelles, et particulièrement de celle qui comprend l'histoire des oiseaux, que ces différentes opinions sur la dénomination des genres et des espèces.

23 Die ongelukkige zucht, om de dieren namen van plaatsen toe te voegen, geeft ook hier aanleiding tot dwaling.

26 On a critiqué, avec une apparence de raison, les noms de pays donnés aux objets que peuvent exister naturellement dans des contrées fort éloignées l'une de l'autre; mais si l'on considère, qui ces noms ne sont imposés qu'à des êtres qui sont tout-à fait nouveaux, et dont on ignore l'existence partout ailleurs que dans le pays qui les fait connaître, on leur trouvera l'avantage de conserver la trace de l'origine de ces êtres pour nous; et comme tout le monde sait, comme il est facile de convenir que ces désignations n'ont rien d'absolu, on reconnaîtra que de tous les noms qui ont une signification, ce sont ceux des pays qui présentent peut-être les moins d'inconvénients.

35 Nous avons fait connaître, dans l'index du genre et dans le supplément à cet index, que les indications publiées jusqu'à ce jour, relativement à l'espèce dont nous publions, pl. 546, une figure exacte faite sur le vivant, reposent sur la description de Le Vaillant et sur la figure d'un sujet mutilé, artistement rétabli par des pièces rapportées: cet individu est en notre possession; il ne porte que quatre plumes à la queue, celles du milieu notamment, la partie antérieure et postérieure du casque étant mutilée, elles paraissent avoir été rétablies par des pièces de liège, sur lesquelles une couche cornée se trouve collée avec soin: tel est l'état de cet individu qui a servi de modèle à la pl. 13 des Oiseaux rares de Le Vaillant.

37 Si nous avons différé à entretenir nos lecteurs de cet important recueil, nous n'en sommes que plus fondés dans l'éloge mérité que nous en devons faire; car la sixième livraison qui vient de paraître, égale au moins en beauté et en perfection, si elle ne les surpasse pas, celles qui l'ont précédée. C'est, au reste, ce que l'on devait attendre de la réputation des auteurs, et des droits que depuis long-temps ils se sont acquis à la reconnaissance des savans.

38 Cette belle entreprise se poursuit avec un zèle admirable, et ses auteurs reçoivent de toutes parts les témoignages de satisfaction qu'ils étaient en droit d'attendre des nombreux partisans de l'histoire des oiseaux.

47 Divisée sans necessité absolue en tribus et familles, faisant partie d'ordres qui portent des caractères trop vagues et donnent trop de latitude; subdivisés en des genres multipliés sans nécessité absolue; ces genres (alors que l'on vouldrait suivre le plan tracé par l'auteur) trop peu nombreux en proportion des êtres connus, qui n'ont point fait partie de ses recherches, puis encore une subdivision en sections si nombreuses, qu'il ne faudra qu'un pas de plus pour que les espèces disparassent et qu'ainsi faisant l'ornithologie comprendra uniquement des genres et des sections.

48 Mais quel sera le sort de ces *espèces anomales* en si grand nombre dans la classe des oiseaux? La minutie ne pourra pas toujours obvier au doute; dans ce cas, l'espèce est destinée à être ballottée sans cesse de genre en genre; elle prêtera bien plus facilement matière à l'erreur, et servira à fournir des emplois bien plus multipliés; les naturalistes auront moins de chances à pouvoir s'entendre […] Dans le doute, pour se tirer d'embarras, on fait un *nouveau genre*. Ce mode de procéder est à l'ordre du jour, et chatouille complaisamment l'amour-propre.

53 …coupé par *sections* sans appellation distincte, facultatives à adopter, à modifier ou à supprimer totalement, sans que l'ordre systématique en souffre atteinte, et sans entraver, par une série de dénominations nouvelles, les rapports établis entre les naturalistes, d'un bout du monde à l'autre.

54 La coupe par sections, empruntée d'une forme rigoureuse, me paraît préférable aux coupes plus sévères de genres: la première peut dépendre de la manière de voir, et est comparable, dans la société, aux règles du ménage; l'autre doit servir de règle universelle.

57 C'est vainement qu'on inventerait encore double et triple de noms nouveaux pour former des groupes strictement méthodiques. Les mœurs de tous ces oiseaux étant, à quelques légères nuances près, absolument les mêmes, on n'a pu avoir recours à ce moyen pour sous-diviser ce grand genre. J'ai mis tous mes soins à comparer plus de cent espèces étrangères, avec nos espèces indigènes; le résultat de cet examen m'a confirmé dans l'opinion qu'il existe un passage graduel, sans démarcation aucune, d'une espèce à l'autre.

65 Une bonne diagnose n'est pas si facile à former qu'on le pense. Les naturalistes auteurs ne savent pas toujours donner en peu de mots une définition nette des espèces. Une longue description hérissée de minuties est précisément celle qui embarrasse le plus.

67 Lorsqu'on se propose d'établir une nouvelle coupe méthodique dans un genre déjà adopté, il est essentiel de connaître, par l'examen de la nature, toutes, ou du moins le plus grand nombre des espèces connues, au milieu desquelles ont été reparties celles qu'on veut isoler; il faut nécessairement avoir sous les yeux la sérié des êtres qui présentent plus ou moins d'affinité avec ceux qu'on se propose de séparer génériquement; il est encore urgent de savoir si le genre de vie, la nourriture, et tout ce qui tient aux mœurs et a la demeure de ces espèces, offrent des différences marquées avec celles reconnues à leurs anciens congénères. Il faut savoir distinguer de simples variétés de formes accessoires, dans une série naturelle

d'espèces, de ces caractères d'un ordre supérieur, qui sont les indices d'une organisation et de mœurs disparates: le coup d'œil exercé du naturaliste praticien parvient d'ordinaire plus sûrement à déterminer avec justesse que ne saurait le faire celui dont les études ont principalement été vouées à la théorie des sciences naturelles.

69 Je dois préalablement faire observer que Mr. Vieillot ne suit point une marche égale dans les caractères essentiels qu'il donne à ses genres; il fait usage de ces marques distinctives avec une espèce d'indifférence, les empruntant tantôt d'une partie tantôt d'une autre; ce procedé est vicieux au plus haut degré, il fait qu'on ne trouve point un nombre approchant égal d'objets de comparaison d'un genre avec l'autre.

70 Il est certain que l'anatomie comparée et l'étude de l'ostéologie des animaux doivent etre considérées comme sciences fondamentales et comme le point de départ du zoologiste qui veut travailler à élever l'édifice méthodique; mais ce n'est point exclusivement selon les lumières dont ces deux études lui fournissent les moyens, qu'il doit établir les groupes de second ordre.

74 Lors-qu'on connaît le plus grand nombre des espèces décrites, et qu'on les rappelle à la mémoire, alors qu'il s'agit de calquer la description d'une espèce nouvelle, on trouvera, du premier coup d'oeil, les principaux rapports ou les dissemblances caractéristiques. Il s'agit de ne rien laisser à désirer dans la description de l'espèce type; puis on ébauche à grands traits celle des autres espèces du même genre: un seul caractère bien défini suffit alors, le plus souvent, pour que l'espèce ne puisse pas être confondue, même avec celle qui offre au premier coup d'oeil le plus d'identité.

82 Il est à espérer, qu'on parviendra avec le tems à créer une méthode plus parfaite. Le seul moyen pour atteindre à ce but est l'examen minutieux de la Nature; aucun genre, aucune sous-division, pas même l'admission d'une espèce, ne doit avoir lieu dans une semblable méthode, avant que préalablement les animaux vivants, ou bien leurs dépouilles non mutilées, ayent été soigneusement examinés par des naturalistes dignes de confiance; on n'admettra plus, sur les seuls renseignements des voyageurs, et sur une indication vague, une multitude d'animaux, que les compilateurs semblent avoir introduits dans les livres, dans le seul but d'augmenter le catalogue de nomenclature.

84 Mr. Vieillot […] bouleverse tous les systèmes qui ont paru précédemment et de nous jours.

90 On se perd dans les affinités circulaires, dans les analogies les plus bizarres; des nombres trinaires et quinaires partagent l'opinion, et on arrive dans l'arène des hypothèses et des idées philosophiques, qui mènent à des contestations sans fin comme sans but; le tout, pour expliquer cette belle nature et l'ordre merveilleux et grandiose qui y règne.

102 Dans l'état présent de la science, et entourés comme nous le sommes de cette grande affluence d'objets nouvellement découverts, il paraît préférable de borner, pour le moment,

nos recherches à la connaissance exacte des espèces et à la détermination, autant que possible, rigoureuse de celles-ci, laissant aux méthodistes, prévenus en faveur de leur échafaudage compliqué, hérissé de termes techniques, le soin de répartir dans un système méthodique toutes ces nuances subtiles qu'ils veulent caractériser rigoureusement par des démarcations génériques.

CHAPTER SIX. Temminck's intellectual landscape

12 Ce sont particulièrement les écrits éloquents de Buffon, qui, en sonnant l'éveille aux bouts de l'univers, ont ajouté de nouveaux charmes à cette étude aimable; l'ordre et l'harmonie, que la classification doit au grand Linné, n'ont pas moins contribué à augmenter le nombre de ses amateurs zèlés; d'illustres savants, en prenant pour guides les écrits de ses hommes célèbres, se sont acquis la gloire de voir leurs noms inscrits au temple de mémoire.

18 En matière de sciences, un ouvrage sans critique est comme un mets sans sel.

34 La méthode, une fois qu'on la possède bien, s'applique avec un avantage infini aux études les plus étrangères à l'histoire naturelle. Toute discussion qui suppose un classement de faits, toute recherche qui exige une distribution de matières, se fait d'après les mêmes lois.

39 Er gaat naauwelijks een dag voorbij, op welken geen nieuw Genus gevormd of geene nieuwe Species bestemd wordt, en nog verzamelen wij zeer veel, hetwelk voor 's handen niet verder in aanmerking wordt genomen, en hetwelk wij eerst in Europa denken te onderzoeken.

40 Eene Verzameling van Systhematische gelegde platen uit de beste schrijvers der Natuurlijke Historie gecollecteerd, zijnde bijna een volkomen *Systhema Natura* in platen.

42 Goede aantekeningen maken, alles verzamelen en voor het verzamelde de meeste zorg dragen, zoo dikwerf het mogelijk is bezendingen naar het Moederland doen, ziedaar de hoofdinstructie voor een natuuronderzoeker in de tropische gewesten.

43 Ik wil niet ontveinzen en de uitkomst doet het blijken, dat Kuhl juist de man niet was om tot uitbreiding van een museum en tot verzamelen te gebruiken.

44 Hij had veel meer nut in Europa kunnen stichten, maar een veld van dien aard, hoe uitgebreid ook in het oog van anderen, vond hij te eng.

57 Il est nécessaire de faire observer à ceux qui compareront notre planche avec celle publiée par M. de Humboldt, que le dessin fait par ce savant et retouché par Barrabant represente la tête et le cou dessiné d'après un individu vivant; ces mêmes parties, dans la planche ci-jointe, ont été dessinées sur un empaillé. Avant de la publier j'ai soumis ma gravure à M. de Humboldt; ce savant trouve que l'occiput est trop relevé, le dos trop bossu et les rides

transversales du cou ne sont point indiquées; tous ces défauts sont des suites d'une préparation vicieuse de la peau dans l'individu monté.

59 Le Cosmos dont le second Volume va paraître en quelques mois ne doit embrasser que la partie géographique de la zoologie, les analogies et les contrastes qu'offrent les grandes masses continentales; les îles et les continents voisins; les formes qui se remplacent en Amérique et en Asie; les espèces de Mammifères et d'oiseaux qu'avec sûreté on peut croire identiques à de grandes distances. Y-a-t-il bien certainement un oiseau qui se trouve partout, des oiseaux identiques entre les tropiques dans les deux continents p.e. en Afrique et en Amérique? Y-a-t-il des mammifères et oiseaux identiques dans les zones tempérées boréales et australes. Ignorant que je suis, je voudrais être exact dans les peu de pages que je dois consacrer à la Géographie des animaux. Les sources dans lesquelles je devrais puiser, ne me sont pas très abordables. Je désire un petit nombre d'exemples piquants relatif aux questions que je viens de toucher. Ce que Vous pouvez donner si facilement, c'est de l'or en barre.

76 Geene beschrijving der ontdekte of overgezonden voorwerpen, noch der waargenomen natuurverschijnselen, zal in een vreemde taal mogen geschieden of aan Buitenlandsche Genootschappen en Geleerden mogen toegezonden worden, dan met toestemming van onzen minister voornoemd, en na de vroegere bekendmaking door een der geleerde Genootschappen of tijdschriften van dit Rijk.

90 De verrijkingen der Academiën, en van dat ondankbare Brussel, van die muitende steden van België, wier nog geblevene gedenkzuilen, in spijt van het bijgeloovigst Wandalismus, dienst zullen bewijzen aan de beschaving van een dom en dweepziek volk; eindelijk de werken van natuurlijke historie, waardoor de kunsten werden aangekweekt, doch die oproerige handen niet hebben geschroomd onder geregtelijke verzekering te leggen.

CHAPTER SEVEN. Classification and natural history: 1800–1850

4 On semble perdre de vue que l'étude de la nature, abstraction faite de tout ce qu'elle a d'important, envisagée sous le point de vue moral et scientifique, influe encore puissamment sur la civilisation, sur l'industrie dont elle fait mouvoir les ressorts, sur plusieurs branches des arts et sur la propagation des lumières dans toutes les classes de la société.

7 Peu de personnes se faisant une idée juste de l'histoire naturelle, il nous a paru nécessaire de commencer notre ouvrage, en définissant bien l'objet que cette science se propose, et en établissant des limites rigoureuses entre elle et les sciences qui l'avoisinent.

10 La connoissance générale et particulière de notre globe, et de toutes les productions qui naissent ou se forment à sa surface et dans son intérieur.

17 Elle [Botanique proprement dite] se compose, 1.° de la *Glossologie*, c'est-à-dire, de la connaissance des termes par lesquels on désigne les organes des plantes et leurs diverses modifications; 2.° de *laTaxonomie*, ou de la Théorie des classifications appliquée au règne végétal; 3.° de la *Phytographie*, ou de l'art de décrire les plantes de la manière la plus utile aux progrès de la science: d'où résultent, comme applications, la *Botanique descriptive*, c'est-à-dire, la description de toutes les espèces dont le règne végétal se composé, et la *Synonymie Botanique*, ou la connaissance des noms divers sous lesquels les plantes ont été désignées.

19 Ook moet men,—hoewel zulks somtijds geschiedt, *Anthropologie* met natuurlijke geschiedenis van den mensch niet verwarren.

20 Het verschil tusschen tusschen menschen en menschen, onderling met elkander vergeleken, waarbij hoofdzakelijk op de verschillende menschemstammen gelet wordt.

27 Ce seroit une cause réelle de retard pour les sciences naturelles, si l'on s'obstinoit à ne voir dans les objets observés, que leur forme, leur dimension, leurs parties externes même les plus petites, leur couleur, etc.; et si ceux qui se livrent à une pareille étude dédaignoient de s'élever à des considérations supérieures; comme de chercher quelle est la nature des objets dont ils s'occupent, quelles sont les causes de les modifications ou des variations auxquelles ces objets sont tous assujettis, quels sont les rapports de ces mêmes objets entr'eux, et avec tous les autres que l'on connoît, etc., etc.

32 De ware theorie zal dan van zelve volgen, zonder dat men weet hoe en wanneer, en het hechte gebouw der wetenschap zal worden opgetrokken op den breeden en vasten grondslag der ervaring, om te blijven staan, wanneer de tooverkasteelen der stelsels en meeningen reeds in damp vervlogen en uit de herinnering verdwenen zijn.

36 L'ouvrage dont nous rendons compte, est, sous ce rapport, exempt de tout reproche, et la seconde édition qui a suivi de près la première, prouve qu'à l'époque actuelle, les études ont un but vraiment philosophique.

57 De wetenschappen, die er in behandeld zullen worden, zijn de volgende: natuurlijke geschiedenis der drie rijken, ontleedkunde der planten en dieren en algemeene physiologie.

58 Wij willen ons echter geene andere bedoeling voorstellen, dan de bevordering der wetenschap zelve en zullen ons door geene angstige keus laten leiden, om telkens eenige bepaalden invloed op het gewone leven, op de geneeskunst of op eenige toegepaste kennis te verlangen overtuigd dat men daardoor aan het wetenschappelijk onderzoek het eigenlijk levensbeginsel ontneemt, en dat er geene wetenschappelijke waarheid is, die niet ook eenigen invloed op het praktische leven heeft of hebben kan.

65 La formation des méthodes est l'objet de l'histoire naturelle proprement dite; l'anatomie les reçoit, pour ainsi dire, toutes faites. C'est d'elles qu'elle prend ses premières directions: mais

elle ne tarde pas à leur rendre la lumière qu'elle en a reçue d'abord; elle est même la plus forte épreuve de leur bonté; et c'est en appliquant une méthode d'histoire naturelle à l'anatomie comparée, qu'on est bientôt en état de reconnoître si elle s'écarte ou non de la marche de la nature.

68 Le plus grand nombre des anatomistes s'est trouvé embarrassé dans les recherches, pour avoir négligé l'étude des caractères que la zoologie fournit: ils ont cru que l'anatomie comparée pouvait à elle seule servir de guide dans toutes les observations de second ordre; et ils ont perdu de vue cette autre science auxiliaire, suivant leurs idées trop au-dessous de l'importance attachée aux recherches anatomiques. Leurs recherches ne sont guère en état de nous servir aujour-d'hui, vu que le plus souvent il est impossible de pouvoir déterminer avec précision sur quelles espèces d'animaux reposent leurs observations; tandis que ceux qui les poursuivent encore sans l'aide des premières notions en zoologie, ne répandent point de lumière très-utile dans l'étude qui a pour but le perfectionnement du système de la nature.

79 L'introduction des méthodes naturelles pour la classification des êtres vivants est l'un des services les plus grands que l'on ait rendus à l'histoire naturelle: elle a changé la face de cette science, et a donné un puissant intérêt à la partie de la botanique et de la zoologie qui jusqu'alors avait été la plus aride.

85 Accuratiorem plantarum indigenarum notitiam dum commendo, non catalogu herbarum aut Indicem nudum volo, non simplicem ut ajunt, Floram.

86 Minder systematiek en meer onderzoek naar de nuttige functie van planten, was de boodschap.

89 Alle Ornithologen hebben UwEd, waarlijk voor deze schone Monographie veel verplichting, en alle zullen ongemeen na de voortzetting daarvan verlangen.

APPENDIX II

Bibliography of Coenraad Jacob Temminck

Temminck, Coenraad Jacob. *Catalogue Systématique du Cabinet d'Ornithologie et de la collection de Quadrumanes avec une courte description des oiseaux non-décrits suivi: d'une nôte d'oiseaux doubles et de quelques autres objets d'histoire naturelle offerts en échange.* Amsterdam: C. Sepp Jansz., 1807.

———. *Histoire naturelle générale des pigeons et des gallinacés.* 3 vols. Amsterdam: J. C. Sepp & fils, 1813-1815. doi:10.5962/bhl.title.64844.

———. *Manuel d'ornithologie, ou Tableau systématique des oiseaux qui se trouvent en Europe.* 1 ed. Amsterdam: J. C. Sepp et fils, 1815.

———. *Observations sur la classification méthodique des oiseaux, et remarques sur l'Analyse d'une Nouvelle Ornithologie Élémentaire par L. P. Vieillot, auteur de divers ouvrages d'ornithologie, et un des collaborateurs du Nouveau dictionnaire d'histoire naturelle.* Paris: Gabriel Dufour, 1817.

———. "Sur le genre Bradype et description d'une espèce encore peu connue." *Annales Générales des Sciences Physiques* 6 (1820): 204-18.

———. "Sur le genre Hyène et description d'une espèce nouvelle découverte en Afrique." *Annales Générales des Sciences Physiques* 3 (1820): 46-57.

———. *Manuel d'ornithologie, ou Tableau systématique des oiseaux qui se trouvent en Europe; précédé d'une analyse du système général d'ornithologie, et suivi d'une table alphabétique des espèces.* 2 ed. 4 vols. Paris: H. Cousin, Edmond d'Ocagne, 1820–1840. doi:10.5962/bhl.title.130481.

———. "Sur l'utilité des voyages des decouvertes dans les colonies du Royaume des Pays-Bas." *Annales Générales des Sciences Physiques* 7, no. 20 (1821): 172-78.

———. "Account of Some New Species of Birds of the Genera Psittacus and Columba, in the Museum of the Linnaean Society [1819]." *Transactions of the Linnean Society of London* 13 (1822): 107-30.

———. *Voorschrift, hoedanig te handelen met voorwerpen van Natuurlijke Historie, ten einde dezelve behoorlijk te verzenden en voor bederf te bewaren: ten gebruike van het 's Rijks Museum van Natuurlijke Historie te Leyden.* Leiden: printed by the author, 1825.

———. *Monographies de mammalogie, ou description de quelques genres de mammifères, dont les espèces ont été observées dans les différens musées de l'Europe.* 2 vols. Paris: G. Dufour et Edmond d'Ocagne, 1827–1841.

———. "Blik op de dierlijke bewoners van de Sunda-eilanden en van de overige Nederlandsche bezittingen in Indië." *Bijdragen tot de Natuurkundige Wetenschappen* 3 (1828): 62-78.

———. "Notice sur quelques espèces nouvelles d'oiseaux des genres Psittacus et Columba dans le Muséum de la Société linnéenne (Lin. transact. XIII P.1. p. 107)." *Isis von Oken* 22 (1829): 1194-209.

———. "Algemeen overzigt van de orde der Cheiroptera, en Monographie van de geslachten Harpyia en Cephalotes." *Bijdragen tot de natuurkundige wetenschappen* 6 (1831): 301-34.

———. "Monographie over een nieuw geslacht van Knaagdier, onder den naam van Nyctocleptes." *Bijdragen tot de natuurkundige wetenschappen* 7 (1832): 1-8.

———. "Over het nieuw geslacht Nyctophilus (Nachtvlieger), Leach." *Bijdragen tot de natuurkundige wetenschappen* 7 (1832): 143-45.

———. "Over een geslacht der vleugelhandige zoogdieren, Bladneus genaamd." *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie* 1 (1834): 1-16.

———. "Coup-d'oeil sur la faune des Iles de la Sonde et de l'Empire du Japon. Discours préliminaire destiné a servir d'introduction a la Faune du Japon." In *Fauna japonica, sive, Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis, superiorum, qui summum in India Batava imperium tenent, suscepto, annis 1823–1830, Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*. Vol 1, i-xxx. Leiden: A. Arnz et socios, 1836.

———. "Ueber das Geschlecht der Blattnasen (Rhinolophus. Geoffr.) von C. J. Temminck aus der Tijdschrift voor Natuurlijke Geschiedenis von van der Hoeven u. Vriese l. 1. übersetzt vom Herausgeber." *Archiv für Naturgeschichte* 2, no. 1 (1836): 81-100.

———. "Over de geslachten Taphozous, Emballonura, Urocryptus en Diclidurus." *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie* 5, no. 1 (1838): 1-34.

———. "Over de kennis en de verbreiding der Zoogdieren van Japan." *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie* 5, no. 4 (1838): 273-93.

———. ed. *Verhandelingen over de natuurlijke geschiedenis der Nederlandsche Overzeesche Bezittingen*. 3 vols. Leiden: S. en J. Luchtmans, C. C. van der Hoek, 1839–1842.

———. "Over eenige geslachten van Zoogdieren, een deel der Fauna der Japan uitmakende." *Verslagen en mededeelingen uitgegeven door de vier Klassen van het Koninklijk Nederlandsche Instituut van Wetenschappen, Letterkunde en Schoone Kunsten* (1841): 208-16.

———. "Aperçu général et spécifique sur les mammifères qui habitent le Japon et les îles qui en dépendent." In *Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis Superiorum, qui summum in India Batava imperium tenent, suscepto annis 1823–1830, Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*, Vol. 5, 1-9. Leiden: A. Arnz et socios, 1842.

———. "Description d'un nouveau genre de Mammifères (Urotrichus)." *Magasin de zoologie, d'anatomie comparée et de palaeontologie* 4 (1842): 1-5.

———. *Coup-d'oeil général sur les possessions néerlandaises dans l'Inde archipélagique.* 3 vols. Leiden: A. Arnz & comp, 1846–1849.

———. *Esquisses zoologiques sur la côte de Guiné. Pt.1: Les mammifères.* Leiden: E. J. Brill, 1853. doi:10.5962/bhl.title.14828.

———. "Over eenige nieuwe soorten van Eekhoorns van den Indischen Archipel." *Natuurkundig Tijdschrift voor Nederlandsch Indië* 4 (1854): 343-48.

———. "Zoologische Schetsen van eenige soorten van Hoenderachtige Vogelen." *Bijdragen tot de Dierkunde* 6, no. 1 (1854): 49-50.

Temminck, Coenraad Jacob, and Pauline de Courcelles. *Histoire naturelle générale des pigeons.* Paris: Garnery, 1808.

Temminck, Coenraad Jacob, and Guillaume Michel Jerôme Meiffren Laugier de Chartrouse. *Nouveau recueil de planches coloriées d'oiseaux: pour servir de suite et de complément aux planches enluminées de Buffon.* 5 vols. Paris: F. G. Levrault, 1820–1838. doi:10.5962/bhl.title.51468.

Temminck, Coenraad Jacob, and Hermann Schlegel, eds. *Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis Superiorum, qui summum in India Batava imperium tenent, suscepto annis 1823–1830, collegit, notis, observationibus et adumbrationibus illustravit. Lugduni Batavorum. Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*. 5 vols. Leiden: A. Arnz et socios, 1833–1850.

Temminck, Coenraad Jacob, and Hermann Schlegel. "Mammalia." In *Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis Superiorum, qui summum in India Batava imperium tenent, suscepto annis 1823-1830, collegit, notis, observationibus et adumbrationibus illustravit. Lugduni Batavorum. Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*. Vol. 5. Leiden: A. Arnz et socios, 1842.

Temminck, Coenraad Jacob, and Johann Carl Werner. *Les Oiseaux d'Europe décrits par C. J. Temminck; Atlas de 530 planches dessinées par J. C. Werner.* Paris: Baillière, 1848. doi:10.5962/bhl.title.104704.

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FIGURE 4.2. Phylogenetic tree of marsupials. From M. A. Nilsson et al. "Tracking Marsupial Evolution Using Archaic Genomic Retroposon Insertions." PLoS Biology 8 (7) (2010): e1000436. DOI:10.1371/journal.pbio.1000436. By courtesy of the authors.

FIGURE 4.3. Illustrations of he skull of the Sulawesi bear cuscus or Sulawesi bear phalanger, described by Temminck in 1824 in his *Monographies de mammalogie*, pl. VIII (1824). Image from the Biodiversity Heritage Library. Digitized by the Musée Cantonal de Zoologie, Lausanne.

FIGURE 5.1. Title page of Louis Pierre Vieillot's *Analyse d'une nouvelle Ornithologie élémentaire* (1816). Digitized by the Bibliothèque nationale de France, département Sciences et techniques, S-35415.

FIGURE 5.2. Original watercolor of a rhinoceros hornbill, possibly by Pieter van Oort. Naturalis Biodiversity Center Archives, Natuurkundige Commissie Archive NNM001000157_001.

FIGURE 5.3. Plate by Jean-Gabriel Prêtre of the rhinoceros hornbill, in Temminck and Meiffren Laugier's *Nouveau recueil de planches enluminés*, vol. 2, Pl. Col. 546 (1838). Image from the Biodiversity Heritage Library. Digitized by Smithsonian Libraries.

FIGURE 5.4. *Planches Anatomiques* from Temminck's *Histoire naturelle générale des pigeons et des gallinacés*, vol 2. pl. II, and vol. 3, pl. IV (1813–1815). Image from the Biodiversity Heritage Library. Digitized by Museums Victoria.

FIGURE 5.5. A diagram for the orders and families of birds from Nicholas A. Vigors "Observations on the Natural Affinities that Connect the Orders and Families of Birds" Transactions of the Linnean Society of London 14, no. 3 (1825), p. 468. Image from the Biodiversity Heritage Library. Digitized by Missouri Botanical Garden, Peter H. Raven Library.

FIGURE 6.1. Heinrich Kuhl's fieldnotes. Naturalis Biodiversity Archives, Natuurkundige Commissie Archive, MMNAT01_NNM001001113_024.

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FIGURE 6.3. Field notes of Alexander von Humboldt: a description of night monkey (*Simia trivirgata*). Alexander von Humboldt, *Journal de la navigation sur l'Apure, l'Orenoque, le Cassiquiare et le Rio Négro (Voy. par les Llanos de Caracas S. Fernando de Apure) Statistique de Cumanas Pta Araya* (Tagebuch IV, Bl. 173v). Staatsbibliothek zu Berlin, Preußischer Kulturbesitz.Staatsbibliothek zu Berlin. Handschriftenabteilung, Nachl. Alexander von Humboldt.

FIGURE 6.4. Plates of the Andean condor from Alexander von Humboldt and Aimé Jaques Bonpland's "Essai sur l'histoire naturelle du Condor, ou du Vultur Gryphus de Linné," In *Recueil d'observations de zoologie et d'anatomie comparée, faites dans l'Océan Atlantique*, plates VIII ad IX (1811). Bibliothèque nationale de France, département Arsenal, FOL-H-385 (1).

Bibliography

Manuscript sources

Staatsbibliothek zu Berlin

Manuscripts Department, Slg. Darmstaedter Afrika 1780: Levaillant, François.

Naturalis Biodiversity Center Archives

Archive C. J. Temminck, 1820–1858 (correspondence and manuscripts)

Jaarverslagen 1820-1858.

Reports to the Ministry of Public Education, National Industry and Colonies, 1820–1823

Reports to the Ministry of Internal Affairs, 1824–1858

Correspondence 's Rijks Museum van Natuurlijke Historie (RMNH), 1820–1858

Archive Natuurkundige Commissie, 1819–1850 (correspondence and manuscripts)

Temminck Family archives, A. M. van Lynden-de Bruïne, private collection

National Archives of the Netherlands, The Hague (NL-HaNA)

Binnenlandse Zaken (BiZa), 2.04.01

Rijksmuseum van Natuurlijke Historie te Leiden (RMNH), 3.12.17

Algemeen Rijksarchief (ARA), 2.14.03

Collectie 048 Falck, 2.21.006.48

Universiteitsbibliotheek Leiden, Special Collections (UBL)

Archief van Curatoren AC2, 1815–1877

Archief Caspar George Carl Reinwardt, UBL-BPL 2922

Printed sources

Acton, John Emerich Edward. *Lectures in Modern History.* London: MacMIllan and Co., Limited, 1906.

Ahrens, T. G. "The Ornithological Collections of the Berlin Museum." *Auk* 42 (1925): 241-45.

Aimassi, Giorgio. "The Original Description of Bonelli's Eagle *Aquila fasciata* Vieillot (Aves: Accipitridae)." *Zoological Bibliography* 4, no. December (2015): 1-14.

Allen, David. "Amateurs and Professionals." In *The Cambridge History of Science. Volume 6: The Modern Biological and Earth Sciences*, edited by John V. Pickstone and Peter J. Bowler. The Cambridge History of Science, 13-33. Cambridge: Cambridge University Press, 2009.

"Analytical Notices of Books. Monographies de Mammalogie, ou descriptions de quelques genres de Mammifères dont les Espèces ont été observées dans les différens Musées de l'Europe. Par C. J. Temminck, livraison, 4eme." *Zoological Journal of the Linnean Society* 2 (1826): 526–34.

Appel, Toby A. *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin.* Oxford University Press, 1987.

Atran, Scott, Richard W. Burkhardt, Pietro Corsi, *et al.*, eds. *Histoire du concept d'espèce dans les sciences de la vie: colloque international (mai 1985) organisé par la Fondation Singer-Polignac, Paris*. Paris: Fondation Singer-Polignac, [1987].

Audouin, Jean Victor, Adolphe Brongniart, and Jean-Baptiste Dumas. "Introduction." *Annales des Sciences Naturelles: comprenant la physiologie animale et végétale, l'anatomie comparée des deux règnes, la zoologie, la botanique, la minéralogie et la géologie* 1 (1834): v-xvi.

Beaufort, Willem Hendrik de. "Coenraad Jacob Temminck, uit zijne brieven geschetst." *Ardea* 9, no. 2 (1920): 34-43.

Bell, Thomas, John George Children, James de Carle Sowerby, and G.B. Sowerby. "Introduction." *The Zoological Journal* 1, no. 1 (1824): iii-vii.

Berkel, Klaas van. *De stem van de wetenschap. Geschiedenis van de Koninklijke Nederlandse Akademie van Wetenschappen.* Vol. 1. Amsterdam: Bert Bakker, 2011.

Berkel, Klaas van, Albert Van Helden, and Lodewijk C. Palm. *The History of Science in the Netherlands: Survey, Themes and Reference.* Leiden: Brill, 1999.

Besluit regelende het hooger onderwijs in het koningrijk der Nederlanden: 2 Augustus 1815. Koninkrijk der Nederlanden, 1815.

"Bibliographical Notices. Nouveau Recueil de Planches Coloriées d'Oiseaux… par M. Temminck et Meiffren Laugier Baron de Chartrouse, Livr. 98–102, 1839." *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 4 (1840): 266–68.

Bicheno, James Ebenezer. "On Systems and Methods in Natural History." *Transactions of the Linnean Society of London* 15, no. 2 (1827): 479-96.

Bierens de Haan, J. A. *De geschiedenis van een verdwenen Haarlemsch museum van natuurlijke historie: het Kabinet van naturaliën van de Hollandsche maatschappij der wetenschappen, 1759–1866.* Haarlem: De Erven F. Bohn N. V., 1941.

———. *De Hollandsche Maatschappij der Wetenschappen, 1752–1952.* Haarlem: Tjeenk Willink & Zoon, 1952.

Bleeker, Pieter. "Mémoire sur les poissons de la côte de Guinée." *Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem* 2, no. 18 (1863): 1-136.

Boeseman, Marinus. "Collectors and Fish Collections of the Rijksmuseum van Natuurlijke Historie in Leiden, the Netherlands (1820–1980)." In *Collection Building in Ichthyology and*

Herpetology edited by Theodore W. Pietsch and William D. Anderson Jr., 81-100. Lawrence, Kansas: American Society of Ichthyologists and Herpethologists, 1997.

Boie, Heinrich. "Manuel d'ornithologie, ou tableau systèmatique des oiseaux qui se trouvent en Europe par C. J. Temminck." *Heidelbergische Jahrbücher der Literatur*, no. 25-26 (1816): 387-416.

Boitard, Pierre. *Histoire naturelle des oiseaux de proie d'Europe.* Paris: Parmantier, 1824.

Bonaparte, Charles Lucien. "Observations of the State of Zoology in Europe, as Regards the Vertebrata." In *Reports on the Progress of Zoology and Botany, 1841, 1842*. Edinburgh: Ray Society, 1845.

———. "On the Lorine genus of Parrots, Eclectus, with the Description of a New Species, Eclectus Cornelia." *Proceedings of the Zoological Society of London* 17 (1849): 142-46.

Boomgaard, Peter. "The Making and Unmaking of Tropical Science: Dutch Research on Indonesia, 1600–2000." *Bijdragen tot de Taal-, Land- en Volkenkunde* 162, no. 2/3 (2006): 191-217.

Botke, IJnte. *Theodorus van Swinderen (1784–1851), hoogleraar en schoolopziener. Gedenktekens door en voor hem gesticht.* Groningen: Universiteitsmuseum Groningen, 1990.

Bowler, Peter J., and John V. Pickstone, eds. *The Modern Biological and Earth Sciences*, Vol. 6. The Cambridge History of Science. Cambridge: Cambridge University Press, 2009.

Braun, Alexander. *Betrachtungen über die erscheinung der verjüngung in der natur.* Leipzig: W. Engelman, 1851.

Breidbach, Olaf, and Michael T. Ghiselin. "Lorenz Oken and "Naturphilosophie" in Jena, Paris and London." *History and Philosophy of the Life Sciences* 24, no. 2 (2002): 219-47.

Brisson, Mathurin-Jacques. *Ornithologie, ou, Méthode contenant la division des oiseaux en ordres, sections, genres, especes & leurs variétés.* Vol. 4, Paris: J.-B. Bauche, 1760. doi:10.5962/bhl.title.51902.

Browne, Janet. *The Secular Ark: Studies in the History of Biogeography.* New Haven: Yale University Press, 1983.

Brugmans, Sebald Justinus. *De accuratiori plantarum indigenarum notitia maxime commendanda, habita Leidae ... MDCCLXXXVI: altera valedictoria, de natura soli Frisici exploranda, dicta Franequerae ... MDCCLXXXVI.* Leiden: S. et J. Luchtmans, 1787.

Bryson, Bill. *A Short History of Nearly Everything.* London: Doubleday, 2003.

Buffon, Georges Louis Leclerc. *Histoire Naturelle, générale et particulière, avec la description du Cabinet du Roi*. 44 vols. Paris: Imprimerie Royale, 1749–1804. doi:10.5962/bhl.title.64910.

———. *Histoire naturelle des oiseaux*. 18 vols. Paris: Imprimerie royale, 1770–1785. doi:10.5962/bhl.title.66490.

Buffon, Georges Louis Leclerc, Edme-Louis Daubenton, and Francois Nicolas Martinet. *Planches enluminées d'histoire naturelle*. 10 vols. Paris: s.n., 1765–1783? doi:10.5962/bhl.title.51460.

Cain, Arthur J. "The Development of Systematic Ideas of Variation Illustrated by Malacology." In *History in the Service of Systematics*, edited by A. Wheeler and J. H. Price: Society for the Bibliography of Natural History, Special Publication, 1981.

Calisch, Isaac Marcus, and Nathan Salomon Calisch. *Nieuw woordenboek der Nederlandsche taal; bevattende: de meest gebruikelijke woorden, spraakwendingen en spreekwoorden.* Tiel: H. C. A. Campagne, 1864.

Camerini, Jane R. "Evolution, Biogeography, and Maps: An Early History of Wallace's Line." *Isis* 84, no. 4 (1993): 700-27.

Candolle, Augustin Pyramus de. *Elements of the Philosophy of Plants: Containing the Principles of Scientific Botany ... with a History of the Science, and Practical Illustrations.* Translated by Kurt Polycarp Joachim Sprengel. Edinburgh: W. Blackwood, 1821. doi:10.5962/bhl.title.32221.

———. *Théorie élémentaire de la botanique; ou, Exposition des principes de la classification naturelle et de l'art de décrire et d'étudier les végétaux.* Paris: Déterville, 1813. doi:10.5962/bhl.title.39705.

———. "Géographie Botanique." In *Dictionnaire des sciences naturelles, dans lequel on traite méthodiquement des différens êtres de la nature, considérés soit en eux-mêmes, d'après l'état actuel de nos connoissances, soit relativement à l'utilité qu'en peuvent retirer la médecine, l'agriculture, le commerce et les arts*. Vol. 18, edited by Frédéric Cuvier. Strasbourg: F. G. Levrault, 1820.

Capadose, Abraham. *Lofrede op Sebaldus Justinus Brugmans.* Werken der Hollandsche Maatschappij van Fraaie Kunsten en Wetenschappen. Vol. 7. Leiden: Hollandsche Maatschappij van Fraaie Kunsten en Wetenschappen, 1822.

Catalogue de la bibliothèque délaissé par C. J. Temminck: dont la vente aura lieu le lundi 27 septembre 1858 et deux jours suivants, dans la maison du défunt, (entrée au Aalmarkt, W. IV. no. 97) par les libraires S. J. Brill et van der Hoek frères à Leide. [S.l.]: [s.n.], 1858.

Coleman, William. *Georges Cuvier, Zoologist. A Study in the History of Evolution Theory.* Cambridge: Harvard University Press, 1964.

Colenbrander, H. T., ed. *Gedenkschriften van Anton Reinhardt Falck*. 's Gravenhage: Martinus Nijhoff, 1913.

Cuvier, Frédéric. "Nouveau Recueil de planches coloriées d'oiseaux… par M. Temminck, conservateur du cabinet d'histoire naturelle de Leyde, er M. Meiffren Laugier, baron de Chartrouse." *Journal des Savants, 2 Sér*, no. 17 (1832): 641–51.

Cuvier, Georges. *Tableau élémentaire de l'histoire naturelle des animaux.* Paris: Baudouin, 1798. doi:10.5962/bhl.title.39351.

———. *Leçons d'anatomie comparée.* 5 vols. Paris: Crochard, 1805. ark:/13960/t1mh1xz3c.

———. "Analyse d'un ouvrage, de M. Humboldt, intitulé: Tableaux de la nature ou considérations sur les deserts, sur la physionomie des végétaux, et sur les cataractes de l'Orenoque." In *Fonds Cuvier 3159*. Paris: Library of the Institut de France, 1807.

———. *Le Règne Animal Distribué d'après son Organisation, pour Servir de Base à l'Histoire Naturelle des Animaux et d'Introduction à l'Anatomie Comparée*. 4 vols. Paris: Déterville, Imprimerie de A. Belin, 1817. doi:10.5962/bhl.title.41460.

———. *Discours sur les révolutions de la surface du globe: et sur les changemens qu'elles ont produits dans le règne animal.* Paris: Chez G. Dufour et Edmond d'Ocagne, 1826. doi:10.5962/bhl.title.96253.

———. *Discourse on the Revolutionary Upheavals on the Surface of the Globe and on the Changes which they have Produced in the Animal Kingdom*. Translated by Ian Johnston. 1826. http://www.blc.arizona.edu/courses/schaffer/249/Before%20Darwin%20-%20New/Cuvier/Cuvier%20-%20Discours.pdf.

———. "Biographical Memoir of M. de Lamarck." *Edinburgh New Philosophical Journal* 20 (January 1836): 1-21.

Darwin, Charles. *A Monograph on the Sub-Class Cirripedia, with Figures of all the Species.* 2 vols. London: Ray Society, 1851–1854. doi:10.5962/bhl.title.2104.

———. *On the Origin of Species by Means of Natural Selection.* London: John Murray, 1859. doi:10.5962/bhl.title.68064.

Darwin, Charles, and Alfred Wallace. "On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection." *Journal of the Proceedings of the Linnean Society. Zoology* 3, no. 9 (1858): 45-62.

Daston, Lorraine, and Peter Louis Galison. *Objectivity.* New York: Zone Books, 2015.

Daudin, Henri. *Cuvier et Lamarck: les classes zoologiques et l'idée de série animale (1790–1830).* Études d'histoire des Sciences Naturelles 2. 2 vols. Paris: F. Alcan, 1926.

———. *De Linné à Jussieu; méthodes de la classification et idée de série en botanique et en zoologie (1740–1790).* Études d'histoire des Sciences Naturelles 1. Paris: F. Alcan, 1926.

Dekker, René W. R. J. "Type Specimens of Birds in the National Museum of Natural History, Leiden. Part 2. Passerines: Eurylaimidae – Eopsaltriidae (Peters's Sequence)." *NNM Technical Bulletin* 6 (2004): 1-142.

Doel, H. W. van den. *Het rijk van Insulinde. Opkomst en ondergang van een Nederlandse kolonie.* Amsterdam: Prometheus, 1996.

Doolittle, W. Ford. "The Practice of Classification and the Theory of Evolution, and what the Demise of Charles Darwin's Tree of Life Hypothesis Means for both of them." *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 364, no. 1527 (2009): 2221-28.

Hoek Ostende, Lars W. van den, René W. R. J. Dekker, and Guido O. Keijl. "Type-specimens of Birds in the National Museum of Natural History, Leiden. Part 1. Non-Passerines." *NNM Technical Bulletin* 1 (1997): 1-248.

Di Gregorio, Mario A. "Hugh Edwin Strickland (1811–1853) on Affinities and Analogies: or, the Case of the Missing Key." *Ideas and Production* 7 (1987): 35-50.

Dickinson, Edward C. "Systematic Notes on Asian birds. 9. The "Nouveau recueil de planches coloriées" of Temminck & Laugier (1820–1839)." *Zoologische Verhandelingen* 335 (2001): 7-54.

Dickinson, Edward C., Normand David, Leslie K. Overstreet, Frank D. Steinheimer, and Justin J. F. J. Jansen. "Histoire naturelle des pigeons or Les Pigeons: Coenraad Jacob Temminck versus Pauline Knip." *Archives of Natural History* 37 (2010): 203-20.

Dickinson, Edward C., and Florence F. J. M. Pieters. "Some Bibliographic Findings on "Muséum d'Histoire naturelle des Pays-Bas. – Revue méthodique et critique des collections déposées dans cet établissement" (1862–1881) edited by Hermann Schlegel." *Zoological Bibliography* 1, no. 3 (2011): 116-35.

Doren, Jan Baptist Jozef van. *Mémoire sur les Quadrumanes et les Chéiroptères de l'Archipel Indien.* Amsterdam: J.D. Sijbrandi, 1868.

Drapiez, Pierre August Joseph. "Manuel d'ornithologie, ou tableau systématique des oiseaux qui se trouvent en Europe, par C. J. Temminck, 2me édition (1)." *Annales Générales des Sciences Physiques* 6 (1820): 276–85.

Dreier, Rolf P. "Voor Museum en Vaderland. De oprichtingsjaren van 's Rijksmuseum van Natuurlijke Historie in Leiden (1815–1830)." Master's thesis, Leiden University, 2003.

Dulm, Frederik J. L. van. *'Zonder eigen gewinne en glorie': mr. Iman Wilhelm Falck (1736–1785), gouverneur en directeur van Ceylon en onderhorigheden.* Verloren, 2012.

Dumont d'Urville, Jules-Sébastien-César. *Voyage de la corvette l'Astrolabe exécuté par ordre du Roi, pendant les années 1826-1827-1828-1829, sous le commandement de J. Dumont d'Urville.* 13 vols. Paris: J. Tastu, 1830. doi:doi.org/10.5962/bhl.title.2132.

Duperrey, Louis-Isidore. *Voyage autour du monde: exécuté par ordre du roi, sur la corvette de Sa Majesté, la Coquille, pendant les années 1822, 1823, 1824, et 1825.* Paris: Arthus Bertrand, 1826–1830. doi:10.5962/bhl.title.57936.

Ehlers, Ernst Heinrich, Albert von Kölliker, and Karl Theodor Ernst von Siebold. "Prospectus." *Zeitschrift für Wissenschaftliche Zoologie* 1, no. 1 (1848): n.p.

Elias, Johan Engelebert. *De Vroedschap van Amsterdam, 1578–1795.* N. Israel, 1963.

Endersby, Jim. "Classifying Sciences: Systematics and Status in mid-Victorian Natural History." In *The Organisation of Knowledge in Victorian Britain*, edited by Martin Daunton: British Academy/Oxford University Press, 2005.

———. *Imperial Nature. Joseph Hooker and the Practices of Victorian Science.* Chicago: University of Chicago Press, 2008.

Epen, Didericus Gijsbertus van, ed. *Nederland's patriciaat 1868–1930.* Vol. 5. 's-Gravenhage: Centraal bureau voor genealogie en heraldiek, 1914.

Fabricius, Johann Christian. *Philosophia entomologica sistens scientiae fundamenta, adiectis definitionibus, exemplis, observationibus, adumbrationibus.* Hamburg: Impensis Carol. Ernest. Bohnii, 1778. doi:10.5962/bhl.title.10672.

Farber, Paul Lawrence. "Buffon and the Concept of Species." *Journal of the History of Biology*, vol. 5 no. 2 (1972): 259-84.

———. "The Type-concept in Zoology during the First Half of the Nineteenth Century." *Journal of the History of Biology* 9, no. 1 (1976): 93-119.

———. "The Development of Taxidermy and the History of Ornithology." *Isis* 66, no. 244 (1977): 550-66.

———. "The Development of Ornithological Collections in the late Eighteenth and early Nineteenth Centuries and their Relationship to the Emergence of Ornithology as a Scientific Discipline." *Journal of the Society for the Bibliography of Natural History* 9, no. 4 (1980): 391-94.

———. *The Emergence of Ornithology as a Scientific Discipline: 1760–1850.* Dordrecht: D. Reidel, 1982.

———. *Finding Order in Nature: the Naturalist Tradition from Linnaeus to E. O. Wilson.* Baltimore Md.: Johns Hopkins University Press, 2000.

Finsch, Otto, and Gustav Hartlaub. *Die Vögel Ost-Afrikas. Baron Carl Claus von Deer Decken's Reisen in Ost-Africa.* Vol. 4. Leipzig: Heidelburg, C. F. Winter'sche Verlagshandlung, 1870. doi:10.5962/bhl.title.14155.

Flourens, Pierre. *Résumé analytique des observations de Frédéric Cuvier sur l'instinct et l'intelligence des animaux.* Paris: C. Pitois, 1841.

Forrer, Matthi, and Arlette Kouwenhoven. *Siebold en Japan; zijn leven en werk.* Leiden: Hotei, 2000.

Forster, Georg. *Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England und Frankreich.* Leipzig: Reclam, 1905.

Fransen, Charles H. J. M., Lipke Bijdeley Holthuis, and J. P. H. M. Adema. "Type-catalogue of the Decapod Crustacea in the Collections of the Nationaal Natuurhistorisch Museum, with Appendices of pre-1900 Collectors and Material." *Zoologische Verhandelingen* 311 (1997): 1-344.

Fransen, Charles H. J. M., and Martien J. P. van Oijen. "L. B. Holthuis, 'The institutional Memory' of the Leiden Museum - Obituary." *Contributions to Zoology* 77, no. 3 (2008): 201-04.

Freycinet, Louis Claude Desaulses de. *Voyage autour du monde: entrepris par ordre du roi ... exécuté sur les corvettes de S. M. l'Uranie et la Physicienne, pendant les années 1817, 1818, 1819 et 1820.* 4 vols. Paris: Pillet, 1824?-1844. doi:10.5962/bhl.title.15862.

Gassó Miracle, Maria Eulàlia. "The Significance of Temminck's Work on Biogeography: Early Nineteenth Century Natural History in Leiden, the Netherlands." *Journal of the History of Biology* 41, no. 4 (2008).

———. "On Whose Authority? Temminck's Debates on Zoological Classification and Nomenclature: 1820–1850." *Journal of the History of Biology* 44, no. 3 (2011).

Geoffroy Saint-Hilaire, Étienne, and Frédéric Cuvier. "Ours de Sibérie." In *Histoire naturelle des mammifères, avec des figures originales, coloriées, dessinées d'après des animaux vivans*. Paris: A. Belin, 1824.

Gibson, Susannah. "The Careering Naturalists: Creating Career Paths in Natural History, 1790–1830." *Archives of Natural History* 44.2 (2017): 195–214.

Gijzen, Agatha. " 's Rijks museum van natuurlijke historie, 1820-1915." PhD dissertation, W. L. & J. Brusse, 1938.

Glen, Hugh F., and Gerrit Germishuizen. "Brehm, Joachim." In *Botanical Exploration of Southern Africa*, 107-08. Pretoria: South African National Biodiversity Institute, 2010.

Gloger, Constantin Wilhelm Lambert. *Das Abändern der Vögel durch Einfluss des Klima's.* Breslau: August Schulz & Co., 1833. doi:10.5962/bhl.title.50395.

Gordin, Michael D. *Scientific Babel: the Language of Science from the Fall of Latin to the Rise of English.* London: Profile Books, 2017.

Goss, Andrew. *The Floracrats. State-sponsored Science and the Failure of the Enlightenment in Indonesia.* Madison, Wisconsin: University of Wisconsin Press, 2011.

Gould, John. *The Birds of Europe.* 5 vols. London: Richard and John E. Taylor, 1837. doi:10.5962/bhl.title.65989.

Gray, George Robert. *A List of the Genera of Birds: with their Synonyma and an Indication of the Typical Species of Each Genus*. 2 ed. London: Richard and John E. Taylor, 1841. doi:10.5962/bhl.title.14202.

———. *Appendix to a List of the Genera of Birds*. London: Richard and John E. Taylor, 1842. doi:10.5962/bhl.title.119636.

Gray, John Edward. "A Revision of the Genera and Species of Viverrine animals (Viverridae) founded on the Collection in the British Museum." *Proceedings of the Zoological Society of London* (1864): 502-79.

Greshoff, M. "Kuhl en Van Hasselt. Eene episode in het Nederlandsch-Indisch natuuronderzoek." *Album der natuur* 52, no. 1 (1903): 60-88.

Grondhout, J. A. M. A. "De Ter Meer's." *Jaarboekje voor Geschiedenis en Oudheidkunde van Leiden en Rijnland* 9 (1912): 153-61.

Groot, Hans. *Van Batavia naar Weltevreden; Het Bataviaasch Genootschap van Kunsten en Wetenschappen, 1778–1867*. Leiden: Brill, 2009. http://www.doabooks.org/doab?func=fulltext&rid=13333.

Haffer, Jürgen. "The History of Species Concepts and Species Limits in Ornithology." *Bulletin of the British Ornithologists' Club* 112A [Centenary] (1992): 106-58.

Hartlaub, Gustav. "A Systematic Index to a Series of Descriptions of Birds, Published by C. J. Temminck in his 'Catalogue Systématique du Cabinet d'Ornithologie, etc.', of the year 1807," edited by William Jardine. Edinburgh: W.H. Lizars, 1849.

———. "Beschreibung einiger neuen, von Herrn H.S. Pel, holländischem Residenten auf der Goldküste, daselbst gesammelten Vögelarten." *Journal für Ornithologie* 3 (1855): 353-60.

———. "Systematisches Verzeichniss der von Herrn H. S. Pel auf der Goldküste zwischen Cap Tres Puntas und Accrah gesammelten Vögel." *Journal für Ornithologie* 3 (1855): 360-61.

———. *System der Ornithologie Westafrica's.* Bremen: C. Schüenemann, 1857. doi:10.5962/bhl.title.105145.

Heiningen, Teunis Willem van. *The Correspondence of C. G. C. Reinwardt.* Tools and Sources for the History of Science in the Netherlands, volume 2 (2011). The Hague: Huygens Insitute for the History of the Netherlands, 2011.

Hempel, Carl G. *Philosophy of Natural Science.* Foundations of Philosophy Series. New Jersey: Prenctice Hall, 1966.

Herklots, Jan Adrianus. "Additamenta ad faunam carcinologicam Africae occidentalis, sive descriptiones specierum novarum e Crustaceorum ordine, quas in Guinea collegit vir strenuus H . S. Pel praefactus residentiis in littore Guineae." PhD dissertation, 1851.

Hoeven, Jan van der. *Handboek der dierkunde, of grondbeginsels der natuurlyke geschiedenis van het dierenrijk.* 2 vols. Delft: J. Allart, 1827–1833.

———. "Bijdragen tot de natuurlijke geschiedenis van den mensch. 1ste Bijdrage." *Tijdschrift voor natuurlijke geschiedenis en physiologie* 1 (1834): 86-97.

———. "Voorberigt." *Tijdschrift voor Natuurlijke Geschiedenis* 1, no. 1 (1834): i-iv.

Hoeven, Jan van der, and Willem Hendrik de Vriese. "Naschrift van het eerste deel." *Tijdschrift voor Natuurlijke Geschiedenis* 1, no. 1 (1834): n.p.

Holthuis, Lipke Bijdeley. "Biografische notities betreffende verzamelaars voor het Rijksmuseum van Natuurlijke Historie te Leiden. I. Hendrik Severinus Pel (1818–1876)." *Zoologische Bijdragen* 10, no. 1 (1968): 3-32.

———. "The Three Dutch Authors of von Siebold's Fauna Japonica, with some Notes on the Artists." In *Ph.F. von Siebold and Natural History of Japan. Crustacea*, edited by Takai Yamaguchi, 689-731. Tokyo: The Carcinological Society of Japan, 1993.

———. *Rijksmuseum van Natuurlijke Historie 1820–1958.* Leiden: Nationaal Natuurhistorisch Museum, 1995.

Holthuis, Lipke Bijdeley, and Tsune Sakai. *Ph. F. von Siebold and Fauna Japonica; a History of Early Japanese Zoology.* 1 ed. Tokyo: Academic Press of Japan, 1970.

Honig, Pieter, and Frans Verdoorn, eds. *Science and Scientists in the Netherlands Indies*. New York: Board for The Netherlands Indies, Surinam and Curasao, 1945.

Hooker, Joseph Dalton. "Flora Novae-Zelandiae." In *The Botany of the Antarctic Voyage of H. M. Discovery Ships* Erebus *and* Terror *in the Years 1839–1843 under the Command of Captain Sir James Clark Ross.* Vol. 2. London: Reeve Brothers, 1853.

———. *Flora Indica: being a Systematic Account of the Plants of British India, together with Observations on the Structure and Affinities of their Natural Orders and Genera.* London: W. Pamplin, 1855. doi:10.5962/bhl.title.57706.

———. "Notices of Books. Géographie Botanique Raisonée [...] par M. Alph. de Candolle. Concluding remarks." *Hooker's Journal of Botany and Kew Garden Miscellany* 8 (1856): 248-56.

———. *On the flora of Australia: its Origin, Affinities, and Distribution being an Introductory Essay to the Flora of Tasmania.* London: Lovell Reeve, 1859. doi:10.5962/bhl.title.60980.

Hoorn, P. F. van. "Levensberigten der in dit jaar afgestorvene medeleden. Levensberigt van Dr. Paulus Godfried van Hoorn." *Jaarboek van de Maatschappij der Nederlandse Letterkunde*, no. 1-9 (1851).

Horsfield, Thomas. *Zoological Researches in Java, and the Neighbouring Islands*. London: Kingsbury, Parbury, & Allen, 1824.

———. "Description of the Helarctos euryspilus; Exhibiting in the Bear from the Island of Borneo, by the Type of a Subgenus of Ursus." *Zoological Journal of the Linnaean Society* 2 (1826): 221–34.

Hubrecht, A. A. W. "Hermann Schlegel." *De Gids* Jaargang 4 (1884): 536-47.

Huigen, Siegfried. *Knowledge and Colonialism: Eighteenth-century Travellers in South Africa.* Brill, 2009.

Huistra, Hieke. "Preparations on the Move: the Leiden Anatomical Collections in the Nineteenth Century." PhD dissertation, Leiden University, 2013.

Huistra, Hieke. *The Afterlife of the Leiden Anatomical Collections: Hands On, Hands Off*. The History of Medicine in Context Series. London: Routledge, 2019.

Hull, David L. "The effect of Essentialism on Taxonomy. Two Thousand Years of Stasis (I)." *The British Journal for the Philosophy of Science* 15, no. 60 (1965): 314-26.

———. "The effect of Essentialism on Taxonomy. Two Thousand Years of Stasis (II)." *The British Journal for the Philosophy of Science* 16, no. 61 (1965): 1-18.

Humboldt, Alexander von. "Sur les lois que l'on observe dans la distribution des formes végétales." *Annales de Chimie et de Physique* 1, 2nd ser. (March 1816): 225-39.

Humboldt, Alexander von, and Aimé Bonpland. *Essai sur la géographie des plantes: accompagné d'un tableau physique des régions équinoxiales.* Paris: Levrault, Schoell et compagnie, 1805. doi:10.5962/bhl.title.9309.

Humboldt, Alexander von, and Aimé Jacques Alexandre Bonpland. *Recueil d'observations de zoologie et d'anatomie comparée, faites dans l'Océan Atlantique, dans l'intérieur du Nouveau Continent et dans la Mer du Sud, pendant les années 1799, 1800, 1801, 1802 et 1803*. 2 vols. Paris: F. Schoell et G. Dufour, 1811–1833. doi:10.5962/bhl.title.43770.

Husson, A. M., and Lipke Bijdeley Holthuis. "The dates of publication of "Verhandelingen over de natuurlijke Geschiedenis der Nederlandsche overzeesche Bezittingen" edited by C. J. Temminck." *Zoologische Mededelingen* 34, no. 2 (1955): 17-25.

Huxley, Leonard, ed. *Life and Letters of Sir Joseph Dalton Hooker, O.M., G.C.S.I. Based on Materials Collected and Arranged by Lady Hooker*. London: John Murray, 1918.

Illiger, Johann Karl Wilhelm. "Einige Gedanken über die Begriffe: Art und Gattung in der Naturgeschichte." In *Versuch einer Systematischen vollständigen Terminologie fur das Thierreich und Pflanzenreich*. Helmstadt: C. G. Fleckeisen, 1800.

———. *Prodromus systematis mammalium et avium; additis terminis zoographicis utriusque classis, eorumque versione germanica.* Berlin: C. Salfeld, 1811.

International Commission on Zoological Nomenclature. *International Code of Zoological Nomenclature*. London: The International Trust for Zoological Nomenclature, 1999. http://www.iczn.org/iczn/index.jsp.

International Institute of Social History. "Value of the guilder / euro. Comparing the purchasing power of the guilder from 1450 to any other year." http://www.iisg.nl/hpw/calculate.php, accessed September 6, 2018.

Jansen, Justin J. F. J. “An Unpublished “Catalogue du Cabinet de C. J. Temminck” (c. 1803–1804).” *Archives of Natural History* 44, no. 2 (2017): 352-55.

Jansen, Justin J. F. J. "The Ornithology of the Baudin Expedition (1800–1804)." PhD dissertation, Leiden University, 2018.

Jardine, Nicholas, James A. Secord, and Emma C. Spary, eds. *Cultures of Natural History*: Cambridge University Press, 1996.

Jardine, William. *The Natural History of Game-birds.* Edinburgh: W. H. Lizars, 1834. doi:10.5962/bhl.title.101720.

William Jardine, red. *Memoirs of Hugh Edward Strickland. With a Selection from his Scientific Writings*. London: John Van Voorst, 1858.

Johnson, Kristin. “Natural History as Stamp Collecting: a Brief History.” *Archives of Natural History* 34, no. 2 (2007): 244-58.

Jonge, Hans de. “Sebald Justinus Brugmans (1763–1819).” Master’s thesis, Leiden University, 1999.

———. *Het vergeten fenomeen Sebald J. Brugmans 1763–1819, verzamelaar tussen koning, keizer en universiteit.* Leiden: Museum Boerhaave, 2001.

———. “Macht, machinaties en musea. Jan van der Hoeven, Hermann Schlegel en hun strijd om het Rijksmuseum van natuurlijke historie te Leiden.” *Bijdragen en Mededelingen betreffende de Geschiedenis der Nederlanden* 120 (2005): 177-206.

Kinch, Michael Paul. “Geographical Distribution and the Origin of Life: the Development of Early Nineteenth-century British Explanations.” *Journal of the History of Biology* 13, no. 1 (1980): 91-119.

Klaver, Charles John Joseph. *Inseparable Friends in Life and Death: the Life and Work of Heinrich Kuhl (1797–1821) and Johan Conrad van Hasselt (1797–1823), Students of prof. Theodorus van Swinderen.* Groningen: Barkhuis, 2007.

Knapp, Sandra, Gerardo Lamas, Eimear Nic Lughadha, and Gianfranco Novarino. “Stability or Stasis in the Names of Organisms: the Evolving Codes of Nomenclature.” *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 359, no. 1444 (2004): 611-22.

Kohler, Robert E. *All Creatures: Naturalists, Collectors, and Biodiversity, 1850–1950.* Princeton, Oxford: Princeton University Press, 2013. doi:10.2307/j.ctt4cgbz8.

Kohlstedt, Sally Gregory. “Museums: Revisiting Sites in the History of the Natural Sciences.” Review of Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum, Mary P. Winsor; An Agenda for Antiquity: Henry Fairfield Osborn and Vertebrate Paleontology at the American Museum of Natural History, 1890–1935, Ronald Rainger. *Journal of the History of Biology* 28, no. 1 (1995): 151-66.

Koninglijke Maatschappy der Wetenschappen te Haarlem. “Directeuren van de Koninglijke Maatschappy der Wetenschappen. Geschikt naar den tijd der verkiezing.” *Natuurkundige Verhandelingen van de Koninglijke Maatschappy der Wetenschappen te Haarlem* 5, no. 1 (1809): xxvii-xxxii.

Koninklijk-Nederlandsch Instituut van Wetenschappen Letterkunde en Schoone Kunsten. *Verslagen en Mededeelingen, uitgegeven door de vier Klassen van het Koninklijk-Nederlandsch Instituut van Wetenschappen, Letterkunde en Schoone Kunsten,* Vol. 4, 1841.

Koninklijke Orde der Unie. "Beschrijving van de plegtigheden der algemeene vergadering van de Ridders der Unie, op den 4den van Herfst-maand des Jaars 1809." In *Gedenkschriften van de Koninklijke Orde der Unie, voor de jaren 1807, 1808 en 1809*, 165-204, 1810.

Koolmees, J. A. "Caspar Georg Reinwardt (1773–1854)." Master's thesis, Utrecht University, 1979.

Kortenbach, C. J. "Het Hof van Zessen, thans Rijksmuseum van Oudheden." *Jaarboekje van de Historische Vereniging Oud Leiden* 37 (1945): 74-94.

Krikken, Jan, Cees van Achterberg, Piet H. van Doesburg, Rienk de Jong, and K. W. Zwart. "Samuel Constant Snellen van Vollenhoven (1816–1880) and his Entomological Work." *Tijdschrift voor Entomologie* 124 (1981): 235-68.

Kuhl, Heinrich, and Johan Coenraad van Hasselt. *Beiträge zur Zoologie und vergleichenden Anatomie.* Frankfurt am Main: Verlag der Hermannschen Buchhandlung, 1820. doi:10.5962/bhl.title.40284.

———. "Pjihorjavor, aan den voet van den Pangerango, 18 Julij 1821." *Algemeene Konst- en Letterbode* 1, no. 7 (1822): 99-102.

La Fontaine, Jean de. "Le geai paré des plumes du paon." In *Fables*. Paris: Barbin, 1668.

La Vergata, Antonello. "Au nom de l'espèce: classification et nomenclature au XIXe siecle." In *Histoire du concept de l'espèce dans les sciences de la vie: colloque international (mai 1985) organisé par la Fondation Singer-Polignac, Paris*, edited by Scott Atran, 193-225. Paris: Fondation Singer-Polignac, [1987].

Lamarck, Jean-Baptiste de. *Encyclopédie méthodique. Botanique.* 8 vols. Paris, Liège: Panckoucke, Plomteux, 1783–1808. doi:10.5962/bhl.title.824.

———. "Sur l'Histoire Naturelle en général." *Journal d'Histoire Naturelle* 1 (1792): 3-6.

———. *Hydrogéologie, ou Recherches sur l'influence qu'ont les eaux sur la surface du globe terrestre; sur les causes de l'existence du bassin des mers, de son déplacement et de son transport successif sur les différens points de la surface du globe: enfin sur les changemens que les corps vivans exercent sur la nature et l'état de cette surface.* Paris: Agasse et Maillard, 1802.

———. *Philosophie zoologique, ou exposition des considérations relatives à l'histoire naturelle des animaux; à la diversité de leur organisation et des facultés qu'ils en obtiennent; aux causes physiques qui maintiennent en eux la vie et donnent lieu aux mouvemens qu'ils exécutent; enfin, à celles qui produisent les unes le sentiment, et les autres l'intelligence de ceux qui en sont doués.* nouvelle éd. [1830 re-issue of the 1809 edition] ed. Paris: Baillière, 1830. doi:10.5962/bhl.title.50194.

Land, Jacob van der, ed. *The History of Natural History in Leiden*. Leiden: Naturalis, 2001.

Larson, James. "Not without a Plan: Geography and Natural History in the Late Eighteenth Century." *Journal of the History of Biology* 19, no. 3 (1986): 447-88.

Latham, John. *A General Synopsis of Birds.* Vol. 1, London: Benj. White, 1781. doi:10.5962/bhl.title.49894.

———. *Index ornithologicus, sive Systema ornithologiae; complectens avium divisionem in classes, ordines, genera, species, ipsarumque varietates: adjectis synonymis, locis, descriptionibus, &c.* 2 vols. London: Leigh et Sotheby, 1790.

———. *A General History of Birds.* 10 vols. Winchester: Jacob and Johnson, 1821–1828. doi:10.5962/bhl.title.62572.

Lauts, Ulrich Gerard. "Nieuw uitgekomen boeken: Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique par C. J Temminck, 1846." *Algemeene Konst- en Letterbode* 1, no. 12 (1847): 182-99.

———. "Nieuw uitgekomen boeken: Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique par C. J Temminck, 1847." *Algemeene Konst- en Letterbode* 1, no. 9 (1849): 137-44.

Lesson, René-Primevère. "Réclamation de M. Vieillot, relative au Manuel d'Ornithologie." *Bulletin des sciences naturelles et de géologie* 15 (1828): 142-44.

Levaillant, François. *Voyage de M. Le Vaillant dans l'intérieur de l'Afrique: par le Cap de Bonne-Espérance, dans les années 1780, 81, 82, 83, 84 & 85.* Vol. 1, Paris: Leroy, 1790. doi:10.5962/bhl.title.101757.

———. *Histoire naturelle d'une partie d'oiseaux nouveaux et rares de l'Amérique et des Indes.* Paris: J. E. Gabriel Dufour, 1801. doi:10.5962/bhl.title.102769.

———. *Histoire naturelle des oiseaux d'Afrique*. 6 vols. Paris: J. J. Fuchs, 1799–1808. doi:10.5962/bhl.title.63636.

———. *Second voyage de F. Levaillant dans l'intérieur de l'Afrique par le Cap de Bonne-Espérance, pendant les années 1783, 84 et 85*. 2 vols. Paris: H. J. Jansen et compagnie, [1795 or 1796]. doi:doi.org/10.5962/bhl.title.101758.

Levaillant, François, and Jacques Barraband. *Histoire naturelle des perroquets.* 2 vols. Paris: Levrault, 1801–1805. doi:10.5962/bhl.title.60852.

Limoges, Camille. "The Development of the Muséum d'Histoire Naturelle of Paris, c. 1800–1914." In *The Organization of Science and Technology in France 1808–1914*, edited by Robert Fox and George Weisz. Cambridge: Cambridge Univ. Press, 2008.

Lindroth, Carl H. "Systematics Specializes between Fabricius and Darwin: 1800–1859." In *History of Entomology*, edited by Ray F. Smith, Thomas E. Mittler and Carrol N. Smith. California: Annual Reviews Inc. and the Entomological Society of America, 1973.

Linnaeus, Carolus. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* 1 ed. Leiden: Theodor Haak, 1735.

———. *Philosophia Botanica in qua explicantur fundamenta botanica cum definitionibus partium, exemplis terminorum, observationibus rariorum, adjectis figuris æneis.* Stockolm: G. Kiesewetter, 1751. doi:10.5962/bhl.title.37652.

———. *Species plantarum: exhibentes plantas rite cognitas ad genera relatas, cum differentiis specificis, nominibus trivialibus, synonymis selectis, locis natalibus, secundum systema sexuale digestas.* 2 vols. Stockholm: Holmiae, 1753. doi:10.5962/bhl.title.37656.

———. *Caroli a Linné. Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* 13 ed. Vol. 1, Leipzig: Georg. Emanuel. Beer, 1788. doi:10.5962/bhl.title.36932.

Lyell, Charles. *Principles of Geology: Being an Attempt to Explain the Former Changes of the Earth's Surface, by Reference to Causes now in Operation.* 1 ed. Vol. 2. London: John Murray, 1832.

Lynden-de Bruïne, Alberta Maria van. *In vogelvlucht door Europa: de reisjournalen van Dionysia Catharina Temminck-Cau, 1807–1824.* Zutphen: Walburg, 2001.

Macleay, William Sharp. *Horae Entomologicae or, Essays on the Annulose Animals.* Vol. 1, London: S. Bagster, 1819. doi:10.5962/bhl.title.48636.

———. "Remarks on the Identity of Certain General Laws which have been lately Observed to Regulate the Natural Distribution of Insects and Fungi." *Transactions of the Linnean society of London* 14 (1825): 46-68.

Manse, Maarten. "Kennis is macht: de veelzijdige expedities van botanicus Pieter Willem Korthals (1807–1892)." *Studium* 6, no. 1 (2013): 42-50.

Mayr, Ernst. "Illiger and the Biological Species Concept." *Journal of the History of Biology* 1, no. 2 (1968): 163-78.

———. *The Growth of Biological Thought: Diversity, Evolution, and Inheritance.* Cambridge, Mass: The Belknap Press of Harvard University Press, 1982.

McOuat, Gordon. "Species, Rules and Meaning: The Politics of Language and the Ends of Definitions in 19th Century Natural History." *Studies in History and Philosophy of Science Part A* 27, no. 4 (1996): 473-519.

———. "Cataloguing Power: Delineating 'Competent Naturalists' and the Meaning of Species in the British Museum." *The British Journal for the History of Science* 34, no. 1 (2001): 1-28.

Mees, Gerlof Fokko. "Vogelkundig onderzoek op Nieuw Guinea in 1828. Terugblik op de ornithologische resultaten van de reis van Zr. Ms. Korvet Triton naar de zuid-west kust van Nieuw-Guinea." *Zoologische Bijdragen* 40, no. 1-64 (1994).

Meisner, Friedrich. *Systematisches Verzeichniss der Vögel, welche die Schweiz entweder bewohnen, oder theils zu bestimmten, theils zu unbestimmten Zeiten besuchen, und sich auf der Gallerie der Bürger-Bibliothek in Bern ausgestopft befinden.* Bern: Hallerschen Buchhandlung, 1804.

Melville, Richard V. *Towards Stability in the Names of Animals: a History of the International Commission on Zoological Nomenclature, 1895–1995.* London: International Trust for Zoological Nomenclature, 1995.

Merrill, Lynn L. *The Romance of Victorian Natural History.* New York, Oxford: Oxford University Press, 1989.

Milne-Edwards, Henri. *Cours élémentaire d'histoire naturelle. A l'usage des Collèges et des Maisons d'Éducation, rédigé Conformément au Programme de l'Université du 14 septembre 1840. Zoologie.* Paris: Fortin, Masson et Cie, 1841. doi:10.5962/bhl.title.41891.

Minelli, Alessandro, and Giancarlo Contrafatto, eds. *Biological Science Fundamentals and Systematics.* Vol. 2. EOLSS Publications, 2009.

Moes, Ernst Wilhelm, and Eduard van Biema. *De Nationale Konste-Gallery en het Koninklijk Museum. Bijdrage tot de geschiedenis van het Rijksmuseum.* Amsterdam: F. Muller, 1909.

Molhuysen, P. C., and P. J. Blok. "Smissaert." In *Nieuw Nederlandsch Biografisch Woordenboek.* Vol. 2, edited by A. W. Sijthoff's, 1912.

Molina, Miquel. "More Notes on the Verreaux brothers." *Pula: Botswana Journal of African Studies* 16, no. 1 (2002): 30-36.

"Monographies de Mammalogie, ou descriptions de quelques genres de Mammiferes dont les especes ont eté observées dans les differens Musées de l'Europe. Par J. C. Temminck. Livraisons 1-3. pp. 72. pl. viii." *The Zoological Journal* 1, no. 4 (1824): 574-76.

Mörzer Bruyns, W. F. J., red. *Met de Triton en Iris naar de zuidwestkust van Nieuw Guinea in 1828: de reisverhalen van Justin Modera en Arnoldus Johannes van Delden.* Werken van de Linschoten-Vereeniging; CXVII. Zutphen: Walburg Pers, 2018.

Müller, Salomon. "Aanteekeningen, over de natuurlijke gesteldheid van een gedeelte der westkust en binnenlanden van Sumatra." *Tijdschrift voor natuurlijke geschiedenis en physiologie* 2 (1835): 315-55.

———. "Ueber den Character der Thierwelt auf den Inseln des indischen Archipels, ein Beitrag zur zoologischen Geographie." *Archiv für Naturgeschichte* 12, no. 1 (1846): 109-28.

Murray, Andrew. *The Geographical Distribution of Mammals.* London: Day and Son, limited, 1866. doi:10.5962/bhl.title.15762.

Naumann, Johann Andreas, and Johann Friedrich Naumann. *Johann Andreas Naumann's Naturgeschichte der Vögel Deutschlands, nach einigen Erfahrungen entworfen.* Leipzig: G. Fleischer, 1820. doi:10.5962/bhl.title.49752.

Naumann, Johann Friedrich. *Taxidermie, oder, Die Lehre Thiere aller Klassen: am einfachsten und zweckmässigsten für Kabinette auszustopfen und aufzubewahren.* Halle: Hemmerde und Schwetschke, 1815. doi:10.5962/bhl.title.43737.

Nelson, Gareth. "From Candolle to Croizat: Comments on the History of Biogeography." *Journal of the History of Biology* 11, no. 2 (1978): 269-305.

Nieuwendijk, J. G. *Zoo was Artis, zo is Artis.* Amsterdam: De Bussy, 1970.

"Nouveau Recueil de Planches Coloriéés d'Oiseaux pour servir de complement aux Planches Enluminés de Buffon. Par MM. C. J. Temminck, d'Amsterdam, et Meiffren Laugier, baron de Chartrouse, de Paris." *Annales Générales des Sciences Physiques* 7 (1820): 361–71.

"Nouveau Recueil de Planches Coloriéés d'Oiseaux. Par MM. Temminck et Meiffren Laugier." *Annales Générales des Sciences Physiques* 8 (1821): 395–96.

Nozeman, Cornelis, Martinus Houttuyn, Christiaan Sepp, and Jan Christiaan Sepp. *Nederlandsche vogelen volgens hunne huishouding, aert en eigenschappen beschreeven. Door Cornelius Nozeman. Alle naer 't leeven geheel opnieuw en naeukeurig getekend, in 't koper gebragt, en natuurlijk gekoleurd door, en onder opzicht van, Christiaan Sepp.* 5 vols. Amsterdam: Jan Christiaan Sepp, 1770–1829.

Nyhart, Lynn K. "Natural History and the 'New' Biology." In *Cultures of Natural History*, edited by Nicholas Jardine, James A. Secord and Emma C. Spary, 426-43: Cambridge University Press, 1996.

———. *Modern nature: the rise of the biological perspective in Germany.* Chicago: University of Chicago Press, 2009.

O'Hara, Robert J. "Representations of the Natural System in the Nineteenth Century." *Biology and Philosophy* 6, no. 2 (1991): 255-74.

Oehser, Paul H. "Louis Jean Pierre Vieillot (1748–1831)." *Auk* 65, no. 4 (1948): 568-76.

Ogilby, William. "Further Observations on 'Rules for Nomenclature'." *Magazine of Natural History* 2, no. 2 (1838): 275-84.

———. "Letter in Reference to Mr. Strickland's Observations on the Application of the Term Simia." *Magazine of Natural History* 2, no. 2 (1838): 492-94.

———. "Observations on 'Rules for Nomenclature'." *Magazine of Natural History* 2, no. 2 (1838): 150-57.

Oken, Lorenz. *Grundriss der Naturphilosophie der Theorie der Sinne und der darauf gegriindeten Classification der Thiere. Frankfurt, a. M. 1804.* Frankfurt-am-Main: printed by the author, 1804.

———. *Allgemeine Naturgeschichte für alle Stände.* 8 vols. Stuttgart: Hoffmann'sche Verlags-Buchhandlung, 1833-1843. doi:10.5962/bhl.title.36892.

Outram, Dorinda. *The Letters of Georges Cuvier: a Summary Calendar of Manuscript and Printed Materials Preserved in Europe, the United States of America, and Australasia.* Chalfont St. Giles, 1980.

———. *Georges Cuvier: Vocation, Science, and Authority in Post-revolutionary France.* Manchester: Manchester University Press, 1984.

———. "New spaces in Natural History." In *Cultures of Natural History*, edited by Nicholas Jardine, James A. Secord and Emma C. Spary, 249-65. Cambridge: Cambridge University Press, 1996.

Pickstone, John V. "Museological Science? The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology and Medicine." *History of Science* 32, no. 2 (1994): 111-38.

Pieters, Florence F. J. M. "Het schatrijke naturaliënkabinet van Stadhouder Willem V onder directoraat van topverzamelaar Arnout Vosmaer." In *Het verdwenen museum. Natuurhistorische verzamelingen, 1750–1850*, edited by Bert C. Sliggers and Marijke H. Besselink, 19-44. Haarlem: Teylers Museum, 2002.

Poot, Nathalie, Geert Vanpaemel, and Siska Waelkens. *Een walvis in de stad. De collecties van de Leuvense Faculteit Wetenschappen.* Leuven University Press, 2014.

Prichard, James Cowles. *Researches into the Physical History of Man.* London: J. and A. Arch, 1813.

Queiroz, Kevin de. "Systematics and the Darwinian Revolution." *Philosophy of Science* 55, no. 2 (1988): 238-59.

R. K. D. Nederland Instituut voor Kunstgeschiedenis. "Portret van Marinus Adriaan Perpetuus Smissaert (1773–1819)." https://rkd.nl/nl/explore/images/151688, accessed Augustus 1, 2018.

Raat, Alexis J. P. "Alexander von Humboldt and Coenraad Jacob Temminck." *Zoologische Bijdragen* 21, no. 1 (1976): 19-38.

———. "Coenraad Jacob Temminck (1778–1858). Een biografische schets." *De Negentiende Eeuw* 2, no. 2 (1978).

Raffles, Thomas Stamford. *A History of Java.* Vol. 1. London: Black, Parbury, and Allen, 1817.

Reinwardt, Caspar Georg Carl. *Redevoering van C. G. C. Reinwardt, over hetgeen het onderzoek van Indië tot uitbreiding der natuurlijke historie heeft toegebragt. Gehouden den 3 mei 1823, bij het plegtig aanvaarden van het gewoon hoogleeraarsambt in de scheikunde, kruidkunde en natuurlijke historie aan de Hoogeschool te Leyden.* Amsterdam: J. van der Hey, 1823.

"A Retrospect of the Literature of British Ornithology, from the Close of the 17th Century to the Present Time." *The Analyst: a Quarterly Journal of Science, Literature, and the Fine Arts* 3, no. 3 (1836): 78-99.

Richardson, John. "Report on North American Zoology." *Report of the British Association for the Advancement of Science* 5 (1836): 121-224.

Rijksbureau voor Kunsthistorische Documentatie. "Directeuren van Artis. Reindert Draak, 1838–1840." http://artis.rkdmonographs.nl/directeuren, accessed February 6, 2017.

Roberts, T. R. "The Freshwater Fishes of Java, as Observed by Kuhl and van Hasselt in 1820–23." *Zoologische Verhandelingen* 285, no. 1 (1915): 1-94.

Roger, Jacques. *Buffon: A Life in Natural History.* Translated by Sarah Lucille Bonnefoi. Ithaca and London: Cornell University Press, 1997.

Rookmaaker, L. C. *The Zoological Exploration of Southern Africa, 1650–1790.* Rotterdam: A. Balkema, 1989.

———. *Calendar of the Scientific Correspondence of Hugh Edwin Strickland.* University Museum of Zoology, Cambridge, 2010.

———. "The Early Endeavours by Hugh Edwin Strickland to Establish a Code for Zoological Nomenclature in 1842-1843." *Bulletin of Zoological Nomenclature* 68, no. 1 (2011): 29-40.

Rookmaaker, L. C., P. A. Morris, I. E. Glenn, and P. J. Mundy. "The Ornithological Cabinet of Jean-Baptiste Bécoeur and the Secret of the Arsenical Soap." *Archives of Natural History* 33, no. 1 (2006): 146-58.

Rudwick, Martin J. S. *Georges Cuvier, Fossil Bones, and Geological Catastrophes: New Translations & Interpretations of the Primary Texts.* Chicago: University of Chicago Press, 1997.

Saunders, Howards. "Preface." In *Vieillot's Analyse d'une nouvelle ornithologie élémentaire*, edited by Howards Saunders, iii-iv. London: The Willughby Society, 1883.

Schilthuizen, Menno. "Early Entomological Art: The Colour Plates of Snellen van Vollenhoven." *Tijdschrift voor Entomologie* 150, no. 2 (2007): 263-69.

Schlegel, Gustav. "Levensschets van Hermann Schlegel." *Jaarboek Koninklijke Akademie Wetenschappen* (1884): 1-95.

Schlegel, Hermann. *Abhandlungen aus dem Gebiete der Zoologie und vergleichenden Anatomie.* Leiden: A. Arnz & comp., 1841–1843. doi:10.5962/bhl.title.16080.

———. "Over eenige nieuwe soorten van vergiftige slangen van de Goudkust." *Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen* 3 (1855): 312-17.

Schuh, Randall T., and Andrew V. Z. Brower. *Biological Systematics.* 1 ed. Ithaca, NY: Cornell University Press, 2009.

Secord, James A. "The Crisis of Nature." In *Cultures of Natural History*, edited by Nicholas Jardine, James A. Secord and Emma C. Spary, 447-59. Cambridge: Cambridge University Press, 1996.

———. *Visions of Science Books and Readers at the Dawn of the Victorian Age.* Chicago: University of Chicago Press, 2015.

Shufeldt, R. W. "Taxidermical Methods in the Leyden Museum, Holland." *Report of the U.S. National Museum for 1895* (1897): 1031-37.

Simpson, Michael G. *Plant Systematics.* 2 ed.: Elsevier Science, 2010.

Sirks, Marius Jacob. "Indisch natuuronderzoek." PhD dissertation, Utrecht University. Amsterdamsche boek- en steendrukkerij v/h Ellerman, Harms & co., 1915.

Six, G. A. "Overzicht der diensten door het Rijks-museum van natuurlijke geschiedenis te Leiden aan de dierkunde bewezen." *Album der natuur* 26, no. 1 (1877): 149-60.

Sliggers, Bert C. "Henry Hope's vermakelijke buitenleven en de Haarlemmerhout." In *Paviljoen Welgelegen 1789–1989. Van buitenplaats van de bankier Hope tot zetel van de provincie Noord-Holland*, edited by F. W. A. Beelaerts van Blokland. Haarlem: Schuyt & Co, 1989.

———. "Het Naturaliënkabinet van de Hollandsche Maatschappij der Wetenschappen 1759–1866." In *Het verdwenen museum. Natuurhistorische verzamelingen, 1750–1850*, edited by Bert C. Sliggers and Marijke H. Besselink, 46-142. Haarlem: Teylers Museum, 2002.

———. "Van individu tot instituut. De opkomst van institutionele verzamelingen." In *Het verdwenen museum. Natuurhistorische verzamelingen, 1750–1850*, edited by Bert C. Sliggers and Marijke H. Besselink, 8-18. Haarlem: Teylers Museum, 2002.

Sliggers, Bert C., and Marijke H. Besselink. *Het verdwenen museum. Natuurhistorische verzamelingen, 1750–1850*. Haarlem: Teylers Museum, 2002.

Smeenk, C. "Hermann Schlegel 1804–1884. Ein reiches Leben in einer reichen Sammlung." *Mauritiana* 15, no. 2 (1995): 73-87.

Smit, Pieter. "The Rijksherbarium and the Scientific and Social Conditions which Influenced its Foundation." *Blumea* 25 (1979): 5-11.

Smit, Pieter, A.P.M. Sanders, and J. P. F. van der Veer, eds. *Hendrik Engel's Alphabetical List of Dutch Zoological Cabinets and Menageries*. 2 ed. Amsterdam: Rodopi, 1986.

Snellen van Vollenhoven, Samuel Constantinus. "Coenraad Jacob Temminck." *Algemeene Konst- en Letterbode* 9 (1858): 1-8.

Stark, John. "Introduction." In *Elements of Natural History: Adapted to the Present State of the Science, Containing the Generic Characters of Nearly the Whole Animal Kingdom, and the Descriptions of the Principal Species*, 1-15. Edinburgh: W. Blackwood, 1828.

Steinheimer, Frank D. "Martin Hinrich Carl Lichtenstein and his Ornithological Purchases at the Auction of William Bullock's Museum in 1819." *Archives of Natural History* 35 (2008): 88-99.

Stevens, Peter Francis. *The Development of Biological Systematics: Antoine-Laurent de Jussieu, Nature, and the Natural System.* Columbia University Press, 1994.

Stresemann, Erwin. "Die Entwicklung der Vogelsammlung des Berliner Museums unter Illiger und Lichtenstein." *Journal für Ornithologie* 70 (1922): 498-509.

———. "Aus C. J. Temmincks Briefen an H. Lichtenstein." *Ardea* 39, no. 4 (1951): 253-59.

———. "Histoire des origines des 'Planches Coloriées' de Temminck et Laugier." *L'oiseau et la revue Française d'ornithologie* 21 (1951): 33-47.

———. "Analyse von C. J. Temmincks "Catalogue systématique" (1807)." *Zoologische Mededelingen* 31, no. 29 (1953): 319-31.

———. "Aus dem Briefwechsel von C. J. Temminck mit dem Grafen von Hoffmannsegg und C. Illiger 1810-1814." *Ardea* 44, no. 4 (1956): 253-63.

———. *Ornithology from Aristotle to the Present.* Translated by Hans J. Epstein and Cathleen Epstein. Cambridge, MA: Harvard University Press, 1975.

Stresemann, Erwin, and Peter Thomsen. "Ornithologen-Briefe aus den Jahren 1816 bis 1820 gewechselt zwischen J. F. Naumann und C. J. Temminck." *Centaurus* 2 (1952): 97-139.

Strickland, Hugh Edwin. "On the Inexpedience of Altering Established Terms." *Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology and Meteorology* 1 (1837): 127-31.

———. "Rules for Zoological Nomenclature." *Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology and Meteorology* 1 (1837): 173–76.

———. "A Few Words of Explanation in Reference to Mr. Ogilby's Letter." *Magazine of Natural History* 2, no. 2 (1838): 555-56.

———. "Remarks on Mr. Ogilby's 'Further Observations on Rules for Nomenclature'." *Magazine of Natural History* 2, no. 2 (1838): 326–33.

———. "Reply to Mr. Ogilby's 'Observations on Rules for Nomenclature'." *Magazine of Natural History* 2, no. 2 (1838): 198–204.

———. "Observations upon the Affinities and Analogies of Organized Beings." *Magazine of Natural History* 4 (1840): 219-26.

———. "On the True Method of Discovering the Natural System in Zoology and Botany." *Annals and Magazine of Natural History* 6, no. 36 (1840): 184-94.

———. "Report on the Progress and the Present State of Ornithology." *Report of the British Association for the Advancement of Science* 14 (1845): 170-221.

Strickland, Hugh Edwin, Charles Darwin, John Stevens Henslow, Leonard Jenyns, William Ogilby, John Phillips, John Richardson, and John Obadiah Westwood. "Report of a Committee Appointed to Consider of the Rules by which the Nomenclature of Zoology may be Established on a Uniform and Permanent Basis." *Report of the British Association for the Advancement of Science* 12 (June 1843): 105-21.

Striekwold, Robbert J. "Naam maken: wat de dood van twee negentiende-eeuwse wetenschappers ons leert over de natuurhistorie." *Ex Tempore* 37, no. 3 (2018): 213-26.

Sundevall, Carl Jakob. "Kritisk framställning af fogelarterna uti äldre ornithologiska arbete." *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 2, no. 3 (1857): 23-60.

Susanna, Joannes Andreas. *Levensschets van Hendrik Boie, en hulde aan zijne deugden en verdiensten, benevens eenige door hem geschrevene brieven, gedurende zijne reis en verblijf in Oost-Indië.* Amsterdam: P. Meijer Warnars, 1834.

———. "Levensschets van Coenraad Jacob Temminck." *Jaarboek van de Maatschappij der Nederlandse Letterkunde* (1858): 47-78.

Swainson, William. *Zoological Illustrations, or, Original Figures and Descriptions of New, Rare, or Interesting Animals: Selected Chiefly from the Classes of Ornithology, Entomology, and Conchology, and Arranged on the Principles of Cuvier and other Modern Zoologists.* London: Baldwin, Cradock, and Joy, 1820. doi:10.5962/bhl.title.42279.

———. *A Preliminary Discourse on the Study of Natural History.* London: Longman, Rees, Orme, Brown, Green & Longman, 1834. doi:10.5962/bhl.title.10710.

———. *A Treatise on the Geography and Classification of Animals.* The Cabinet Cyclopædia. Natural History. London: Longman, Rees, Orme, Brown, Green & Longman, Taylor, 1835.

———. *On the Natural History and Classification of Birds.* The Cabinet Cyclopædia. Natural History. 2 vols. London: John Taylor, 1836-1837. doi:10.5962/bhl.title.64988.

———. *Taxidermy, with the Biography of Zoologists and Notices of their Works.* The Cabinet Cyclopædia. Natural History. London: Longman, Orme, Brown, Green & Longmans, 1840. doi:10.5962/bhl.title.61651.

Swinderen, Theodorus van. *Index rerum naturalium quae conservantur in Museo Academico Groningano. Naamlijst der voorwerpen van natuurlijke historie welke bewaard worden in het Akademisch Museum te Groningen.* Groningen: J. Oomkens, Akademie-drukker, 1822. doi:10.5962/bhl.title.99949.

Temminck, Coenraad Jacob. *Catalogue Systématique du Cabinet d'Ornithologie et de la collection de Quadrumanes avec une courte description des oiseaux non-décrits suivi: d'une nôte d'oiseaux doubles et de quelques autres objets d'histoire naturelle offerts en échange.* Amsterdam: C. Sepp Jansz., 1807.

———. *Histoire naturelle générale des pigeons et des gallinacés.* 3 vols. Amsterdam: J. C. Sepp & fils, 1813-1815. doi:10.5962/bhl.title.64844.

———. *Manuel d'ornithologie ou Tableau systématique des oiseaux qui se trouvent en Europe.* 1 ed. Amsterdam: J. C. Sepp et fils, 1815.

———. *Observations sur la classification méthodique des oiseaux, et remarques sur l'Analyse d'une Nouvelle Ornithologie Élémentaire par L. P. Vieillot, auteur de divers ouvrages d'ornithologie, et un des collaborateurs du Nouveau dictionnaire d'histoire naturelle.* Paris: Gabriel Dufour, 1817.

———. *Manuel d'ornithologie, ou Tableau systématique des oiseaux qui se trouvent en Europe; précédé d'une analyse du système général d'ornithologie, et suivi d'une table alphabétique des espèces.* 2 ed. 4 vols. Paris: H. Cousin, Edmond d'Ocagne, 1820–1840. doi:10.5962/bhl.title.130481.

———. "Van de Directeur van 's Rijks Museum." 's *Gravenhaagsche courant*, Augustus 8, 1822.
———. *Voorschrift, hoedanig te handelen met voorwerpen van Natuurlijke Historie, ten einde dezelve behoorlijk te verzenden en voor bederf te bewaren: ten gebruike van het 's Rijks Museum van Natuurlijke Historie te Leyden.* Leiden: printed by the author, 1825.
———. *Monographies de mammalogie, ou description de quelques genres de mammifères, dont les espèces ont été observées dans les différens musées de l'Europe.* 2 vols. Paris: G. Dufour et Edmond d'Ocagne, 1827–1841.
———. "Blik op de dierlijke bewoners van de Sunda-eilanden en van de overige Nederlandsche bezittingen in Indië." *Bijdragen tot de Natuurkundige Wetenschappen* 3 (1828): 62-78.
———. "Algemeen overzigt van de orde der Cheiroptera, en Monographie van de geslachten Harpyia en Cephalotes." *Bijdragen tot de natuurkundige wetenschappen* 6 (1831): 301-34.
———. "Monographie over een nieuw geslacht van Knaagdier, onder den naam van Nyctocleptes." *Bijdragen tot de natuurkundige wetenschappen* 7 (1832): 1-8.
———. "Binnenlandsche berigten. 's Gravenhage, den 3den November." *Nederlandsche staatscourant*, November 4, 1835.
———. "Nieuwstijdingen. Nederland." *Middelburgsche courant*, November 7, 1835.
———. "Coup-d'oeil sur la faune des Iles de la Sonde et de l'Empire du Japon. Discours préliminaire destiné à servir d'introduction à la Faune du Japon." In *Fauna japonica, sive, Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis, superiorum, qui summum in India Batava imperium tenent, suscepto, annis 1823–1830, Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*. Vol 1, i-xxx. Leiden: A. Arnz et socios, 1836.
———. "Over de kennis en de verbreiding der Zoogdieren van Japan." *Tijdschrift voor Natuurlijke Geschiedenis en Physiologie* 5, no. 4 (1838): 273-93.
———. ed. *Verhandelingen over de natuurlijke geschiedenis der Nederlandsche Overzeesche Bezittingen*. 3 vols. Leiden: S. en J. Luchtmans, C. C. van der Hoek, 1839–1842.
———. "Over eenige geslachten van Zoogdieren, een deel der Fauna der Japan uitmakende." *Verslagen en mededeelingen uitgegeven door de vier Klassen van het Koninklijk Nederlandsche Instituut van Wetenschappen, Letterkunde en Schoone Kunsten* (1841): 208-16.
———. "Aperçu général et spécifique sur les mammifères qui habitent le Japon et les îles qui en dépendent." In *Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis Superiorum, qui summum in India Batava imperium tenent, suscepto annis 1823–1830, Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*, Vol. 5, 1-9. Leiden: A. Arnz et socios, 1842.
———. "Description d'un nouveau genre de Mammifères (Urotrichus)." *Magasin de zoologie, d'anatomie comparée et de palaeontologie* 4 (1842): 1-5.
———. *Coup-d'oeil général sur les possessions néerlandaises dans l'Inde archipélagique*. 3 vols. Leiden: A. Arnz & comp, 1846–1849.
———. *Esquisses zoologiques sur la côte de Guiné. Pt.1: Les mammifères*. Leiden: E. J. Brill, 1853. doi:10.5962/bhl.title.14828.

———. "Over eenige nieuwe soorten van Eekhoorns van den Indischen Archipel." *Natuurkundig Tijdschrift voor Nederlandsch Indië* 4 (1854): 343-48.

———. "Zoologische Schetsen van eenige soorten van Hoenderachtige Vogelen." *Bijdragen tot de Dierkunde* 6, no. 1 (1854): 49-50.

Temminck, Coenraad Jacob, and Pauline de Courcelles. *Histoire naturelle générale des pigeons.* Paris: Garnery, 1808.

Temminck, Coenraad Jacob, and Guillaume Michel Jerôme Meiffren Laugier de Chartrouse. *Nouveau recueil de planches coloriées d'oiseaux: pour servir de suite et de complément aux planches enluminées de Buffon.* 5 vols. Paris: F. G. Levrault, 1820–1838. doi:10.5962/bhl.title.51468.

Temminck, Coenraad Jacob, and Hermann Schlegel, eds. *Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis Superiorum, qui summum in India Batava imperium tenent, suscepto annis 1823–1830, collegit, notis, observationibus et adumbrationibus illustravit. Lugduni Batavorum. Ph. Fr. de Siebold; sous la dir. de C. J. Temminck et H. Schlegel*. 5 vols. Leiden: A. Arnz et socios, 1833–1850.

Theunissen, Bert. "Biologie en Bildung: Jan van der Hoeven (1802–1868)." *Gewina* 21 (1998): 108-26.

———. *'Nut en nog eens nut': wetenschapsbeelden van Nederlandse natuuronderzoekers, 1800–1900.* Hilversum: Verloren, 2000.

Thomson, William, and Hugh Blackburn, eds. *Sir Isaac Newton's Principia: reprinted for Sir William Thomson ... and Hugh Blackburn*. Glasgow: J. Maclehose, 1871. Reprint of the third edition 1726.

Thunberg, Carl Peter. *Reise durch einen Theil von Europa, Afrika und Asien, hauptsächlich in Japan, in den Jahren 1770 bis 1779.* 1 Auflage. Berlin: Haude und Spener, 1792.

Trustees of the British Museum. "Annual Report of the Trustees of the British Museum, 1822." *The Edinburgh Review or Critical Journal for Feb. 1823–May 1823* 38, no. 76, V (1823): 379-98.

Ueno, Masuzō. "The Western Influence on Natural History in Japan." *Monumenta Nipponica* 19, no. 3/4 (1964): 315-39.

Veth, Huibert Johannes. "Overzicht van hetgeen, in het bijzonder door Nederland, gedaan is voor de kennis der fauna van Nederlandsch Indië." PhD dissertation, Leiden University, 1879.

Vieillot, Louis Pierre. *Analyse d'une nouvelle ornithologie élémentaire*. Paris: Deterville, 1816

———. "Le Coucou a ventre noir." In *Nouveau Dictionnaire d'Histoire Naturelle, Appliquée aux Arts, à l'Agriculture, à l'Économie rurale et domestique, à La Médecine, etc.* Vol. 8, edited by Charles Sigisbert Sonini. Paris: Deterville, 1817.

———. "Ornithologie." In *Nouveau Dictionnaire d'Histoire Naturelle, Appliquée aux Arts, à l'Agriculture, à l'Économie rurale et domestique, à La Médecine, etc.* Vol. 24, edited by Charles Sigisbert Sonini. Paris: Deterville, 1818.

———. "L'Aigle à queue barrée. 9. A. Fasciata." In *Tableau encyclopédique et méthodique des trois règnes de la nature. Ornithologie* Vol. 3, edited by Pierre Joseph Bonnaterre. Paris: Mme veuve Agasse, 1823.

Vigors, Nicholas Aylward. "Some Observations on the Nomenclature of Ornithology; Particularly with Reference to the Admission of New Genera." *The Zoological Journal* 1, no. 2 (1824): 180–200.

———. "Observations on the Natural Affinities that Connect the Orders and Families of Birds." *Transactions of the Linnean Society of London* 14, no. 3 (1825): 395-517.

Visser, R.P.W. "Het Rijksmuseum van Natuurlijke Historie in de 19de eeuw." In *Het verdwenen museum. Natuurhistorische verzamelingen, 1750–1850*, edited by Bert C. Sliggers and Marijke H. Besselink. Haarlem: Teylers Museum, 2002.

Völkel, Hans. *Herman H. ter Meer. Ein Leben als Dermoplastiker und Kuñstler.* Leipzig: Leipziger Universitätsverlag, 2004.

Vriese, Willem Hendrik de. *Ons streven naar waren roem. Eenige woorden van dankbare herinnering bij het afsterven van den Hoogleeraar C. G. C. Reinwardt, gericht tot de kweekelingen van Leydens Hoogeschool, op 13 Maart 1854.* Leiden: C. C. van der Hoek, 1854.

———. *Reis naar het oostelijk gedeelte van den Indischen Archipel in het jaar 1821 door Caspar Georg Carl Reinwardt.* Amsterdam: Frederik Muller, 1858.

Vrolik, Willem. "Levensberigt van Wilhem de Haan." *Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen (Afdeeling Natuurkunde)* 3 (1855): 399-408.

———. "Levensbericht van Coenraad Jacob Temminck." *Jaarboek van de Maatschappij der Nederlandse Letterkunde* (1857): 65-80.

Wallace, Alfred Russel. "Attempts at a Natural Classification of Birds." *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 18 (1856): 193–216.

———. "On the Habits of the Orang-Utan of Borneo." *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 18 (1856): 26-32.

———. "On the Orang-Utan or Mias of Borneo." *Annals and Magazine of Natural History; Zoology, Botany, and Geology* 17 (1856): 471-76.

———. *The Malay Archipelago: the Land of the Orang-utan, and the Bird of Paradise.* 1 ed. New York: Harper & Brothers, 1869. doi:10.5962/bhl.title.11170.

Wallace, David Rains. *Mountains and Marshes: Exploring the Bay Area's Natural History.* Berkeley: Counterpoint, 2015.

Walls, Laura Dassow. *The Passage to Cosmos. Alexander von Humboldt and the Shaping of America.* Chicago: University of Chicago Press, 2009.

Weber, Andreas. "Hybrid Ambitions: Science, Governance, and Empire in the Career of Caspar C. G. Reinwardt (1773–1854)." PhD dissertation, Leiden University, 2012.

Weiss, Martin Paul Michael. "The Masses and the Muses: A History of Teylers Museum in the Nineteenth Century." PhD dissertation, Faculty of Science, Leiden University, 2013.

Westwood, John Obadiah. "Introduction." In *The Entomologist's Text Book. An Introduction to the Natural History, Structure, Physiology and Classification of Insects, Including the Crustacea and Arachnida*, 3-75. London: W. S. Orr and Company, 1838.

Wilkins, John S. *Species: a History of the Idea.* Species and Systematics. Vol 1. Berkeley: University of California Press, 2009.

Willdenow, Karl Ludwig. *Grundriss der Kräuterkunde zu Vorlesungen.* Berlin: Haude und Spener, 1792. doi:10.5962/bhl.title.8054.

Winsor, Mary P. *Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum.* Science and Its Conceptual Foundations. Chicago: The University of Chicago Press, 1991.

———. "The Development of Linnaean Insect Classification." *Taxon* (1976): 57-67.

———. *Starfish, Jellyfish, and the Order of Life: Issues in Nineteenth Century Science.* New Haven: Yale University Press, 1976.

———. "The Creation of the Essentialism Story." *History and Philosophy of the Life Sciences* 28 (2006): 149-74.

Witkamp, Pieter H. "Vier-en-twintig voorgangers." *Jaarboekje Natura Artis Magistra* (1869).

Witteveen, Joeri. "Naming and Contingency: the Type Method of Biological Taxonomy." *Biology and Philosophy* 30, no. 4 (2015): 569-86.

———. "Suppressing Synonymy with a Homonym: The Emergence of the Nomenclatural Type Concept in Nineteenth Century Natural History." *Journal of the History of Biology* 49, no. 1 (2016): 135-189.

Wolf, Johann, and Bernhard Meyer. *Naturgeschichte der Vögel Deutschlands in getreuen Abbildungen und Beschreibungen.* Nürnberg: J. F. Frauenholz, 1805–[1821]. doi:10.5962/bhl.title.62380.

Wood, Neville. *The Ornithologist's Text-Book: Being Reviews of Ornithological Works, with an Appendix, Containing Discussions on Various Topics of Interest.* London: John W. Parker, 1836. doi:10.5962/bhl.title.62717.

Yamaguchi, Takai, ed. *Von Siebold and Natural History of Japan: Studies on the Unpublished Specimens of Japanese Animals Collected by Von Siebold and Still Preserved in the Museums of the Netherlands*. Kumamoto: Kumamoto University, 1987.

Zachos, Frank E. *Species Concepts in Biology: Historical Development, Theoretical Foundations and Practical Relevance.* Switzerland: Springer, 2016. doi:10.1007/978-3-319-44966-1.

Samenvatting

Dit boek komt voort uit een poging de tegenstrijdige opvattingen van biografen en historici over de negentiende-eeuwse Nederlandse dierkundige Coenraad Jacob Temminck te doorgronden. Waar sommigen hem karakteriseerden als een eminente ornitholoog en een hoofdrolspeler in de ontwikkeling van de systematiek, zagen anderen hem als een amateuronderzoeker die zich nooit geheel los heeft kunnen maken van oudere, achttiende-eeuwse tradities binnen de natuurlijke historie. Dit opmerkelijke verschil in waardering vraagt om een nader onderzoek van Temmincks leven en werk. Een dergelijk onderzoek kan tevens dienen als vertrekpunt voor een studie van Nederlandse bijdragen op het gebied van zoölogische classificatie in deze periode.

Al spoedig bleek echter dat de bestudering van Temmincks carrière mij dwong tot een nadere beschouwing van drie vraagstukken die een centrale rol speelden binnen de negentiende-eeuwse natuurlijke historie: de ontwikkeling van systematiek als vakgebied, de opkomst van een meritocratische besluitvorming binnen de natuurlijke historie, en de positie van de systematiek binnen de natuurlijke historie en de natuurlijke filosofie. Deze bredere thema's, van essentieel belang voor een goed begrip van Temmincks activiteiten, zijn tot nog toe slechts gedeeltelijk onderzocht. Dit boek beoogt in deze lacunes te voorzien.

In het eerste deel van het boek volgen we Temmincks eerste schreden op het gebied van de systematiek. Zijn passie voor vogels ontwikkelde hij al tijdens zijn jeugd in zijn ouderlijk huis, waar hij omgeven was door opgezette vogels en vogelkooien, en waar hij meeslepende verhalen hoorde van de ontdekkingsreiziger en ornitholoog François Levaillant. Toen zijn vader in 1822 overleed, erfde Temminck diens natuurhistorisch kabinet. Dit was in meerdere opzichten een belangrijke gebeurtenis, want het was bovenal de ordening en catalogisering van deze collectie die Temminck naar het wetenschapsgebied van de zoölogische classificatie dreef. Zijn collectiecatalogi leverden in eerste instantie aanvullingen op bestaande classificaties en ontwikkelden zich vervolgens tot gezaghebbende monografieën, die Temminck een prominente plaats bezorgden op het internationale podium van de natuurlijke historie.

Twee belangrijke factoren droegen bij aan dit succes. Allereerst baseerde Temminck zijn beschrijvingen van vogels op eigen onderzoek van specimina, en niet op afbeeldingen of beschrijvingen van andere auteurs. Daartoe ondernam hij langdurige

reizen – in een enkel geval was de reisduur zelfs elf maanden – waarbij hij de voornaamste Europese musea en particuliere kabinetten bezocht. Daarbij kwam, en dat is wellicht nog belangrijker, dat zijn classificatiemethode gezien kan worden als een poging tot standaardisering van de wijze waarop soorten, geslachten en ordes werden beschreven, benoemd en gerangschikt. In navolging van Cuviers zoölogische principes selecteerde hij zorgvuldig die combinaties van eigenschappen die hem in staat stelden groepen vogels zo goed en beknopt mogelijk af te grenzen. Daarbij was hij uiterst consequent in zijn gebruik van die combinaties binnen zijn classificatieschema's. Zijn werk blonk uit door de accuratesse, elegantie en doelmatigheid waarmee hij tot zijn classificaties kwam. Het waren deze eerste publicaties die Temminck een gezaghebbende positie binnen de systematiek bezorgden.

In het begin van zijn loopbaan bekleedde Temminck een aantal posities die, in combinatie met zijn succesvolle publicaties, zijn wetenschappelijke prestige ten goede kwamen. De belangrijkste daarvan was het directeurschap *ad interim*, samen met Martinus van Marum (secretaris van de Hollandsche Maatschappij van Wetenschappen te Haarlem), van het nationale kabinet van naturalia, 's Lands Kabinet van Natuurlijke Historie, gedurende de periode dat de eigenlijke directeur, Carl G. C. Reinwardt, in Java verbleef. In de vijf jaar dat Temminck diens positie waarnam, van 1815 tot 1820, bouwde hij een uitstekende reputatie op als museumbeheerder en ornitholoog.

Al in datzelfde jaar 1815 begon Temminck te lobbyen voor de oprichting van een nationaal museum. Een dergelijke instelling was volgens Temminck onontbeerlijk voor een jonge natie die een plaats wilde opeisen op het Europese podium. 's Lands Kabinet was in zijn ogen te slecht toegerust om in die behoefte te voorzien. Naast deze politieke noodzaak was er nog een tweede reden voor Temminck om een nieuw museum te bepleiten: de systematiek. Temminck stelde dat zo'n nationaal museum volledig onafhankelijk zou moeten functioneren van de universiteiten, waar collectievorming vooral gericht was op de vergelijkende anatomie. De daar bestaande gewoonte om de systematiek primair te zien als hulpwetenschap voor de anatomie en fysiologie had geresulteerd in de vorming van collecties die bovenal dienden voor de studie van organen en hun functies, en niet voor de classificatie van soorten – een praktijk die andersoortige objecten vereiste.

Hoewel de Leidse universiteit zich eveneens opwierp als kandidaat–beheerder van een nationaal museum, door verdere uitbreiding van de universitaire collectie en met de hoogleraar Sebald J. Brugmans aan het roer, trok Temminck uiteindelijk aan het langste eind. In augustus 1820 werd bij koninklijk besluit 's Rijks Museum van Natuurlijke Historie opgericht, een nationaal museum met een collectie die specifiek was gericht op classificatiedoeleinden. Temminck slaagde er tevens in de positie van directeur voor

zichzelf veilig te stellen door de schenking van zijn eigen collectie aan het museum van zijn benoeming afhankelijk te maken. Tot zijn teleurstelling werd het toezicht op het museum echter toevertrouwd aan de curatoren van de universiteit.

In de periode van 1820 tot 1850 verdeelde Temminck zijn tijd over zijn taken als museumdirecteur en zijn publicaties. In tien jaar tijd slaagde hij erin het museum uit te bouwen tot een instituut van internationale allure, vooral door de opbouw van een magnifieke collectie. De politieke en economische veranderingen in Nederland na 1830 hadden echter een sterk nadelige invloed op zowel de financiën als de wetenschappelijke productie van het museum. Temminck, zijn museumstaf en de Natuurkundige Commissie (opgericht in 1820 om de natuurlijke rijkdommen van het Nederlands-Indische eilandenrijk te exploreren en te verzamelen) moesten voortdurend vechten voor de steeds schaarser wordende fondsen, alsmede de steun van de overheid. Het wetenschappelijke prestige van zowel het museum als zijn directeur nam geleidelijk af.

Met het oog op een beter inzicht in Temmincks rol en status in de Europese natuurhistorische wereld voorziet het tweede deel van het boek in een conceptuele analyse van zijn opvattingen over de natuur, met name de ideeën die ten grondslag lagen aan zijn systematiek. Daarbij gaat het vooral om Temmincks specifieke invulling van het type-, geslachts- en soortbegrip, zoals die naar voren komt in zijn 'wet' betreffende de geografische verspreiding van dieren: dezelfde vormen of *typen* worden aangetroffen op dezelfde breedtegraden op de aardbol. Zowel deze wet als zijn classificatieschema's waren gebaseerd op Temmincks opvatting van het *type* als een sjabloon of blauwdruk voor het genus en, omgekeerd, van het genus als de fysieke uitdrukking van een *type* in een specifiek deel van het aardoppervlak. De soorten zag hij als variëteiten van dat genus. Zijn opvattingen over de geografische verspreiding van dieren verrieden mede zijn geloof in de onveranderlijkheid van soorten en een opeenvolging van afzonderlijke scheppingen.

Andere natuuronderzoekers hadden heel andere ideeën over de natuurlijke orde, en die weerspiegelden zich in hun eigen classificaties. De debatten tussen Temminck en collega-ornithologen als Louis P. Vieillot en Nicholas Vigors draaiden bijvoorbeeld om de definities van geslachten en soorten, de regels van de zoölogische nomenclatuur en de verschillende methoden om te komen tot een natuurlijk indelingssysteem van het dierenrijk. In al deze debatten was het genusconcept veel belangrijker dan het soortbegrip. Alles bij elkaar legt het tweede deel van het boek een tamelijk chaotische toestand bloot en een schrijnend gebrek aan overeenstemming onder systematici. Desalniettemin bleef het ultieme oogmerk van bijna alle betrokkenen identiek. Vrijwel allen streefden naar standaardisering van de praktijken en methoden van zoölogische

classificatie in hun zoektocht naar het ongrijpbare ideaal van een natuurlijk systeem, een waarachtige weerspiegeling van de wetten der natuur.

Tenslotte plaats ik Temmincks loopbaan en theorieën in het derde deel van het boek in de bredere context van de negentiende-eeuwse natuurlijke historie. Tussen 1800 en 1850 vonden twee belangrijke verschuivingen plaats: er werden niches gevormd, en er ontstond een meritocratie. Terwijl de systematiek specialistischer werd en helderder werd gedefinieerd, werkten haar beoefenaren bijna uitsluitend in natuurhistorische kabinetten, waar ze specimina konden vergelijken en populaties in kaart konden brengen. Natuurhistorische veldwerkers daarentegen ontwikkelden een andere, op Alexander von Humboldt geïnspireerde aanpak, terwijl de universiteiten – althans de Nederlandse – het terrein werden van de vergelijkende anatomie en morfologie. Het uitkristalliseren van de systematiek ging gepaard met de vorming van een gemeenschap waarbinnen men elkaars werk beoordeelde: er ontstond een meritocratie. Elke naam die werd voorgesteld, elk systeem of elk algemeen principe, werd binnen die gemeenschap bediscussieerd. Consensus, hoe lastig bereikbaar ook, was noodzakelijk voor het broodnodige proces van standaardisatie. Een veelvoud aan gespecialiseerde tijdschriften verscheen, en het aantal systematici nam gestaag toe. Voor Temminck bleek het moeilijk de aansluiting te houden. Uiteindelijk leidde het democratiseringsproces tot de vorming van een meritocratie waarbinnen Britse natuurhistorici de boventoon voerden. Temmicks autoriteit werd hierdoor aangetast. Hij publiceerde steeds minder, doordat hij aan omvangrijke monografieën bleef werken waarvan de voltooiing tientallen jaren kostte. Daardoor begon hij achter te lopen op zijn vakgenoten.

Tegen 1850 bracht de ontwikkeling van de systematiek tot een discipline een verschuiving teweeg in de disciplinaire hiërarchie binnen de natuurlijke historie. Hoewel er verschillende ideeën bestonden over welke disciplines tot de natuurlijke historie behoorden, was er geen discussie over de vraag of de systematiek erbij hoorde. De onderzoekers leken zich ervan bewust dat ze met hun pogingen tot structurering en methodologische standaardisering aan de vorming van een discipline werkten. Maar terwijl de betrekkelijk nieuwe discipline van de vergelijkende anatomie hoog in aanzien stond, was de status van de systematiek voorwerp van hevig debat. Het draaide vooral om de in- of uitsluiting van filosofische argumenten. Eén opvatting was dat de systematiek – de praktijk van beschrijven en classificeren – disciplinaire status zou bereiken als ze in staat was de natuurlijke orde en de oorzaken ervan te verklaren, zonder enige *a priori* theoretische aannames. Dit was de opvatting van, onder anderen, Temminck, Karl Illiger en Hugh Strickland.

Als de systematiek daarentegen werd opgevat als een hulpmiddel, een instrument om theorieën over de orde in de natuur te bewijzen of weerleggen, dan had ze ten

opzichte van andere disciplines een erg lage status. Zo zagen Lamarck, de *Naturphilosophen* en *quinarians* zoals Vigors en William Sharp MacLeay classificaties als inderdaad niet meer dan nuttige hulpmiddelen.

Uiteindelijk waren alle classificaties uiteraard op enig niveau gebaseerd op onderliggende ideeën en concepten over bijvoorbeeld de soort of het genus. Merkwaardig genoeg werd dit niet onderkend door de natuuronderzoekers die geloofden dat de systematiek zonder *a priori* aannames tot een natuurlijk system zou leiden. Rond het midden van de eeuw moest die natuurlijke orde nog ontdekt worden, net als een groot deel van de natuur zelf, en veel onderzoekers beperkten zich daarom tot het beschrijven van de veelvormigheid van de natuur. Deze wat passieve opstelling deed de status van de systematiek geen goed. Temmincks eigen gezag was tegen die tijd ook sterk ondermijnd.

Samenvattend geeft dit boek een breder en meer gedetailleerd beeld van Temmincks loopbaan en van de voornaamste ontwikkelingen binnen de zoölogische systematiek van zijn tijd, en het vult daarmee een lacune op in de historiografie van de natuurlijke historie in Nederland. We kunnen mijn inziens stellen dat de systematiek tegen het midden van de negentiende eeuw de status van een discipline binnen de natuurlijke historie had bereikt, met haar eigen vragen, methoden, nationale verschillen, verenigingen en communicatiekanalen. Maar de systematiek bleek niet in staat verklaringen in termen van oorzaak en gevolg te geven, en daardoor verloor ze rond 1850 haar gezag. De gevolgen daarvan zijn tot op de dag van vandaag merkbaar. De systematiek probeert in feite al twee eeuwen om haar aanzien te vergroten door de meest urgente conceptuele vragen van de tijd in haar onderzoeksdomein te betrekken.

Curriculum Vitae

Maria Eulàlia Gassó Miracle (Barcelona, 1973) is Curator at Naturalis Biodiversity Center, Leiden, the Netherlands. Her work focuses on the collection, conservation, presentation and management of the museum's cultural heritage. She also conducts research on the history of nineteenth-century natural history and collections, with a particular interest in pre-Darwinian zoology. Eulàlia Gassó holds a Master's degree in Biology from the University of Barcelona (1998), where she also followed a course on History and Philosophy of Science (*cum laude*). She was granted an Erasmus Scholarship in 1998 to study at Wageningen University, the Netherlands. Between 2001 and 2018, she worked as Curator of the herpetological and entomological collections at Naturalis Biodiversity Center, alternating the curation of the collections with research to unravel their history. While holding this official position, she became affiliated with the University of Leiden as an external PhD candidate in 2005. In the course of her studies, she has published several collection catalogues, taxonomic papers and articles about Coenraad J. Temminck, the history of the Naturalis collections and digital heritage. She lectures occasionally on the history of Naturalis and on zoology, both for the general public and in academic settings.