Geological collections of the Nationaal Natuurhistorisch Museum (Leiden, The Netherlands): cultural heritage of the geosciences and mining

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The role played by the geological collections of the Nationaal Natuurhistorisch Museum, the National Museum of Natural History, in documenting the developments in the Earth sciences in The Netherlands and abroad is discussed, as well as the influence exercised by the mining industry and former Dutch colonies. Thus, an overview is given of the variety of the geological collections which were obtained from government institutions, including universities, and private persons.
First the early collections, which are poorly represented, are treated. An example is the Cabinet of the Stadtholder William V. Geological exploration during the 19th century, mainly in Asia, but also in the Americas, left its traces in our museum. Of special interest is the von Siebold collection, a small collection of unattractive minerals and fossils, but the first of its kind from Japan.
Interpreting the geological history of a region or a period is the next phase in geological research. An early example is the Staring collection, brought together by the Commission for the geological map of The Netherlands, of which Dr. Winand Staring was the Secretary. The influence of mining developments is shown amongst others by the Jongmans collection of Carboniferous-Permian plants and stratigraphical samples of the Dutch coal mines, illustrating the rise and fall of the Dutch coal industry.

Contents

Introduction and early collections

The rich geological collections of the Nationaal Natuurhistorisch Museum Naturalis (National Museum of Natural History Naturalis, Leiden, The Netherlands) are examined from a number of perspectives herein. When the Rijksmuseum van Natuurlijke Historie (RMNH, i.e., National Museum of Natural History) was founded in 1820 by Royal Decree (of King William I), it was based on three collections:

1. 's Lands Kabinet van Natuurlijke Historie (National Cabinet of Natural History), founded by King Louis Napoléon of The Netherlands, a younger brother of the French emperor Napoleon.
2. The Natural History collection of Leiden University, including the 'Kabinet des Stadhouders' (Cabinet of the Stadtholder: William V), which had been donated to the university by his son King William I.
3. The collection of its first Director, Coenraad Jacob Temminck, essentially a bird collection (see Holthuis, 1995, p. 10).

The early geological collections are rather insignificant. As might be expected, Medieval times are not documented at all. The first Dutch lapidary was written in the 13th century by Jacob van Maerlant (1193-1280), probably a Belgian, who worked for the Count of Holland and Zeeland. Van Maerlant wrote a natural history encyclopedia *Der naturen bloeme,* a title that should not be translated as 'On the flower of nature', but rather something like 'An overview of nature', because 'bloeme' is used in the sense of selection as in the Dutch word 'bloemlezing' (= anthology). Unfortunately, the lapidary that formed part of it is not preserved, but references to it are known (van Oostrom, 1996). It is unlikely that it was based on a collection (no Medieval collections are preserved). Rather, it was based on earlier lapidaries, such as those of Hildegard von Bingen (1098-1179) and Albertus Magnus (1193-1280), to mention two Saints who wrote on minerals (one a woman at that!). In turn these were based on the lapidaries of 'Arab' scholars, such as Avicenna (Ibn Sina; 980-1037), who was born in Bukhara (Uzbekistan) and should more correctly be considered a Turk. The interest in minerals was largely based on their pharmaceutical value and these lapidaries were mainly written by people practicing medicine. Many famous physicians, such as William Harvey (1578-1657) and Herman Boerhaave (1668-1738), had important mineral collections or wrote on mineralogy.

Fig. 1. Painting of Carolus Linnaeus (Carl von Linné; 1707-1778) in Lap costume, physician and famous naturalist, founder of binary systematics (in posession of the Nationaal Natuurhistorisch Museum, Leiden).

Although the latter was a professor at Leiden University, no minerals from its old natural history collection can be traced to him.

Minerals and fossils also formed part of the curiosity cabinets that were accumulated in the 17th century in The Netherlands (Winkler Prins, 2000). An atypical example is the 'Constcamer' of Rembrandt van Rijn (1606-1669), which was focused on art, but included minerals and fossils, as we know from a detailed inventory of his household which was made because he went bankrupt. This inventory was used to reconstruct his 'artroom' in the Rembrandthuis, a museum in the house where he used to live in Amsterdam (see van den Boogert *et al*., 1999). Naturalis provided a long-term loan of minerals and fossils that could have been in Rembrandt's possession. His minerals and fossils would not have been spectacular, because he didn't use them for his paintings, drawings or etches, as he did with most of the material from his 'artroom', including sea shells and stuffed birds.

Although we have no geological material that can be referred to Carolus Linnaeus (Carl von Linné, 1707-1778) - we have only a painting of him (Fig. 1) - he should be mentioned since he carried out much of his important research in The Netherlands where he also took his Doctor's degree in Medicine (not in Leiden, but in Harderwijk, which had a much quicker doctoral programme). This research was published in his *Systema Naturae,* which formed the basis for the binominal nomenclature used in biology and palaeontology, and also included mineralogy (Linné, 1766-1768).

The 'Kabinet des Stadhouders' (Cabinet of the Stadtholder, William V) included material taken to Paris as spoils of war, but regained after the defeat of Napoleon at Waterloo by Professor Sebald Justinus Brugmans (Franeker, 24.3.1763 - Leiden, 22.7.1819; see Winkler Prins, 2003, fig. 1). Brugmans was a physician (Major-General of the Netherlands Army Medical Corps) and naturalist (his dissertation was on the Scandinavian origin of Dutch erratics) who was sent to Paris to reclaim the Dutch natural history collections (Brongersma, 1978, p. 43). He succeeded only partly, because Cuvier and Lamarck claimed that they needed some of the specimens for taxonomic descriptions; they were supported by Alexander von Humboldt. Therefore, we only have a plaster cast copy of the famous mosasaur from Maastricht (Fig. 2). The mosasaur came from the underground mines in Maastrichtian limestones (Faujas-Saint-Fond, 1779). It was considered so important that the military was instructed not to bombard the part of Maastricht where the fossil was located and to bring it back to Paris.

The Mineralogical collections were rather unimportant; the curators had no formal geological training and showed little interest in the collections (Holthuis, 1995, p. 27). The fossils formed part of the zoological collections. The curators of Invertebrates showed some interest in fossils, notably Guilielmus de Haan (Amsterdam, 7.2.1801 - Haarlem, 15.4.1855), whose Doctoral thesis (de Haan, 1825) was on ammonites describing several important genera, such as *Goniatites* and *Ceratites* as new, thus being important until this day. However, the main interest of the curators was in zoology (Holthuis, 1995, p. 32). The second director of the Museum even refused to accept a curatorship for palaeontology offered by the government, because there were not separate curators for the different classes of vertebrates. The pharmacist and palaeontologist Joseph Augustin Hubert de Bosquet (Maastricht, 7.2.1814 - Maastricht, 28.6.1881; Kruytzer, 1963) would have been an ideal candidate for this post. As a result we have only a few of de Bosquet's specimens, the majority of which are to be

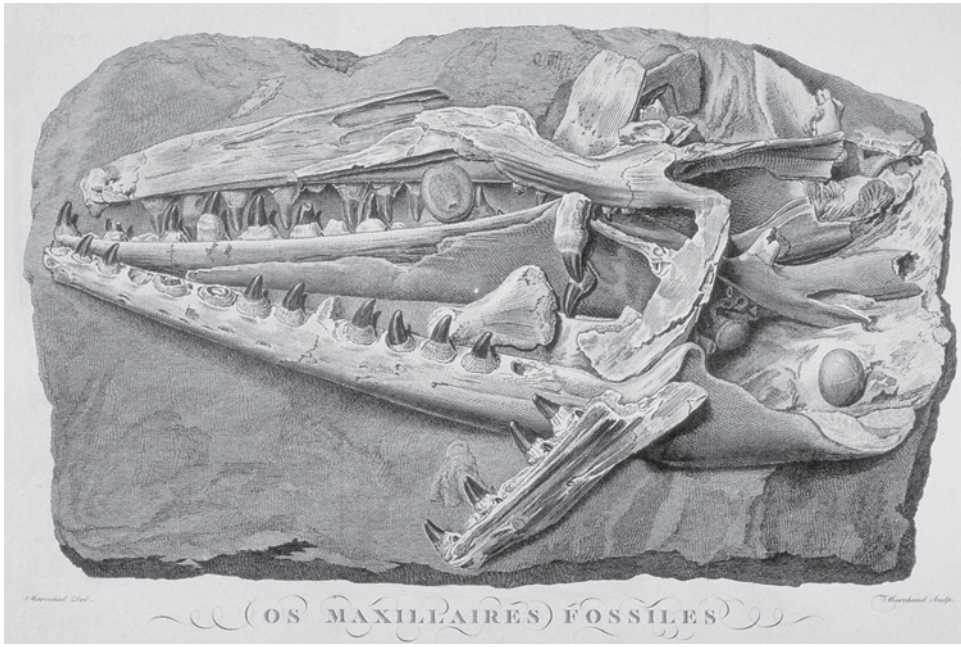

Fig. 2. Replica of mosasaur scull, original in the Muséum National d'Histoire Naturelle at Paris (Faujas-Saint-Fond, 1799, pl. 51).

found at the Musée Royale d'Histoire Naturelle in Brussels. Things changed for the better when, in 1878, the geological collections were entrusted to the newly appointed Professor of Geology, Karl Martin, thus effectively creating the 'Rijksmuseum van Geologie en Mineralogie' (National Museum of Geology and Mineralogy), which was reunited with the National Museum of Natural History after a century.

Exploration phase

The Americas

Some fossils and minerals of the renowned Dutch chemist, physician and geologist Gerard Troost ('s Hertogenbosch, 15.5.1776 - Nashville, Tenessee, 14.8.1850; Fig. 3) form a rather insignificant part of our collections. Troost had emigrated to the USA, where he was a founder and first president of the Academy of Sciences of Philadelphia. His collection is mainly of historical interest (e.g., a specimen donated to him by Governor Clinton of New York; Fig. 4), because it illustrates the early geological exploration of Tennessee (Merrill, 1906).

As far as South America is concerned, we have a collection of Dr. Franz Voltz, a German geologist who was an early investigator of the geology of Suriname (Martin, 1927). He died in Paramaribo in 1855 (Wong *et al*., 1998). Recent acquisitions from the Dutch universities document the study of the geology of the former Dutch Antilles (ABC islands). For example, from Utrecht we received the collection of Professor Louis Martin Robert Rutten (Maastricht, 4.6.1884 - Utrecht, 11.2.1946; see Kuenen, 1947).

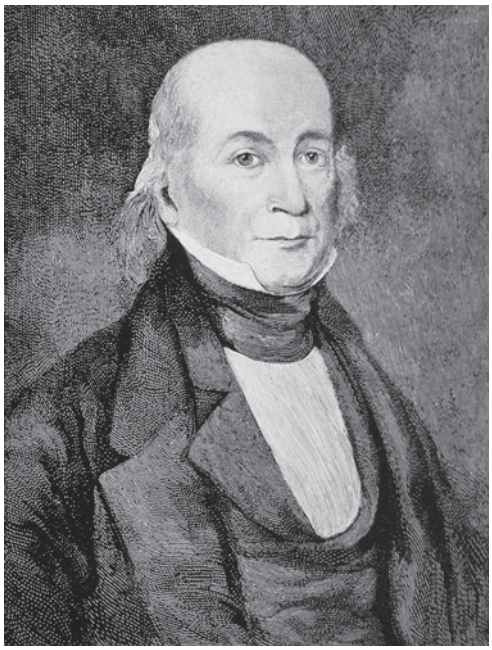

Fig. 3. Portrait of Dr. Gerard Troost (1776-1850), physician, chemist and geologist (Merrill, 1906, pl. 9).

Asia

Of special interest is a small collection of Japanese minerals and fossils of Dr. Philipp Franz Balthasar [von] Siebold (Würzburg, 17.2.1796 - München, 18.10.1866; Fig. 5). Von Siebold worked as a physician for the Dutch Government, especially on Decima where he learnt Japanese in order to be able to communicate with Japanese physicians and other scientists (Kouwenhoven & Forrer, 1993). He was a great collector and naturalist. His collections formed the foundation of the 'Rijksmuseum voor Volkenkunde' (National Ethnographical Museum) in Leiden; his botanical specimens were described in the *Flora Japonica* (de Siebold *et al*., 1835-1870) and are kept at the Leiden branch of the National Herbarium of The Netherlands; the zoological specimens described in the *Fauna Japonica* (de Siebold *et al*., 1833-1850) are in our museum. We have also his geological specimens, which are far less important, but still of considerable interest since they form the oldest such collection from Japan. Von Siebold is considered the father of modern (western) science in Japan and is as such greatly honoured (he is as well known there as a Linnaeus or Newton with us). Japanese investigators regularly visit our museum in order to study the von Siebold collections and Leiden formed the obvious place for the Siebold House for Japanese-Dutch cultural relations.

The natural history of the former Dutch East Indies (present day Indonesia) was extensively studied by the 'Natuurkundige Commissie', whose members provided the RMNH with important, mainly zoological, collections. As far as geology is concerned, the most important commissioner was Franz Wilhelm Junghuhn (Mansfeld, 26.10.1809 -

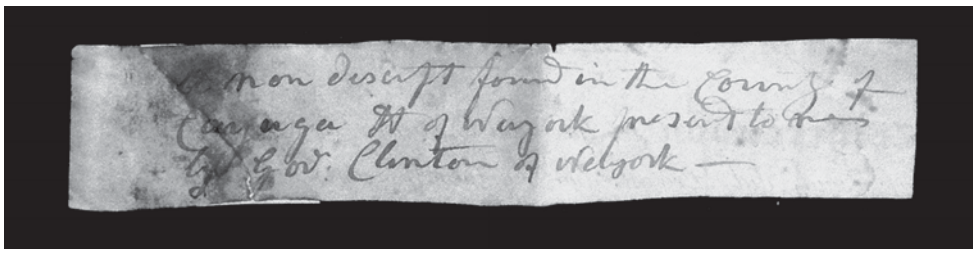

Fig. 4. Label of a specimen donated to Gerard Troost (1776-1850) by Governor Clinton of New York, now in our collections (RGM 216075).

Fig. 5. Japanese painting of Dr. Philipp Franz Balthasar [von] Siebold (1796-1866), first investigator of the geology of Japan.

Fig. 6. Portrait of Dr. Winand Carel Hugo Staring (1808-1877) initiator and secretary of the Commission for the Geological Map of The Netherlands (Veldink, 1970, pl.).

Lembang, 24.4.1864), a German who fled from prison (where he was held because of a duel) and became military physician in the Dutch East Indies (Verbeek, 1909). Another German physician, Professor Caspar(us) Georg(ius) Carol(us) Reinwardt (Lüttinghausen, 3.6.1773 - Leiden, 6.3.1854), also collected geological material for the museum (Holthuis, 1995).

Historical geology

The Netherlands

Of crucial importance for the development of the Dutch geosciences was the geological mapping of The Netherlands by the 'Commissie voor de Geologische Kaart van Nederland' (Commission for the Geological Map of The Netherlands). This is especially true of its secretary, the 'Father of Dutch geology', Dr. Winand Carel Hugo Staring (De Wildenborgh bij Vorden, 5.10.1808 - De Boekhorst bij Laren, 4.6.1877; Fig. 6), whose doctoral thesis dealt with the geology of The Netherlands (Staring, 1833). The map was published by Staring in 1860, after the Commission was dissolved due to internal frictions (van den Bosch, 1979). It was highly innovative in showing a detailed subdivision of the Quaternary and was awarded a gold medal at the 1862 London exhibition, An early geological map of France and the Low Countries from 1817 by Jean Baptiste Julien d'Omalius d'Halloy showed The

Netherlands as practically one colour, for the Quaternary, with the exception of southern Limburg (see de Bruijn, 1974, p. 27). Staring's map was useful for agriculture and 'mining' of raw materials such as clay (for the brick and tile industry).

Clay pits were of crucial importance for the study of the Dutch Quaternary, the basal stage of which is the Tiglian with its type locality at Tegelen. When the clay pits at Tegelen were temporarily accessible in the 1970s, the museum started a major collecting project with colleagues from Dutch universities to recover fossil material (Freudenthal *et al*., 1976). Although the material in general is not impressive, the bones, seeds and pollen give a good impression of life in The Netherlands 1.5 million years ago, when the climate must have been subtropical (van den Hoek Ostende, 2004, fig. 5).

In contrast, erratics from the Ice Age also formed an important part of the Staring collection. The study of the Dutch Quaternary was continued by Dr. Jan Lorié (Rotterdam, 30.6.1852 - Utrecht, 5.1.1924; van Baren, 1922), who made important contributions and whose collections are in our possession. The study of glacial erratics continues to the present day and we recently acquired the important Zandstra collection.
Amateurs played an important role in providing material for Staring's map (van der Geijn, 1944) and continue to undertake important research to this day. Arie W. Janssen, formerly a curator in the museum, himself came from the amateur ranks. He stimulated the contacts between professionals and amateurs, and became an internationally renowned specialiast on Cainozoic molluscs, starting with Miocene molluscs from The Netherlands - his Miste book is a classic monograph - and adjoining countries. His search for a tool to correlate the Cainozoic deposits of northwest Europe with those of Tethys led to his study of pteropods, small pelagic gastropods with a world-wide distribution, of which he became a renowned expert.

Southeast Asia

When Dr. Johann Carl (Karl) Ludwig Martin (Jever, 24.11.1851 - Leiden, 14.11.1942; Winkler Prins, 2003, fig. 2), a German geologist who had studied the erratics of the Staring collection, was appointed Professor of Geology at Leiden University in 1877, a new era started for the geological collections. The then Director of the 'Rijksmuseum van Natuurlijke Historie', Professor Schlegel, entrusted to him the mineralogical and palaeontological collections in 1878, being glad to get rid of them, since he considered them a source of dust endangering his zoological specimens. Gradually the collections became an independent institution, the 'Rijksmuseum van Geologie en Mineralogie' (RGM, i.e., National Museum of Geology and Mineralogy), with Martin as it first director (Escher, 1931), to be reunited with the National Museum of Natural History one hundred years later.

Opening a box labelled "Petrefacts from the Aachen region" Martin found the Junghuhn collection, considered to be lost, containing Tertiary molluscs from the Dutch East Indies (now Indonesia) (de Groot, 1978, p. 5). Thus started his lifelong interest in these fossils, of which he became the foremost expert, and Leiden became the centre for research on Indonesian Cainozoic molluscs (Gerth, 1944; van Regteren Altena, 1946). He used them to unravel the Cainozoic history of Indonesia using Lyellian statistics, i.e., the percentage of Recent species in a sample was used to estimate its age (Gerth, 1944; see also Rudwick, 1978). He obtained remarkable results, although he was occasionally mistaken when the sample reflected an unusual

Fig. 7. Medal struck on the occasion of the centenary of the discovery of *Homo erectus* (Dubois, 1892) showing the portrait of Professor M. Eugène F.Th. Dubois (1858-1940).

palaeoenvironment, as was shown by Dr. Cornelis Beets (Klatèn (Indonesia), 25.4.1916 - Wassenaar, 28.7.1995), who continued Martin's work. Beets interrupted his research career by working in the oil industry before returning to the RGM as its Director (Winkler Prins, 1996). Our present curator of Cainozoic molluscs, Frank P. Wesselingh, started research in Indonesia using these collections.

The best known palaeontological collection of our museum, and the only one cited in *World Palaeontological Collections* (Cleeveley, 1985), is that of Professor Marie Eugène François Thomas Dubois (Eijsden, 28.1.1858 - De Bedelaer near Halen (Lb.), 16.12.1940; Fig. 7). He was a Dutch physician who, as a child, developed an interest in the Upper Cretaceous fossils found in South Limburg, the area where he grew up. Dubois was greatly impressed by *On the Origin of Species* (Darwin, 1859), published the year after he was born. After his medical studies he went to the Dutch East Indies as a health officer, but with the intention to search for the missing link between men and the apes. He succeeded in finding the *Pithecanthropus erectus* (= *Homo erectus* (Dubois, 1892); see, for example, Leakey & Slikkerveer, 1993; Shipman, 2001; de Vos, 2004). With the help of the military, he collected a large number of Pliocene-Pleistocene vertebrates from excavations on Java and Sumatra, specimens that are now in our collections. Biological and biogeographical aspects illuminated by the Dubois collection remain very important. Study of these faunas has continued until this day, presently by Dr. John de Vos in cooperation with colleagues in Indonesia and elsrwhere. Research continues to elucidate the stratigraphic context and periods of migration to the islands, which are connected with sea-level fluctuations. Upon his return to The Netherlands, Dubois became Professor of Geology at the University of Amsterdam, where he worked on his collections, which were in part studied by others (Brongersma, 1941), but he also studied vertebrate material from the Dutch locality of Tegelen (see van den Hoek Ostende, 2004).

The Mediterranean

The scarcity of exposures of lithified pre-Pleistocene rock in The Netherlands meant that the Dutch universities had to look elsewhere for possibilities to train their

students. Attention was focussed on Mediterranean countries such as Spain, Italy and Greece. Curators with degrees from different universities have focused their interest on different aspects of the geology of Spain. Vertebrate palaeontologists from the University of Utrecht, among them Dr. Mathias Freudenthal of our Museum, developed the study of small mammals as a tool for detailed stratigraphic research of the Cainozoic terrestrial deposits. Washing large sediment samples (see van den Hoek Ostende, 2004, fig. 4), enough rodent teeth can be retrieved to get statistically relevant samples, thus enabling the study of evolution and migration of these faunas. A good example is the study of the Aragonian in eastern Spain by a team lead by Freudenthal (1988). Another important project of his was on the Miocene island fauna of Gargano (southeast Italy), showing both gigantism within rodents (e.g., *Deinogalerix*; Freudenthal, 1972) and birds (owls; Ballmann, 1973), as well as nanism within deer (*Hoplitomeryx*; Leinders, 1984). Parts of the Gargano fauna are still being studied by Dutch and Italian students.

The Betic Cordillera (southern Spain) was the subject of research by a group from the University of Amsterdam. Dr. Phillip Hoedemaeker, former curator of our museum, studied the ammonites from a virtually complete section of the Lower Cretaceous in basinal facies along the Río Argos that proved to be ideal for the determination of sequence stratigraphy. This section is now the standard section for the Lower Cretaceous of the Tethys and, as such, also world wide (e.g., Hoedemaeker & Herngreen, 2003).

The Geological Institute of Leiden University mapped large parts of northern Spain from the Pyrenees (mainly crystalline rocks; Zwart, 1979) through the Cantabrian Mountains (mainly Palaeozoic sedimentary rocks (see below); Savage & Boschma, 1980) to Galicia. The collection of crystalline rocks of the latter area is now being revised by Dr. Charles Arps, a former curator of petrology.

Developing mining industry

Coal industry

Recent acquisitions include important collections from the Dutch Geological Survey (now Netherlands Institute of Applied Geoscience, TNO), of which the palaeobotanical collections of Professor Wilhelmus Josephus Jongmans (Leiden, 13.8.1878 - Heerlen, 13.10.1957; Winkler Prins, 2003, fig. 3; van Waveren, 2004) are of special interest. Jongmans was a botanist who became a palaeobotanist to help dating the coal layers in the collieries of southern Limburg. He was the Director of the Heerlen branch of the Geological Survey ('Geologisch Bureau voor het Mijngebied') and became a famous Carboniferous stratigrapher, initiator of the Carboniferous Congresses, the first international congress series to be dedicated to the study of a specific geological period (Wagner, 1997). The history of the collection illustrates the rise and fall of the Dutch coal industry.

Jongmans was also instrumental in the choice of a research area for the Geological Institute of Leiden University. He was given the oportunity to undertake palaeobotanical research in either Morocco or the Cantabrian Mountains in Spain. After a quick glance at the literature, it became clear that more Carboniferous plants were to be found in the Cantabrian Mountains, so he decided to go there with his student R.H.

Wagner; both the Structural Geology and Palaeontology/Stratigraphy Departments of Leiden University followed suit. After the closure of these departments their collections were donated to the museum. I continued research on the Carboniferous stratigraphy of the area and on its marine faunas, particularly brachiopods. Dr. Wagner and I carried out a detailed investigation of the Cantabrian, the basal stage of the Stephanian, filling the gap below the Stephanian A, which was renamed Barruelian with its type section also in the Cantabrian Mountains. In order to obtain detailed information on these stages, the Guardo project was proposed and accepted by IGME, the Spanish geological survey. The official goal was to evaluate the coal reserves of the Guardo coal basin (it was the time of an oil crisis!), but in the meantime detailed stratigraphic sections of the uppermost Westphalian and Lower Stephanian were measured and the fossils collected, allowing a detailed reconstruction of the basin (Wagner & Winkler Prins, 1985).

Oil industry

The biostratigraphy of southeast Asia based on molluscs by Professor K. Martin was too crude and impractical for the developing oil industry, and the Royal Dutch/Shell group stimulated micropalaeontological research. Dr. Isaak Martinus van der Vlerk (Utrecht, 31.1.1892 - Leiden, 29.6.1974; Fig. 8) worked on larger foraminifera and became famous for developing his letter classification of the Indo-

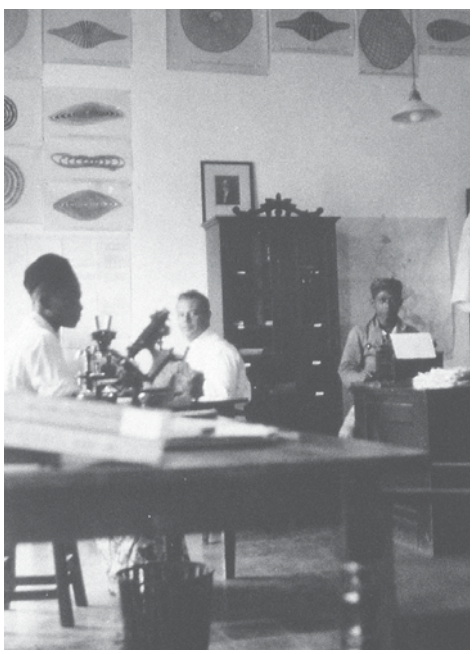

Fig. 8. Professor Isaak Martinus van der Vlerk (1892–1974) at work in Bandung. He is well known for his so-called Letter classification of the Indo-Pacific Tertiary, based on larger foraminifera.

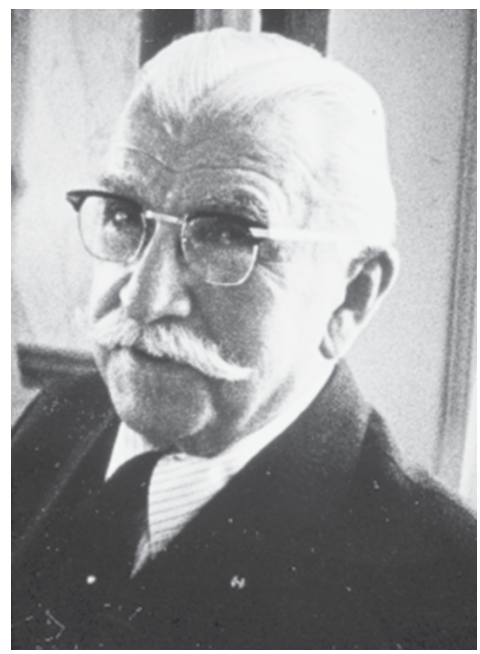

Fig. 9. Portrait of Drhc Ir Heinrich Moritz Emil Schürmann (1891–1979), an oil-geologist (Director of the Royal Dutch/Shell Group, whose extensive collection of Precambrian rocks was donated to our museum.

Pacific Tertiary. He later became Professor of Palaeontology at Leiden University and Director of the Museum (den Tex, 1974). Several people continued his work and now Dr. Willem Renema (curator of micropalaeontology) is working in southeast Asia on larger foraminifera, diving also for extant specimens to collect ecological data for his palaeoecological studies.

Only indirectly connected with the oil industry is a magnificent collection of Precambrian rocks from all over the world, collected mainly before the Second World War by Drhc Heinrich Moritz Emil Schürmann (Dessau (Anhalt), 24.3.1891 - Den Haag, 13.6.1979; Fig. 9), and bequested to the Museum. He was a petroleum geologist, later to become Director of the Royal Dutch/Shell Company, who started his career as a student of Professor J. Wanner in Egypt studying Precambrian rocks, thus developing a life-time fascination for these rocks (Dozy, 1979).

Mineral industry

With the Jongmans' collection came the small, but important, mineral collection of Dr. Gustaaf Adolf Frederik Molengraaff (Nijmegen, 27.2.1860 - Wassenaar, 26.3.1942; Fig. 10), a botanist and geologist, professor at the Technical University of Delft (Brouwer, 1942). The greater part of Molengraaff's collections, consisting mainly of rocks and fossils from our former colonies (e.g., Permian and Triassic fossils from Timor, Indonesia, including type material of Wanner's monographs) were donated to our museum by the Technical University of Delft as part of the endangered geological collections from our universities that form part of our national geological heritage. The Timor collections were originally used for a chronostratigraphic subdivision, but the way they were collected (bought from the local population by the basket load) makes this impossible. However, I just started a project with a colleague from Australia (Professor Neil Archbold) to study the Permain brachiopods for comparison with the faunas from Western Australia for palaeogeographic analysis. There is also interest in other parts of those collections, such as the echinoderms, and catalogues of the type and figured specimens will be prepared.

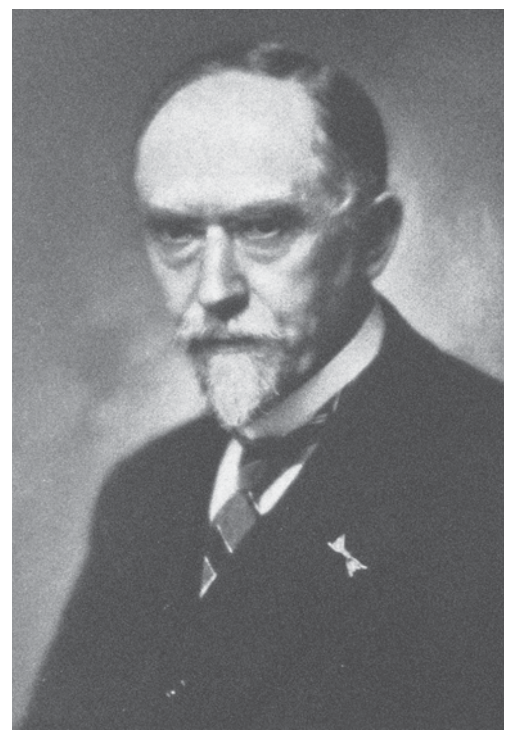

Fig. 10. Portrait of Professor Gustaaf Adolf Frederik Molengraaff (1860-1942).

Also worthy of mention is our collection of minerals of gemstone quality used for reference by the Nederlands Edelsteen Laborarorium (NEL; Netherlands Gemmological Laboratory), which is housed in our museum. The NEL

operates for the gem trade and private individuals who want their gems assessed (but no price estimates are given). Professor Pieter Cornelis Zwaan (Katwijk, 11.8.1928 - Leiden, 7.11.2002; Fig. 11) was an internationally renowned gemmologist, and former director of NEL and of the geological museum. He was succeeded as a mineralogist and gemmologist by his son Johan Zwaan.

The impression that mining in The Netherlands was restricted to the 20th century is far from true. An important prehistoric flint industry existed, tens of thousands of years ago, at Rijckholt (south Limburg), of which some material can be found in our collections.

Fig. 11. Portrait of Professor Pieter C. Zwaan (1928-2002), an internationally renowned gemmologist (Arps & Winkler Prins, 2002).

Conclusions

It is unfortunate that no material can be attributed to the old curiosity cabinets and the collections of 18th century scientists with a Leiden connection, such as Boerhaave and Linnaeus. An in itself rather unimportant early 19th century collection of minerals, rocks and fossils from Japan by von Siebold is of great cultural importance, since it marks the beginning of the geological studies of Japan. Other important (late) 19th century collections are from the former Dutch East Indies (present-day Indonesia) and consist mainly of Cainozoic molluscs studied by Karl Martin and the Dubois collection of fossil vertebrates, including the famous *Homo erectus* type material. The museum remains a centre for the study of the geology of southeast Asia up to this day, and we have, for example, significant 20th century collections of Cainozoic foraminifera (initiated by van der Vlerk) and Permian-Triassic invertebrates from Timor. These collections had formed the basis for important publications in the past and are still the focus of ongoing research.

Our colonial past played also a role in obtaining collections from the Americas, notably from the ABC Islands. Presently, there is a new interest in these 20th century collections.

Obviously, the museum had an interest in the geology of Europe, particularly The Netherlands. In the 19th century European material was mainly bought from merchants or donated. The only outstanding collection was the one brought together by the commission for the preparation of the first geological map of The Netherlands, the Staring collection. In the 20th century students brought back nice fossils and minerals from geological excursions, but scientifically these were of no great importance. From The Netherlands, the Tiglian collection is worth mentioning (van den Hoek Ostende,

2004), but also the Cainozoic molluscs collected and studied by curators of the museum in co-operation with amateurs. After the Second World War, the Dutch universities started research in various parts of Spain, helping to create research centres at various Spanish universities, who have taken over, still cherishing the old Dutch contacts. The collections resulting from the Dutch studies are largely kept in our museum.

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