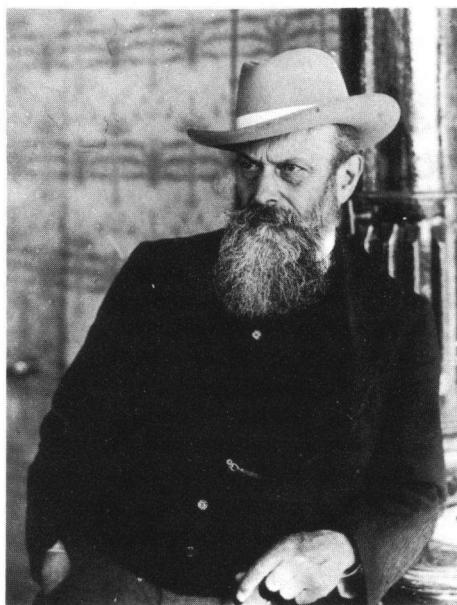
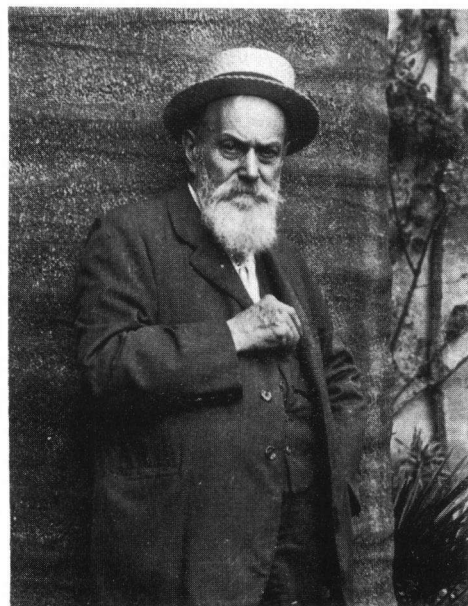




1864



1906



1918

Fresco, St. Museo, Via Roman 19.
10 November 1919.

Carissimo Getto.

Preziosissimo ricevendo i materiali per
un possibile prossimo libro sulla
Nuova Guinea, mi piacerebbe
di sapere se fra le carte di Doria
si trovano per caso, delle tirature
delle fotografie fatte da D'Albeniz.
Fammi anche il piacere di
fornirmi due di il Capitano Pirelli
e a Genova, perché a lui non sono
domandare se ha nulla di colui
avvicinato delle negative e delle
fotografie.

In attesa di una risposta che mi
dia al tempo stesso, tuo notizie
cedermi con una cordiale stretta
la mano. Ha nechie e di affare
Amico

Beccari

**Dedicated to the memory of
ODOARDO BECCARI**

DEDICATION

A dedication to ODOARDO BECCARI, the greatest botanist ever to study in Malesia, is long overdue. Although best known as a plant taxonomist, his versatile genius extended far beyond the basic field of this branch of Botany, his wide interest leading him to investigate the laws of evolution, the interrelations between plants and animals, the connection between vegetation and environment, plant distribution, the cultivated and useful plants of Malesia and many other problems of plant life. But, even if he devoted his studies to plants, in the depth of his mind he was primarily a naturalist, and in his long, lonely and dangerous explorations in Malesia he was attracted to all aspects of nature and human life, assembling, besides plants, an incredibly large number of collections and an invaluable wealth of drawings and observations in zoology, anthropology and ethnology. He was indeed a naturalist, and one of the greatest of his time; but never in his mind were the knowledge and beauty of Nature disjoined, and, as he was a true and complete naturalist, he was at the same time a poet and an artist.

His *Nelle foreste di Borneo, Viaggi e ricerche di un naturalista* (1902), excellently translated into English (in a somewhat abbreviated form) by Prof. E. GIGLIOLI and revised and edited by F.H.H. GUILLEMARD as *Wanderings in the great forests of Borneo* (1904), is a treasure in tropical botany; it is in fact an unrivalled introduction to tropical plant life and animals, man included. It is a most readable book touching on all sorts of topics and we advise it to be studied by all young people whose ambition it is to devote their life to tropical research.

In the last years of his life, BECCARI was rearranging his diaries, notes and observations of the expeditions to eastern Malesia with the intention of publishing a second book on his explorations, but very unfortunately death did not allow him to carry out his wish. He left only a revised copy of his diaries and field notes which formed the bulk of the book *Nuova Guinea, Selebes e Molucche*, published posthumously by his son NELLO BECCARI in 1924. It is neither well known nor duly appreciated outside Italy, since no translation has been published. Undoubtedly it lacks the glamour and freshness of the previous book, being devoid of the original and acute observations derived from his field research, which are largely profuse in his *Nelle foreste di Borneo*, but it offers a good and fascinating description of his adventurous travels with a wealth of interesting remarks, and it is an invaluable documentation of the natural features of those almost unexplored countries, particularly of the characteristics and customs of their inhabitants.

This synthesis, however, is only part of his oeuvre and before entering on his achievements, let us first look at his life and the development of his ideas and ideals.

BECCARI's early youth was ill fated. He was born in Florence, in his father's home in the Via dei Benci at the corner of Borgo dei Greci, on November 16, 1843. His mother, ANTONIETTA MINUCCI, from Radda in Chianti in Tuscany, died soon after his birth, and his father GIUSEPPE BECCARI, from an ancient family native of Rimini (Romagna), died in 1849 when ODOARDO was six years old; he was brought up by his maternal uncle MINUCCIO MINUCCI. In April 1853 he entered the Collegio 'Ferdinando' in Lucca, where his love for botany was nurtured by the Vice Rector and Prefect of Studies, the Abbé IGNAZIO MEZZETTI¹ and by his Professor of Botany in the Lyceum of Lucca and Director of the Botanic Garden, CESARE BICCHI. The latter, aware of the talent of his pupil and perhaps foreseeing his glorious future, in 1860 dedicated to him a new species, *Tulipa beccariana*², the first of the numerous plants and animals to be named in his honour.

BECCARI's first collections date back to 1856, when he was a student of the College of Lucca and still only 13 years old. During his stay there he assembled a herbarium, which was still in exis-

(1) In his honour, in 1871, BECCARI named a new genus of *Annonaceae* *Mezzettia*.

(2) *Tulipa beccariana* BICCHI, Agg. Fl. Lucch. (1860) 21, *nom. nud.*; I Giardini 8 (1861) 50, t. 2.

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tence at the beginning of the present century. A search for it in Lucca as a separate herbarium was unsuccessful, but several specimens with labels headed 'Erbario Beccari' are present in the herbarium of IGNAZIO MEZZETTI, now kept in the Lyceum Machiavelli of Lucca, where BECCARI attended secondary school until July 1861. Whether these specimens are part of the separate BECCARI herbarium included in MEZZETTI's herbarium or duplicates of it, is uncertain. Other plants collected in the period in which BECCARI was a student in Lucca are kept in WEBB's herbarium in Florence.

In August 1861 he published his first paper and in the autumn of the same year, when he was 18 years old, BECCARI commenced his studies in the Faculty of Natural Science at the University of Pisa. At first, perhaps under the influence of BICCHI, he devoted his attention to the Cryptogams and already in 1862 BECCARI's name appears together with those of several eminent botanists of the time, among the collectors of the 'Erbario Crittogamico Italiano', the classical exsiccata with printed labels, founded in 1858 by GIUSEPPE DE NOTARIS of Genoa.

In the University of Pisa, BECCARI distinguished himself so much in botany, that the celebrated botanist PIETRO SAVI made him an assistant to the chair of botany in January 1863, while he was still an undergraduate. Dissatisfied with the conservatism of SAVI, however, he gave up his assistantship and moved to the University of Bologna from where he took his degree in Natural Science on July 1, 1864, by disputing his thesis on the structure of the lichen *Arnoldia cyathodes* MASS. [= *Plectopsora cyathodes* (MASS.) KÖRBER] with the famous professor in botany ANTONIO BERTOLONI.

Before his graduation, BECCARI had already planned a long journey to far away regions, when in June 1864, in the laboratory of Prof. GIOVANNI CAPELLINI, geologist at the University of Bologna, he met Marquis GIACOMO DORIA, a young, impassioned naturalist, later patron and Maecenas of science, and founder of the Museo Civico di Storia Naturale at Genoa which bears his name. The two young men, united by the same enthusiasm for scientific exploration in unknown countries, soon fraternized. Shortly after his graduation, BECCARI visited DORIA at Genoa, where they decided to undertake a long exploration together and, counselled also by the celebrated British naturalist JOHN BALL, they chose the Kingdom of Sarawak, in Borneo, as the destination of their enterprise. As part of his preparations, BECCARI spent the period from February to April 1865 in the great British centres of botany, the British Museum in London and Kew Gardens, obviously to acquaint himself roughly with the plants of Borneo. He met the HOOKERS, CHARLES DARWIN and Sir JAMES BROOKE, the Rajah of Sarawak, who assured him of the assistance of his nephew, the Tuan-muda, Sir CHARLES BROOKE, then governing the territory in his absence.

Thus prepared, young ODOARDO, at the age of 22, commenced his studies on the flora of the Malesian tropics, which was to become his main life occupation, and in which he would rise to the greatest heights as a scientific explorer, naturalist, and botanist. He sailed from Southampton on April 4, 1865, and met DORIA and his own brother, GIOVANNI BATTISTA BECCARI (who was on his way to Japan), at Alexandria. From there they travelled by train to Suez and by boat to Aden and then to Ceylon, where they spent a fortnight. There BECCARI visited the famous Botanic Gardens at Peradeniya and climbed Mt Petrotallagalla, where he made his first personal acquaintance with the tropical flora and started collecting. Via Penang island and Singapore, the voyagers arrived on June 19, 1865 at Kuching, capital of Sarawak, which they had selected as their base of operations. At the beginning they were guests of the Tuan-muda, Sir CHARLES BROOKE; later they settled in a house of their own with servants, and also bought a small boat ('sampan') for their excursions in the forests along the river. Soon BECCARI and DORIA took up their botanical and zoological collecting in the dense and primitive forests which at that time surrounded Kuching. BECCARI was anxious to know the mountains and to collect intensively; thus he undertook the construction of a

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big hut in the forest of Gunong Mattang at an altitude of about 300 m with the intention of making it the base for the explorations and collections in the primitive forests of Borneo. However, after some months the health of DORIA deteriorated to such a point that at the beginning of March 1866 he was forced to return to Italy. Thus, BECCARI, having accompanied his friend to Singapore, remained alone to carry out the programme which he had planned with him and had hoped to realize together. At the beginning of April he moved to his house in the forest of Gunong Mattang which he called 'Vallombrosa', after the great monastery hidden in the dense mountain forest of Pratomagno, east of Florence. Together with a Chinese cook and four Malesian boys he spent nearly all the remaining months of 1866 there, except for four excursions and a period in October-November at Kuching to pack his collections. On one of these excursions to Gunong Poe he discovered a new species of *Rafflesia*, the famous parasitic plant with vegetative parts extremely reduced and a gigantic flower, the largest in the plant kingdom, apparently arising directly from the stem of the host liana. The largest flower of the new species, *Rafflesia tuan-mudae*, so named in honour of the Tuan-muda of Sarawak, Sir CHARLES BROOKE, attained about 56 cm in diameter.

In *Nelle foreste di Borneo* BECCARI gives many details of his hut at Mattang. He had cleverly designed it for drying plants and preparing zoological specimens rather than for lodging; soon it became an active and efficient laboratory, full of all sorts of products of nature. In his book he described his primitive life there as very happy and fully suited to his temperament. With only a cotton coat, trousers and a Chinese straw hat, mostly bare-footed, he carefully explored the surrounding primary forest, assembling marvellous collections of plants and animals. Back at his hut, he devoted many hours to arranging his collection, making drawings and descriptions and recording those notes and observations which later became the basis of his fascinating book *Nelle foreste di Borneo*.

At the beginning of 1867 BECCARI abandoned the hut at Mattang and spent the first two months at Kuching collecting in the surroundings, but chiefly arranging and packing his large collections. In March 1867 he again undertook his adventurous wanderings with the intention of visiting the interior of Sarawak. One of his trips from mid-March to the last days of May was devoted to the exploration of Batang-Lupar and the lakes of Kapuas with the main purpose of hunting orang-utan. He assembled there one of the best collections of these animals (skin, skeletons, heads and skulls, and even a foetus) and a wealth of observations which allowed him to express the opinion that the hominids did not originate in dense forest, like that of Borneo, and that the orang-utan, particularly well adapted to an arboreal environment, would be, not an ancestor, but a collateral of man. In his opinion, the hominids were derived from forerunners, allied to the great anthropoids of tropical Africa, with an anatomical conformation, particularly of the limbs, more suited to evolve towards a biped gait and an erect habit and they had their origin in more open vegetation, like that of some regions of tropical Africa, where we find the greatest number of large mammals with rapid locomotion. Recent research in south-western Ethiopia seems to support this hypothesis.

From August 12 to September 14, 1867, BECCARI collected in the district of Bintulu and in the country of the Kayan. From there, he was looking forward to organizing an expedition to the interior regions of Sarawak, which at that time were still nearly unexplored and hardly visited by Europeans; but his project found every possible difficulty and obstacle. Despite them, without guide or interpreter, but with only four men and a small boat, he set out on September 15 from Bintulu on his journey through the interior of Sarawak along the basins of the main rivers Bintulu, Redjang and Batang Lupar and their tributaries, across the ridges of hills and mountains which represent the watershed between them. The journey was made mostly sailing up, or down, the rivers in various native paddle boats obtained from time to time from the natives, but also on foot

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to overcome some impassable rapids or to cross the ridge between two adjacent basins; often he was forced to walk with difficulty in the stream beds, or to proceed slowly with a compass through the dense forests; more than once he was in real danger, even near the end of his travels when, having lost his compass, without food, in an unhabited region, he got lost for two days in a dense forest. On November 20, 1867, BECCARI arrived at Kuching where he concluded this long, hard and risky enterprise.

In the first two years of his stay in Borneo BECCARI's health remained excellent, but in the last months it had been deteriorating. Already in June 1867 he had suffered the first attack of malaria and later many others followed. Furthermore, in July of the same year he had observed the first symptoms of elephantiasis on his right ankle. After the expedition to the interior of Sarawak he spent two months in Kuching arranging and packing the collections he had made. He had planned another long journey crossing the inland of Borneo from Kuching to Pontianak; but in January his health worsened, and being unable to subdue the high fever which had troubled him for some days, BECCARI was forced to undertake his homeward-bound voyage. He left Kuching on January 29, 1868 and arrived in Italy on March 2, after explorations in Borneo which had lasted almost three years.

In Florence BECCARI was the guest of his old friend from the College of Lucca, EMILIO MARCUCCI, who had taken up the profession of architect but had not given up his love of botany, and who greatly assisted BECCARI in that period in recovering his health. The house was located in Borgo Tegolaio 48, very close to the Museum of Physics and Natural History, where BECCARI had probably assembled his collections. The house soon became a meeting place for young lovers of natural history including LEVIER and SOMMIER. Soon after his return from Borneo G. DORIA and R. GESTRO, from the Civic Museum of Natural History of Genoa, were also his guests for several days, evidently to be informed, in detail, about the large zoological collections he had assembled in Borneo.

At that time BECCARI was very busy sorting out and working on his collections; he also made agreements with collaborating specialists to study particular groups such as seagrasses (ASCHERSON 1871), pteridophytes (CESATI 1876), mosses (HAMPE 1872), lichens (VON KREMPELHUBER 1875) and hepatics (DE NOTARIS 1876), etc. (see Appendix 4); he probably also started distributing duplicate specimens of his Bornean plants. However, together with his technical work, he carried on with the study of his collection.

In March 1869, BECCARI started, at his own expense, the publication of a new periodical, the *Nuovo Giornale Botanico Italiano*, which was intended as a replacement of the *Giornale Botanico Italiano* founded in 1844 by F. PARLATORE, but interrupted in 1852. BECCARI edited three volumes of the new periodical (1869, 1870, 1871) with the help of his friend MARCUCCI, to whom he dedicated the new genus *Marcuccia* (*Annonaceae*) as a sign of gratitude for the help received in editing these volumes, particularly during his travels in Ethiopia in 1870. His first accounts of Bornean plants appeared in early volumes of his journal and many other papers dealing with his collections written by himself and other botanists were published in subsequent volumes. However, in spring 1871, when preparing for his expedition to New Guinea, BECCARI became aware of the difficulties of editing a journal when abroad making long expeditions in distant regions and handed the management of the *Nuovo Giornale Botanico Italiano* over to T. CARUEL, who edited it until the end of 1893, when the journal became the official publication of the Italian Botanical Society, which it continues to be.

Fascinated by his primitive life in Borneo, BECCARI was not satisfied with city life. Probably he had already developed the idea of undertaking a second journey to Malesia, when he received an offer to join an Italian expedition to Ethiopia. He sailed on February 14, 1870, from Genoa and

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together with the zoologist Marquis ORAZIO ANTINORI and Prof. ARTURO ISSEL, geologist at the University of Genoa, visited the Bay of Assab and later, on behalf of the Italian Geographical Society, the country of Bogos. There he assembled a rich collection of plants (315 species of spermatophytes and pteridophytes and 289 species of mosses, algae, fungi and lichens) enumerated and partly described in MARTELLI's *Florula Bogosensis* (1886). He came back to Italy on October 20, 1870.

Soon after his return to Florence, BECCARI materialized his project to visit Malesia again and after careful preparations, training himself in geodetics, astronomy and meteorology, he set out on November 24, 1871 from Genoa for the island of New Guinea, accompanied by Count LUIGI MARIA D'ALBERTIS, an Italian nobleman who was passionately fond of hunting and natural history. Their first visit was to West Java where they stayed for some time in the Botanic Gardens at Bogor. The young director, Dr. RUDOLPH SCHEFFER, must have facilitated his exploring for a few days on Mt Gedeh, with its Tjibodas mountain garden, and adjacent primary forest on Mts Pangerango and Megamendong. Further stops were made at Flores and Timor in the Lesser Sunda Islands, and the islands of Banda and Ambon, where they arrived on March 7, 1872, and enjoyed the kind and helpful hospitality of Captain P.F. KRAAL and his wife, the Italian lady AMALIA MALAN. After a short journey to Buru and Ceram for information they came back to Ambon, where they organized the expedition to western New Guinea renting a small schooner, the 'Burung-Laut', of 25 tons with a crew of eight men.

On March 21, 1872, BECCARI and D'ALBERTIS sailed from Ambon to New Guinea, and having touched the islands of Geser and Goram reached Kapaor on the west coast of the mainland. Later, on April 30, they arrived at the small island of Sorong where they dismissed the Burung-Laut and rented a hut in which they established their first scientific station, collecting chiefly along the Ramoi river. They remained on Sorong island till July 15 when, having left their collections there with one of their men as keeper, they sailed in a ramshackle indigenous sailing boat with a crew of eleven Papuas to Dorei and later to Andai, where they arrived on August 7 after a long voyage, full of adventures.

BECCARI and D'ALBERTIS established their home and headquarters for the exploration of the region in a large Papuan hut built on high palafittes near the Andai river surrounded by the forest, with a splendid view of both the sea and the Arfak Mts. While D'ALBERTIS made a trip in the mountains, BECCARI collected intensively in the vicinity of Andai, but on September 28 he moved to Putat on the lower slopes of the Arfak Mts with the intention of exploring the higher regions. Unfortunately on October 9, he was informed that D'ALBERTIS had fallen seriously ill and he was compelled to return to Andai. The poor health of D'ALBERTIS necessitated that the travellers return to Ambon, but only on November 2 was BECCARI able to find an indigenous boat to reach Sorong and later Ambon. But in Sorong, unexpectedly, they found a schooner sent from Ambon in search of them. After recovering, safe and sound, the collections left there four months before, they sailed to Ambon, where they arrived on December 5, 1872. There BECCARI and D'ALBERTIS were greatly surprised to find the Italian Royal Corvette 'Vettor Pisani' on which D'ALBERTIS obtained a passage, leaving his friend alone. Thus, BECCARI concluded his first expedition to New Guinea, during which, despite all sorts of difficulties and serious health troubles, he had assembled a collection of about 700 species of plants and a rich amount of zoological, ethnographical and mineralogical specimens.

BECCARI remained in Ambon for about two months to arrange and pack the collections. There, as a guest of Captain KRAAL and his wife, he soon regained his health and prepared a trip to the Aru and Kei islands.

BECCARI departed from Ambon on February 8, 1873, having obtained a passage on a Dutch

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Government steamer. Stricken with smallpox en route, BECCARI nonetheless reached the Aru islands on February 22, and with his base on Wokam, he collected plants and animals and made a topographical survey of the islands (see Appendix 1, C: Maps). On July 6, he moved to the Kei islands in a big local sailing boat, a Bughis prahu, on which BECCARI was the guest of its Chinese master. But the boat suffered shipwreck on the east coast of Grand Kei. Fortunately he could save all his collections and collecting equipment. BECCARI found the flora of these islands unexpectedly poor and after visiting Small Kei as well, he sailed on October 4 to Ambon with four men in a small indigenous sailing boat of only 4 tons, bought at Dulan. Despite the premonitions of the natives, the risky voyage of about 350 miles was successful and on October 23 he reached Ambon, where he stayed for two weeks, partly to arrange his collections, but chiefly to recover his strength, being again a guest of his friends, the KRAALS.

On November 5, 1873, BECCARI sailed by the steamer 'Koning Willem III' towards the West Moluccas (Buru and Ternate), proceeding via North Celebes towards Southwest Celebes, where he disembarked at Makassar on November 18. He stayed in the region for nearly three months until February 6, 1874. From there, as a paying passenger on an old Chinese boat of about 40 tons, similar to a prahu, he went to the larger islands south and southeast of Celebes (Kabaena and Muna) and to Kendari on the southeast coast of Celebes where he arrived on February 23. He remained in this district for six months to collect and make topographical surveys, but the collections did not increase very much because the flora was not particularly interesting and because the region was plagued with pirates on the sea, and head-hunters on land. He chiefly collected inland at Lepo-Lepo. Here he was informed that a Dutch vessel was looking for him at Kendari. It was the Escort vessel 'Sumatra' of the Royal Dutch Navy, which had been sent from Makassar in search of him, since it was rumoured that he was in danger from the pirates which infested the sea of Kendari. BECCARI had already decided to leave Kendari and accepted with pleasure the kind offer of the Captain of the vessel to take him and his men aboard to Makassar. Having packed his collections he sailed from Kendari on August 10 and arrived at Makassar after a voyage of five days.

In these last months BECCARI's funds had been running out, but early in 1874 he had already written from Makassar to his friend G. DORIA in Genoa for financial help to carry out his project of a second expedition to New Guinea. When he was back at Makassar on August 29 he received the joyfull news that his friend had convinced the authorities of Genoa to contribute 15,000 lira towards a new, second expedition to the great island.

Aware that the season was not suitable for sailing to New Guinea, BECCARI soon left Makassar by the same steamer 'Koning Willem III' on which he had travelled from Ambon to Makassar some months before. He proceeded to Bali, Surabaya, Semarang, and through the interior of Java to Bogor, to recuperate and to sort out his collections. There, he also spent some days at Tjibodas and on Mt Pangerango collecting. Unwearied, BECCARI left Jakarta on October 15, 1874, and via Surabaya, Makassar, the island of Bima and Timor in the Lesser Sunda Islands he arrived at Ternate island in the Moluccas on November 11. He remained there about 20 days and assembled rich botanical and zoological collections in the primitive forest near the hut (named by him 'Paradisino') which the Dutch Resident had built for him on the slopes of the volcano.

BECCARI intended to organize his travel to New Guinea from Ternate, but soon he realized that this was impossible, and on December 4 he left the island by the mail-steamer arriving at Ambon three days later. There he prepared for his new expedition financed by the Province and the Municipality of Genoa to West New Guinea, his old hunting grounds of 1872. He hired for his voyage the brig-schooner 'Deli' with a crew of 10, and accompanied by 8 men and a young boy for collecting plants and animals.

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He sailed on January 22, 1875, and arrived at Sorong Island on February 1, establishing his base in the schooner and making trips to Ramoi, Dorei Hum, Mt Morait and venturing inland from Has as far as a river, the War Samson, not then recorded on the maps. Together with plants he amassed a rich collection of birds. On March 5 he left Sorong and after a visit of some days to Waigeu Island chiefly hunting for birds, he proceeded to Dorei and soon to Warbusi and Momi on the west coast of Geelvink Bay mainly with the aim of obtaining some specimens of cassowaries. Later, in April, always in the 'Deli', he went to the islands of the Bay which he had not previously visited, spending nearly twenty days on Japen, a week on the uninhabited Mios Num, twenty days on Schouten Island and a week on a small island, Pulo Manim, near Mafor. On June 2 he arrived at Dorei where he found the Italian Corvette 'Vettor Pisani', and where he received the warmest welcome. Having arranged his collections he prepared the expedition to the Arfak Mts; on June 16 he started from Andai towards the mountains establishing his exploration base at Hatam (1500 m) in the centre of the mountain group. On June 23 he climbed one of the summits of the Arfak Mts (about 2000 m). He had planned to remain two months in the mountains, but on July 12 he was forced to cut short his exploration and to come down to the coast because of beri-beri among the crew of the schooner: two men had already died and the others were seriously ill. Thus BECCARI realized that there was no choice; he had to go back to Ternate: his second expedition to New Guinea was nearing its end; his dream of climbing and exploring the highest regions of the Arfak Mts had vanished for a second time. On July 18 he left Mansinam, near Andai, where the 'Deli' was riding at anchor, and on August 4, 1875, he arrived at Ternate, but in the meantime the beri-beri had killed most of the crew. He remained at Ternate three months arranging his collections, notes and observations.

The scientific results of the second expedition to New Guinea were very important. Even if the botanical specimens were not particularly numerous, the zoological collections were very plentiful, especially the skins of birds which surpassed 2000 in number, and included a set of birds of paradise which still remains one of the best of its kind. No less abundant were the ethnological collections consisting of every sort of object in use by natives. Also an important set of approximately 200 Papuan skulls enriched the anthropological collections. But the expedition was also very fruitful because of his untiring activity as a naturalist and explorer in making notes of everything that attracted his attention and in studying all the aspects of the regions he visited. During the expedition he had also made various topographic surveys which later allowed the geographer GUIDO CORA (see Appendix 1, C: Maps) to draw maps of some regions of New Guinea, and he had assembled a great wealth of botanical, zoological, ethnological and anthropological observations which are profusely reported in his letters published by E.H. GIGLIOLI, and in his book *Nuova Guinea, Selebes e Molucche*. Full of interest are the observations on the characteristics and origin of the Papuans, and on the life of birds, particularly those on the bower-birds of paradise, *Amblyornis inornata*, and its 'capanne e giardini', which are carefully and at the same time poetically described by him in a paper full of interesting scientific and philosophical considerations, pervaded with a deep-rooted love and admiration of Nature.

Learning that a Dutch expedition to New Guinea was being prepared, with the vessel 'Soerabaja', with the aim of performing a bathymetric survey, BECCARI received permission to accompany this. It lasted from November 11, 1875 till January 29, 1876, visiting Dorei, the Bay of Wandamen, the islands of Roon and Krudu, the Bay of Humboldt, the island Arimosa, Awek (Japen I.), Dorei, Waigeu, Misool, the Bay of MacCluer, the Bay of Gouns, the island of Geser (off Southeast Ceram), and Ambon. From there he returned on the mail steamer to Ternate. He stayed there about a month to arrange and pack his latest collections and to ship them to Italy. This third expedition to New Guinea had not yielded results as far as BECCARI's botanical and zoological in-

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terests were concerned, but it had allowed him to assemble many ethnological and anthropological notes, and to improve his topographic surveys.

On March 12, 1876, BECCARI sailed from Ternate to Java, on the first stage of his homeward voyage. He arrived, unexpectedly, at Florence on June 18, 1876, after about four years of bold and glorious exploration.

On his return BECCARI was received with great honour. On July 14, 1876, the Municipality of Florence bestowed the freedom of the city on him; some scientific societies, such as the Zoological Society in London, and the Italian Anthropological Society, elected him an honorary member. Other scientific associations, such as the Italian Geographical Society and the Tuscan Society of Horticulture as well as the Faculty of Science of the Royal Institute of Advanced Studies of Florence awarded him a gold medal. But he was not affected by these honours and devoted his time to his collections and to his friends in Florence and Genoa. However, the glamour of exploration and the call of the wild were too strongly in his nature and after a year BECCARI made one further long voyage to the Malesian islands.

He and Captain Count ENRICO A. D'ALBERTIS, a cousin of his former companion, set out from Genoa on October 14, 1877, on a trip, properly intended more for pleasure than for science, to Australia, en route travelling through India from Bombay, Lahore, Delhi, Benares, Lucknow, to Calcutta, touching Singapore and Kuching (December 1877), meeting in Australia FERDINAND VON MUELLER, and proceeding to Tasmania and New Zealand.

On the return voyage he parted from D'ALBERTIS in Singapore and proceeded to Jakarta and then to Bogor where he spent two weeks, preparing a collecting trip in Central West Sumatra.

Sailing from Jakarta on 28 May 1878, he arrived in early June via Padang and Padang Pandjang at Mt Singalang, a primary-forest-clad, long-extinct volcano of nearly 2900 m height. Here he had a hut built, as before in Sarawak and Ternate, which he made his headquarters. The hut, named by him 'Bellavista', was placed above the limit of cultivation and on the lower fringe of the primitive forest, at an altitude of about 1700 m. He remained there from June 12 to early August, making rich collections on the flanks and on the top of the volcano. Later he set his base in a house in the village of Ajer Mantior at the base of Mt Singalang till September 20. After a short stay in Padang to arrange his collections, he undertook a journey on October 4 in the provinces and on October 22 he sailed from Padang to Bangkok where he arrived on November 10. During his travels in West Sumatra (see map of his itineraries in BECCARI 1930) he assembled large botanical and zoological collections; the largest were made on Mt Singalang, the harvest of plants running to a thousand numbers in all. Amongst them were the famous *Rafflesia arnoldii* and the then unknown, largest, erect aroid in the world, *Amorphophallus titanum*, a really colossal herbaceous plant, the tuber being up to 53 cm in diameter, the inflorescence more than 1.5 m high, the lamina of leaf covering a surface of about 15 m in circumference and the petiole attaining about 29 cm diameter at the base. From Bangkok he began his homeward journey to Italy, arriving in Florence on December 28, 1878, thus concluding the last of his fascinating explorations in Malesia.

Reviewing the results of his botanical activities in the six years exploration in the field through almost the whole of Malesia, it is evident that BECCARI's exploration in Sarawak was the most fruitful and thorough, with the huge number of over 4000 collections in two and a half years. The great virtue and value of his collections can only be properly estimated if one takes into consideration that BECCARI collected species rather than specimens, and that he seldom collected a species twice. Each species was studied, dissected and annotated on the spot and mostly carried flowers and fruit. The Sumatran collection again was rather large, about 1000 numbers in five months travel, especially when one considers that BECCARI's interests were wide; in Sumatra he also dedicated time to the study of agriculture, forest products and fruit trees, as he had done in Borneo.

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The amount of these collections clearly contrasts with less than 1000 numbers in the three years spent in the Moluccas, Celebes and New Guinea (see Appendix 4), although really there are more, as most collections from the Kei and Aru islands and Kendari in Southeast Celebes are unnumbered and unlisted. As the flora of at least New Guinea is not less rich in proportion to that of Borneo or Sumatra, the reasons for this contrast can only be explained by BECCARI's activity in the field. Firstly, we must consider that he was a thorough collector and disliked gathering occasional or incomplete specimens; he preferred always to stop some days to collect systematically in a place which he considered botanically interesting, rather than to gather here and there along his path, en route, when moving from one place to another in his long expeditions. In a word, he preferred to collect intensively rather than extensively. In Borneo and in Sumatra where he had huts for drying, labelling and drawing his specimens ('Vallombrosa' and 'Bellavista' respectively) his collections were more numerous than in New Guinea, Celebes and Moluccas when he frequently moved his collecting base, sometimes being forced to do so because threatened by native head-hunters, or by pirates. Finally, we must also bear in mind that the second expedition to New Guinea was made thanks to the financial support of the Province and Municipality of Genoa, secured on the warmest recommendation of GIACOMO DORIA, his friend and zoologist of the expedition to Borneo. BECCARI knew that he longed to enlarge the zoological collections of the Civic Museum of Natural History which he had founded in 1867, and, in his profound honesty, he felt bound to assemble large zoological collections for the Genoa Museum and to put zoology before botany. Indeed, the zoological collections were very rich in quality and in quantity, while the botanical collections were not particularly numerous. Another reason for this contrast can also be found in BECCARI's health which was worse in eastern Malesia than in Borneo and Sumatra.

In 1878 BECCARI was still only 35 years old, but had accumulated an unrivalled, immense amount of material, great scientific-botanical experience and knowledge of the Malesian flora, in fact had proved himself the greatest explorer of his time. He would prove himself also to be the greatest botanist in the elaboration of his results, surpassing BLUME in the width of the field he covered, including plant-geography, ecology and biology.

Having concluded his explorations in Malesia, BECCARI devoted the rest of his life to the study of his collections and of palms, except for an unhappy experience as Director of the Botanical Collections and Garden of the Royal Museum of Physics and Natural History of Florence in 1878–1879, and a short journey to Ethiopia soon after.

The vicissitudes of BECCARI's life as Director of the Botanical Collections and Garden cannot be understood without knowledge of some of the events in the history of the Florence Museum and the sale of BECCARI's collections. The Royal Imperial Museum of Physics and Natural History in Florence was founded in 1775 by PIETRO LEOPOLDO DI LORENA, Grand Duke of Tuscany, and was installed in a building in Via Romana, not far from the Palazzo Pitti, the palace of the Grand Duke, at the base of the great and famous Giardino di Boboli. Part of this was soon designated as the Botanical Garden of the Museum. Thanks to the great interest of the Grand Duke in Natural Science, the scientific collections were greatly increased in the years thereafter and the Museum was subdivided into various sections (Cabinets) and in 1789 an astronomical observatory was also installed there. From then on all the Museum complex was usually named 'La Specola' by the Florentines. The botanical section consisted of the so-called Botanical Collections (herbaria, carpological collections, vegetable products, wax models and fossil plants) and the Botanical Garden. After various events dominated by the historical course of Tuscany in the first half of the 19th century, FILIPPO PARLATORE was appointed in 1842 director of the Collections and Garden. He greatly contributed to the growth of the herbaria and to the organization of the department. In 1854 PHILIP BARKER WEBB died in Paris and bequeathed his invaluable herbarium and library to

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the Florence Museum, together with an annual income of 6945.58 lira (derived from the sale of a palace in Paris) and known as WEBB's Legacy, for their maintenance and increase. In 1859 the Government of Tuscany established the Istituto di Studi Superiori Pratici e di Perfezionamento in Firenze, which had its centre near the Monastery of San Marco; and the Museum of Physics and Natural History with its collections and the botanical garden, although situated on the opposite side of the river Arno, became part of that Institute as the seat of the Faculty of Science. However, the Museum continued to have a director of its own, and in 1868 PARLATORE was appointed to that office. Very unfortunately, the Institute of Advanced Studies, which only became the University of Florence in 1923, had no Rector responsible for the scientific and didactic activity, but only an Administrative Board which determined the course of events in the Museum in the following years without an adequate knowledge of the problems and needs of scientific research. In 1860, after various vicissitudes, the Giardino dei Semplici, founded in 1545 and one of the most ancient in the world, became state property, and, in 1869, together with the adjoining buildings (originally the stables of the Grand Duke) was assigned to the Institute of the Advanced Studies being situated near the centre of the Institute at San Marco. In 1872 the Italian Government, the Province and the Commune of Florence signed a convention for the enlargement of the Institute of Advanced Studies, and the Board of the Institute decided to move some of the Cabinets of the Museum to the centre of the Institute. The latter also foresaw the removal of the Botanical Collections and Garden of the Museum from La Specola to the Giardino dei Semplici and pertinent buildings at San Marco, in order to have the botanical department nearer to the Institute, and to maintain only one garden, the Giardino dei Semplici, by far more famous than that of the Museum. Thus, during 1877 and 1880 the Cabinets of Chemistry, Physics, Geology and Mineralogy were shifted from the Museum to San Marco. Only in 1879 did the Commune of Florence actually hand over the Giardino dei Semplici to the Institute of Advanced Studies. The latter decided that the Botanical Collections and Garden ought soon to be moved to San Marco. However, they were conveyed there only several years later owing to the opposition of several botanists, among whom BECCARI, and other personalities, who were against the removal of the botanical collections, as they considered it, for several reasons, to be a great error.

FILIPPO PARLATORE died on September 9, 1877. He was the last Director of the Museum of Physics and Natural History in Florence as the Institute had decided that the Dean of the Faculty was to hold the directorship of the Museum. However, the office of Director of the Botanical Collections and Garden was vacant, and according to general opinion BECCARI was the best qualified and most worthy successor to the work of PARLATORE, who had so greatly enlarged the herbarium and library and raised them to the level of the greatest museums in the world. But BECCARI's appointment was strongly opposed by the Dean of the Science Faculty and the Board of the Institute of Advanced Studies, particularly because BECCARI was firmly convinced that the Director of the Botanical Collections and Garden should have no hand in teaching. On October 14, 1877, hardly more than a month after PARLATORE's death, BECCARI undertook his travels with E. D'ALBERTIS, sketched above, and at that time no resolution had been taken. Only on March 26, 1878, while BECCARI was journeying in Australia, was he, in spite of the opposition, appointed Director of the Botanical Collections and Garden of the Royal Museum of Physics and Natural History of Florence, with the duty of supervising the practical phytographic research of the students. BECCARI returned to Florence from the exploration of Sumatra on December 28, 1878, and soon took up the office of Director.

In the preceding years BECCARI had organized, worked and studied on his own in the field of botany, and his brilliant achievements were naturally a one-man show. In the field he had to make his own decisions, and learned to do so immediately. He had no rivals and had always very subor-

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dinate personnel whom he could command. That was very different from the situation in which he was now placed as a Director, with a graded staff accustomed to some privileges acquired during the long directorship of **PARLATORE**. On the other hand **BECCARI** was indefatigable and tidy in his work and he required everybody to be active and precise in carrying out his duty. He wanted to infuse new life into the operations of the botanical collections and garden, introducing methods that differed from the traditional ones. Very soon his reforms became unpopular among several of the staff, who felt that he lacked respect for the memory of his predecessor; this state of affairs acerbated the hostility towards him of the Institute of Advanced Studies. But such hostility was not something to scare him.

It is clear, of course, that **BECCARI**, with his enormous drive and ambition, proved by his unique exploration and study of the tropical floras, thinking big, botanically and otherwise, wanted to raise the Florentine centre into an institute which could compete with the leading world herbaria. For this there was excellent opportunity as the Florence botanical collections had already acquired the enormous and (still) most important herbarium of **PHILIP BARKER WEBB**, bristling with types of old collections, with funds attached for its maintenance, and further the important herbaria of **CESALPINO**, **MICHELI**, **TARGIONI**, and **PARLATORE**. To these could now be added his own numerous collections from the East, with its enormous mass of duplicates for the further enrichment of the Florence herbarium by exchange. There was, therefore, every reason and opportunity to fulfill his ambition.

When **BECCARI** took on the directorship, he was aware that the botanical collections were under threat of removal from the Museum to the buildings adjoining the Giardino dei Semplici near the centre of the Institute of Advanced Studies. At first he was rather in favour of the project since he thought that the Institute had large funds for the construction of new buildings and that they would be better and more suitable for the collections than those of the Museum. But when he discovered that the funds of the Institute were scarce, and the buildings were the old stables of the Grand Duke of Tuscany, very humid, unsuitable for both the herbarium and library, and far worse than those of the Museum, he became a most obstinate and relentless opponent to the removal of the collections. His hostility was the primary cause of a wide gulf between him and the Institute Board. On the other hand **BECCARI** began to understand that his ambition of raising the Florence Botanical Collections to the level of the other great European herbaria would be difficult to realize. But this controversy was not the reason for his resignation as Director, at least not the main one. Indeed **BECCARI**'s resignation was for a different reason.

On one of his visits to Java during his travels he had been requested by the Dutch East Indies Government to sell his collections to the Bogor (Buitenzorg) Herbarium for the cash payment of a considerable amount of money and his appointment as botanical explorer in the Garden, or a life annuity of 5000 lira. The offer was alluring, but **BECCARI** wished his collections to remain in Italy and to spend the rest of his life in Florence, attending to their study. However, his own estate was seriously compromised owing to the expenses for his long expeditions, and before his departure for the last journey to Australia, New Zealand and Sumatra (1877–1878) **BECCARI** undertook negotiations with the Florence Institute of Advanced Studies for the sale of his Malesian collections. The Institute asked Marquis G. **DORIA**, the Director of the Civic Museum of Natural History for an appraisal of **BECCARI**'s botanical collections, which were estimated at 75,065 lira. On the basis of this valuation and considering the offer of the Dutch East Indies Government, the Institute of Advanced Studies offered to buy all his botanical collections from Malesia against an annuity of 5000 lira for the rest of his life. **BECCARI** accepted this offer but on the condition that the collections were entrusted to the Museum of Physics and Natural History of Florence and that he was entitled to have them at his disposal during his lifetime; in exchange he would assume

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responsibility for their study and conservation. During his journey, in May 1878, when he was in Batavia prior to his expedition to West Sumatra, BECCARI was informed that the Board of the Institute of Advanced Studies had accepted his conditions and had officially approved the purchase of his collections. Consequently he refused the offer of the Dutch East Indies Government.

When BECCARI came back to Florence and took up the directorship of the Botanical Collections and Garden of the Museum, he ought to have accepted the contract but learnt that the Board of the Institute of Advanced Studies intended to use the money from the WEBB legacy for the payment of his life annuity. BECCARI was greatly disappointed on hearing this decision, since he had thought that his life annuity would be paid by different Institute funds: he disliked the idea that the WEBB collections were to be deprived of nearly all their endowment until his own death. Furthermore, he knew that the WEBB legacy was the main source of income of the botanical department of the Museum and without it, his ambition to make the Florence herbarium one of the greatest in the world and a leading centre of tropical botany could not be accomplished. He understood too that under these conditions, the sale of his collections was incompatible with the duty of his office as Director. Indeed, he got a personal benefit from the sale, while as Director of the Collections and Garden it was his duty to avoid that these were deprived of a large amount of money necessary for their maintenance and increase during his lifetime. Thus he made every effort to persuade the Board of the Institute of Advanced Studies to use different funds to purchase his collections, but without result. He did not underestimate the hostility that the Institute had shown him since the beginning, and particularly recently, and when he was invited to sign the contract, he clearly understood that he was regarded by them as a troublemaker, and that the decision to pay the price of his collections with the WEBB legacy was merely an expedient devised by the Institute in order to compel him either to lose his prestige as Director or to resign from his office. Indeed, if BECCARI had sold his collections and kept his office he would have lost his prestige as a man and as Director, having put his personal interest before his duty. But the Board of the Institute knew that BECCARI was a man of honour and that it would achieve its aim: his resignation.

Then, as a last attempt, he tried to find some way in which, without going back on his word, he could withdraw from the compromise of the sale, but without success. Thus, on July 26, 1879, BECCARI resigned as Director of the Botanical Collections and Garden of the Florence Museum. Only later, on October 31, 1879, as a private citizen, did he sign the contract for the sale of his own collections. The fight had been lost, but his honour was saved!

Soon after the end of this unhappy and painful experience, on November 16, 1879, BECCARI left for Ethiopia to stay with his old friend and benefactor, Marquis GIACOMO DORIA, as members of an Italian expedition to the Assab Bay on the Red Sea which he had already visited in 1870. They also spent some days collecting in Aden and returned to Florence on February 26, 1880.

After his return from Ethiopia, BECCARI resumed the study of his collections, which were located in a few small rooms on the top floor of the Museum of Natural History. In those modest and secluded rooms, alone, like a hermit, without any assistant or help, but together with his rich collections, he worked until his death. There, he wrote his famous works on Malesian plants and on palm taxonomy, and made the splendid drawings and photographs which adorn his publications.

The first months there, however, were unfortunately rather hard for him. After his resignation, in November 1880 TEODORO CARUEL was appointed Director of the Botanical Collections and Garden of the Museum. He was soon instructed by the Institute of Advanced Studies to study the advisability of removing the Botanic Collections and Garden from the Museum to the Giardino

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dei Semplici and adjoining buildings, and eventually to prepare a project for such a removal which had already been decided, but not realized, before PARLATORE's death. BECCARI was aware that CARUEL between 1866 and 1871 had been Director of the Giardino dei Semplici and that he was in favour of the removal and was preparing the pertinent project. BECCARI had already expressed his resolute opposition to the removal, chiefly because the buildings near the Giardino dei Semplici were unsuitable for the collections and library as they were very humid, smaller and worse than those of the Museum, but also because library, herbaria and garden were well settled in the Museum and there was no need to remove them, and in doing so waste a large amount of money which could have been used for their maintenance and growth. Besides, he was strongly convinced that the great botanical collections and library at the Museum, as a centre of taxonomic research, had to be kept distinct from the centre of teaching and research on anatomy and physiology at the Giardino dei Semplici. Thus, in 1880 and 1881 BECCARI tried everything, with letters and articles in various Italian newspapers, to convince the Faculty of Science, the Board of the Institute of Advanced Studies, and public opinion that the removal of the botanical collections and garden would be a great and irreparable mistake. He carried out a referendum against the removal of the herbaria and library among botanists in Italy and abroad. This was spread far and wide and was discussed in many Italian and foreign publications. Numerous botanists from every part of the world, and among them the most eminent taxonomists of the time, declared themselves against the removal.

In 1881 BECCARI published a paper in which the reasons for the protest against the removal of the botanical department from the Museum and the result of the pertinent referendum were given. In the same year CARUEL published his study for carrying into effect the project of the removal of the Botanical Collections and Garden. Despite the opinions of many and outstanding botanists expressed in the referendum, the Board of the Institute of Advanced Studies decided on the removal of the Botanical Collections, Library and Garden from the Museum of Natural History, in Via Romana, to the Giardino dei Semplici and adjoining buildings near San Marco, on the opposite side of the river Arno. However, BECCARI did not give in, and he continued to publish other articles and papers against the removal until 1903. Even if his campaign did not gain its aim, it greatly contributed to further resolutions of the Institute of Advanced Studies which decided to enlarge and improve the buildings annexed to the Giardino dei Semplici and later to reserve for Botany the part of them originally intended for the Zoology department, which remained at the Museum, at La Specola, where it still is today. These deliberations greatly delayed the removal of the Botanical Collections, though the living plants of the Garden of the Museum were all moved to the Giardino dei Semplici during 1883. CARUEL continued to give his botanical lectures at the Museum until his retirement, in 1896, but the following year, his successor, O. MATTIROLO, undertook his teaching in the building near the Giardino dei Semplici. When in 1900 he moved to Turin, P. BACCARINI succeeded him as Director. At that time, the Library and the Botanical Collections were still located in the Museum.

In 1901, when the removal was close at hand, BECCARI was requested to inform the Institute of Advanced Studies in which rooms of the new botanical building at the Giardino dei Semplici he wished to have his Malesian collections deposited. He disdainfully replied that he wished his collections to remain at the Museum in Via Romana in agreement with the contract of their sale, adding that, if the Institute had decided to move them to the new buildings, he would not follow them and would give up their study. His Malesian collections remained in the same rooms at the Museum until the end of his life, but, in 1905, in spite of further protest and particularly after controversy with P. BACCARINI, the removal of the Library and the Botanical Collections (including all the herbaria) from the Museum of Natural History to the new Botanical Institute near the

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ancient Giardino dei Semplici, was brought to a conclusion.

However, let us resume the course of BECCARI's life after his sad experience as Director of the Botanical Collections and Garden of the Museum in 1878–1879, and his hard fight against their removal started in 1881. These regrettable events marked a turning-point in BECCARI's career. He realized that he had lost the chance of making the Florence Herbarium one of the leading centres for research in plant taxonomy, and decided to retire to private life, devoting himself entirely to taxonomic research, chiefly to elaborate his own Malesian collections for which he had gathered a wealth of field observations and drawings.

On January 23, 1882, BECCARI married NELLA GORETTI DE FLAMINI, from a noble family of Casentino, in the high valley of the Arno. They had four sons: NELLO, DINO, BACCIO and RENZO. The eldest, his devoted son NELLO, became a professor of Comparative Anatomy at Florence University and took great pains in editing some posthumous papers by the father, among them the book *Nuova Guinea, Seibes e Molucche* based on the original diaries of his father's explorations in eastern Malesia from 1871 to 1876. He also encouraged U. MARTELLI and R.E.G. PICHI SERMOLLI to revise and edit some works on palm taxonomy which had been left unfinished by his father.

The years immediately following BECCARI's marriage, entirely devoted to his family and to study, were peaceful and fruitful. He set up his home in a villa inherited from his father, the mediaeval Castello del Bisarno, near Ripoli in the immediate vicinity of Florence, and he lived there until his death. According to information obtained from his nephew and from letters to his friends, we know that he also had another house in the city of Florence where he and his family spent the week-days, particularly in winter. We also know that he used, as in the years before his marriage, to spend several weeks, particularly in the summer holidays and during the grape-harvest at Radda in Chianti, on the old country estate of his mother's family. He was very fond of country life and, following the tradition of the old families of the region, he was particularly interested in wine-making, in which he attained great experience. He was one of the first producers, together with Baron B. RICASOLI, of that typical wine, well-known in Italy and abroad as 'Chianti, Gallo nero'. Nevertheless, during his holidays he did not stop his research, even if he did not work so actively as in the Florence Museum, where his collections were housed.

However, after a few years his life was troubled by another sad event. In 1877 he had undertaken the publication of a great work, *Malesia*, mainly with the intention of embodying in it the results of the studies dealing with his own collections from the Malesian Archipelago; in addition, other papers or abstracts of works published elsewhere on plants of that region were also to be included. The first two volumes were printed in Genoa and BECCARI was greatly helped in editing them by his faithful friend R. GESTRO, the Director of the Civic Museum of Natural History of Genoa, particularly during his last journey to the East. However, BECCARI undoubtedly corrected the proofs of all the instalments of *Malesia* and also those of fascicle 3 of volume 1, issued when he was in West Sumatra. This is proved by a letter to GESTRO from Buitenzorg, now Bogor (dated May 2, 1878), which accompanied the corrected proofs of that fascicle. BECCARI published the first two fascicles of volume 1 at his own expense, but later *Malesia* became a publication of the Florence Institute of Advanced Studies. However, despite its great interest, the sale of this work was obviously limited, the text being written entirely in Italian. Consequently the Institute of Advanced Studies decided that it was not worth continuing its publication and suddenly, in 1887, stopped all contributions to it while fascicle 3 of volume 3 was not yet complete. Actually, in the cover of fascicle 3 we find a note which informs us that the publication of *Malesia* is ended and explains the reasons for it. However, BECCARI wished to publish at least the text pertinent to the drawings of the account on *Bombacaceae* already issued in fascicle 3, but as far as possible, also

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other papers and drawings ready for the press. Hence, he was compelled to beg in Italy and abroad for funds necessary to publish the last two fascicles of volume 3 of *Malesia*. Fortunately, the Minister of Education, PAOLO BOSELLI, and the BENTHAM Trust in England, where he was highly esteemed, allowed him the necessary financial support for bringing volume 3 of *Malesia* to a close. The last issue appeared in March 1890.

Great was BECCARI's disappointment at the unhappy conclusion of the publication of *Malesia*, not only because the resolution of the Institute of Advanced Studies represented a slight to him and to his work, but also because he had lost a safe and certain means of publication for the results of the study of his collections. He was so much upset by this event that he even thought of visiting Malesia again. Actually, in the letter to GESTRO (April 4, 1890) which accompanied the last fascicle ('*ultimo definitivo*') of *Malesia* he asked his friend for information on the departures from Genoa to Batavia and about the liners. Anyhow, the end of *Malesia* was another turning-point in his life: it marked the beginning of a long period of inactivity, after which he never resumed the study of his own Malesian collections.

Having concluded the studies already undertaken, he published no scientific papers from 1893 to 1902, except some articles and letters protesting against the removal of the Botanical Collections of the Florence Museum, described above, and the temporary closing of the herbaria and library in connection with this removal. In these years he was on the point of giving up his botanical activity entirely and none of his colleagues and friends, not even his devoted pupil UGO LINO MARTELLI, were able to induce him to resume his research. However, another person was to have the credit for reviving in him the enthusiasm for the country where he had spent the most fruitful period of his youth.

After his explorations in Sarawak BECCARI had kept alive his friendship with the Rajah and the Ranee of Sarawak. They liked to spend part of the year in the surroundings of Genoa. It is difficult to say whether it was by chance or with the definite intention of helping BECCARI to overcome his scientific inactivity, but in the early days of May 1897 the Ranee visited Florence and met BECCARI. A woman of great culture and sensibility, deeply fond of her kingdom of Sarawak, Lady MARGARET BROOKE succeeded in convincing BECCARI to write a book on his fascinating explorations in Borneo. He soon began his work; the Ranee kindly assisted him in the preparation of the book, particularly in providing him with the illustrations. Several of them, in fact, are a selection from many fine photographs taken by the Ranee herself in Sarawak; these were assembled in a great album, still kept in the Florence Botanical Museum, which she presented to BECCARI on June 10, 1897.

The preparation of the book, *Nelle foreste di Borneo*, led BECCARI to recover a certain interest for scientific work and it was not difficult for Prof. ORESTE MATTIROLO, the Director of the Botanical Department of the Museum, to complete the Ranee's enterprise and convince him to resume botanical research after the publication of his book. However, BECCARI had already realized that the removal of the library and the herbaria from the Museum to the Giardino dei Semplici was close at hand, and that without them the elaboration of his own Malesian collections would be rather difficult. Consequently, he did not resume their study, interrupted in 1890 after the publication of *Malesia* was stopped, and decided to devote his entire botanical activity to a single group. This decision was neither easy to take nor satisfying for him, but represented the best solution for carrying out his research without a big library and a great herbarium at his disposal at any moment of the day. The selection of the group was easy, as the Palms had intrigued him since his first visit to Malesia, and he had already done some research on them. On the other hand he knew that this group offered him a taxonomically nearly unexplored, big field. Thus, BECCARI started again on his studies with renewed enthusiasm, spending the whole day at the Museum in his

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small rooms where he had concentrated everything necessary for his work, including the great camera he had designed himself specially for making the marvellous photographs which are reproduced in the plates of his truly monumental works on Palms. In the years that followed he had no difficulty in publishing his writings thanks to the great esteem he enjoyed abroad and the friendship of several Italian botanists. Actually, the publication of his chief work, *Asiatic palms*, was made possible by Sir GEORGE KING, the Director of the Botanic Garden of Calcutta, and other important papers were published by his close friend, U. MARTELLI, in the periodical *Webbia*, which the latter had founded in honour of PHILIP BARKER WEBB. Some interesting works appeared also in *L'Agricoltura Coloniale*, a journal edited by the Istituto Agricolo Coloniale, the foundation of which was promoted by BECCARI and other Italian personalities. Several other papers on palm specimens from all over the world entrusted by their collectors to him for determination, were issued in various periodicals and books.

BECCARI led this last period of his life completely secluded from Italian academic life and nearly forgotten by most Italian botanists, but he was always overwhelmed by the sympathy and esteem of foreign botanists. In this period, perhaps more than before, he enjoyed the affection of his old and devoted friends and particularly of UGO LINO MARTELLI, his only pupil, a very keen botanist himself, well known for his basic works on the great family of *Pandanaceae*, whose study he had undertaken on BECCARI's advice.

This period, entirely devoted to his family and the palm studies, was serene and creative. In the last years of his active and eventful life he assembled the materials for a book on his explorations of eastern Malesia. He had already sorted out a final copy of his diaries and he had also begun to prepare the illustrations for his book, but unexpectedly death prevented him from accomplishing this last performance.

He died peacefully in the evening of the 25th of October 1920, in Florence, at the age of 77.

ODOARDO BECCARI was a great explorer but at the same time a very clever, many-sided, careful collector. Indeed he did incredible work in the field. In his long and lonely explorations in Malesia, BECCARI was attracted by all aspects of nature and human life and assembled an enormous wealth of botanical, zoological, ethnological and anthropological collections. Not only the number of the specimens makes his collections really invaluable, but also the fact that these are often accompanied by notes and descriptions and sometimes by splendid and detailed drawings made in the field.

The botanical collections from Malesia are kept in the Herbarium and Museum of the Florence University. They amount to more than 21,000 sheets, about 2400 flasks of material in alcohol, about 800 carpological specimens and more than 200 wood samples with the pertinent voucher specimens (see further information in VAN STEENIS's *Thesaurus Beccarianus*). Many collection numbers are represented in BECCARI's herbarium by more than one sheet. To these specimens we must add many duplicates which were distributed to the most important herbaria, among which those of the British Museum, Kew, Paris, Geneva, Leningrad, Berlin, Leiden, Vienna, Munich, Stockholm, and Bogor.

The zoological collections consist of several thousand specimens belonging to a very high number of species, many of which were described as new. Those in the higher groups are represented by skins, but sometimes also by skeletons, skulls and even heads or other parts of the body preserved in alcohol. They are kept in the Civic Museum of Natural History of Genoa, which bears the name of its founder and Maecenas, GIACOMO DORIA, the companion of BECCARI on the expeditions to Borneo and the Red Sea. BECCARI paid attention to special groups and assembled several

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collections of particular importance such as that of the great ape, the orang-utan (48 specimens including a foetus), the set of birds of paradise, one of the best of its kind, and the collections of fishes, spiders, coleoptera, and ants. These collections have supplied a very rich harvest of study for many specialists. Indeed 205 works devoted to the study of BECCARI's zoological collections had been published by 1920 in the *Annali del Museo Civico di Storia Naturale* of Genoa alone (see GESTRO's biography of BECCARI).

BECCARI also collected rich and interesting ethnological collections of great value and beauty. They are kept in the Anthropological and Ethnological Museum of Florence and some of them are exhibited in a hall of that Museum. A set of ethnological collections was sent to the Italian Geographical Society in Rome. Some of the idols, weapons, implements, ornaments, clothing, etc. were described and illustrated in BECCARI's books *Nelle foreste di Borneo* and *Nuova Guinea, Selebes e Molucche* for the purpose of trying to establish, with the aid of the anthropological features, the origin of some of the peoples of Malesia. The value of these collections was greatly increased by the detailed information on the customs of those peoples which he described in his books and in the letters to his friends published by E.H. GIGLIOLI, G. CORA and the Italian Geographical Society.

The anthropological collections are kept in the Anthropological and Ethnological Museum of Florence. They consist of skulls and a few skeletons of natives of Malesia. The most important is undoubtedly the set of some 200 skulls assembled in Korido in the island of Schouten in north-western New Guinea. These collections were the base of the first craniological investigations on Papuans, by P. MANTEGAZZA and E. REGALIA.

BECCARI's activity in the field also extended to the geographical features of the districts he visited. During the preparation of his expeditions, he had trained himself in geodetics and topography and he had also invented a new instrument (*Nuovo orizzonte artificiale*, *Rivista Marittima* 6, 1873, 198–200, f. 1–5) for topographic surveys. During his travels he also made a topographic survey of several territories, particularly of the northwestern parts of New Guinea. These surveys later allowed G. CORA to prepare the maps he published in *Cosmos* (see Appendix 1, C: Maps). He also discovered a great river, War Samson, in northwestern New Guinea, near Sorong.

Even though BECCARI had succeeded in assembling such enormous and invaluable collections, his fame is mainly due to his scientific work condensed into more than 150 publications, some of which consist of monographs of basic importance and those on palms especially still remain standard works even today.

BECCARI's versatile mind allowed him to devote his attention to problems in different branches of natural science, but he carried out his activity chiefly in botany. In the first period, during which he made the great expeditions to Malesia, his botanical activity was essentially applied to the study of a part of his collections; the result was published mainly in the *Nuovo Giornale Botanico Italiano* which he founded in 1869. Even if some of these papers were written here and there during his explorations, his scientific output in this period was necessarily small.

With the end of his explorations in Malesia, the second period of BECCARI's activity begins. Probably he was unsatisfied when he limited himself to the descriptions of new genera and species, and in this period he spread his field of research to the monographic or semi-monographic treatment of those families or genera from Malesia which had most attracted him. In this period BECCARI also undertook, at his own expense, the publication of a collection of botanical writings, *Malesia*, in order to facilitate the printing of his papers dealing with his Malesian plants and the reproduction of his splendid drawings. For this purpose he selected the quarto size. In *Malesia* he published some of his most outstanding works. The end of its publication in 1890 marks the end of this second period of his scientific activity and also the end of the study of his own collections from Malesia.

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After about a decade of complete scientific inactivity, due to the sad vicissitudes of his academic life and the end of *Malesia*, BECCARI published *Nelle foreste di Borneo* in 1902. This year coincides with the resumption of his scientific studies and marks the beginning of the third period of his botanical research in which he devoted himself entirely to the study of the family of palms, becoming the best specialist who ever existed.

In the following pages we want to go into more detail about the subjects contained in the massive oeuvre of the Maestro. Confronted with the multitude of his activities we hope to weave this into a readable account, with a distinct feeling that our ability for writing falls short of the way in which BECCARI could express himself, as testified by his '*Wanderings*', which is still a thrilling guide for exploration in the tropics.

Let us start with this work on Sarawak, the core of his main work in Malesia. He worked under favourable conditions, having ample equipment and time at his disposal, and the support of the Tuan-muda, CHARLES BROOKE. His big hut, called 'Vallombrosa' on Gunong Mattang, a hill west of Kuching, was used as a study centre. From there he made excursions and gradually familiarized himself with the very rich flora of the primary forest. He focussed attention on the big trees (*Dipterocarpaceae*, *Bombacaceae*, and others) as well as on the evasive tiny creatures of the saprophytic *Triuridaceae* and *Burmanniaceae*, the parasitic plants, the lianas and so forth, making beautiful and exemplary complete specimens in a skilled, professional way. This was, especially with unwieldy plants such as palms and pandans, gingers and aroids, quite an effort, as every field botanist must be aware. Perseverance and patience fed by infinite interest must have induced him to take particular care with these groups.

A special characteristic is that he knew his plants; hardly ever did he make two collections of the same species. As a scientific collector he was never equalled, and only approached by E.J.H. CORNER and L.J. BRASS. What a contrast with most other collectors who, even today, stick to the disgusting grab-as-grab-can way of collecting on hurried cross-country trips, causing heavy duplication and absence of vital field notes.

How BECCARI managed all this at the age of 22, with only a few months training in tropical form knowledge at Kew, can only be understood if we imagine him as an extraordinarily gifted person with an intense interest in botany; botany in the widest sense, because he was not satisfied only with the taxonomy of flowering plants, but collected for example also wood samples and cryptogams of all major phyla. His horizon widened to collecting minerals and all sorts of animals, observations on vegetation types, on edible and horticultural plants, and the way of life of his companions, the Dayak people; in short, he possessed the integrated interest of a born all-round naturalist, whose scope went far beyond the mere plant collecting and description in which he excelled. BECCARI assembled a great wealth of data on the geographical features of Borneo, on the matter of useful and horticultural plants, on fibres, rattan, bamboos, resins, camphor, getah percha yielding trees, and medicinal plants. He was aware of the primitive domestication of species of *Durio* (durian), *Eugeissona* (a palm), *Artocarpus* (breadfruit), bananas and species of *Nephelium*, which he learned from observation of Dayak life. BECCARI briefly reported on these subjects in a short summary of his journey in Sarawak to the Italian Geographical Society (1868), and later he incorporated the complete data in some appendices to his book *Nelle foreste di Borneo*. Probably, when gliding easily in canoes on the rivers or proceeding with difficulty on the mysterious peat of the swamp forests during his long journey in the interior of Sarawak, he ventured on ideas about the origin of coal in Borneo – in which he was correct. When hunting for orang-utan in Batang-Lupar or excavating in the limestone caves of Sarawak he made his first guesses about the origin of man, which he developed in *Nelle foreste di Borneo*.

He surely must have had a very busy life in his 'Vallombrosa', because he could never have con-

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ceived the *'Wanderings'* thirty years later without having copious notes of his field observations and full diaries. He must also have started in the field to compose botanical papers and preliminary revisions; when still in Sarawak he published some small papers in Italy. BECCARI was much enchanted with Sarawak, the flora, the country, and the Dayak people, and he even conceived a project that the Italian government should purchase it as a crown colony.

When BECCARI returned from Borneo to Florence he founded the *Nuovo Giornale Botanico Italiano*, in which he published freely some papers on spectacular Bornean plants; but before leaving for the expedition to New Guinea he handed over the journal to T. CARUEL, since it would be difficult both to edit it and to explore in Malesia. When, loaded with further materials, manuscripts, field notes and drawings, he returned from New Guinea to Florence, he realized the difficulty of publishing the botanical results of his explorations in the *Nuovo Giornale Botanico Italiano*. Thus he decided to undertake a collection of writings he named *Malesia*, in which he concentrated nearly all his works of that period. The first two instalments of it were published during his one year interval, spent in Florence, between the last expedition to New Guinea and the journey to Australia, New Zealand and Sumatra, and the third one appeared during the last mentioned journey. He undoubtedly must have worked very hard during that period, but he was able to manage it thanks to his efficient organization en route and the help of his friend R. GESTRO in Genoa, where *Malesia* was printed.

BECCARI published in *Malesia* several works which are important for the subject in itself, but also various original considerations about some particular subjects, such as evolutionary processes, dispersal of seeds, geographical distribution, etc. are dealt with in them. First should be mentioned the extensive work on the ant plants devoted to the study of the symbiosis between plants and ants, which occupies the entire second volume. In it, BECCARI gives us his interesting views on the evolution and the common origin of plants and animals, discussing concepts still valid and topical today. Likewise of great interest are his considerations on the origin of the insectivorous plants and the distribution of plants in the Malesian archipelago, dealing especially with the *Nepenthaceae*. Other important works are the monograph on the genus *Phoenix* and the account of the palm genus *Pritchardia* in which he resumes his considerations on the dispersal of seeds and fruits and the origin of the flora of the Pacific islands. The three volumes of *Malesia* contain also a number of monographic or semi-monographic revisions of families and genera from Malesia, e.g., *Icacinaceae*, *Menispermaceae*, *Nepenthes*, *Bombacaceae*, *Triuridaceae*, *Burmanniaceae*, etc., and also a first survey of the palms of New Guinea.

We can conclude that *Malesia* was intended to embody the botany of Malesia as a repository. It must have aroused great interest in the botanical world, containing novelties of fascinating plants with marvellous drawings made by BECCARI himself, a 'must' for every botanical institute. The use of the Italian language, even for monographic contributions from non-Italian collaborators, e.g., on *Araceae* by ENGLER, was certainly an obstacle to a wide sale, and the edition was subvented from Italian sources and the third and last volume could only appear thanks to the aid of the BENTHAM Trustees.

Whether BECCARI ever intended or hoped to achieve an ultimate incorporation of all the monographs of Malesian plant families, that is, an attempt towards a true *Flora Malesiana*, remains uncertain. The fact that he had certainly intentionally explored all areas of Malesia, except the Philippines, and that the first instalments of *Malesia* contained several monographic treatises, may support this idea. What is certain is that he fully realized that he could never dream of accomplishing all this himself. Accordingly he freely entrusted many groups to colleagues in Italy and to his many correspondents abroad as appears from the bibliography in Appendix 4.

Through the distributed duplicates BECCARI's material went to various herbaria and later came

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into the hands of specialists, but much of his original collection, embodied in the original Herbarium Beccarianum, has not been examined by specialists. This original material is separately shelved in Florence, 400 bundles in 33 cupboards; to it belong a card system with field data and a cover with drawings; there is a rather large number of unicates or collections of which no duplicates were distributed. In 1951 VAN STEENIS very roughly sampled a number of families and found that BECCARI often had indicated and annotated genera *in sched.* as new, which were later based on other material, e.g., *Koordersiodendron* ENGL. (1898), *Clavistylus* J.J.S. (1910), *Neosepicaea* DIELS (1922), *Octamyrtus* DIELS (1922), *Haplolobus* H.J. LAM (1931), *Kjellbergiodendron* BURRET (1936), *Macadamia hillebrandii* STEEN. (1952), *Eriandra* v. ROYEN & STEEN. (1952), *Whiteodendron* STEEN. (1952).

It is a pity that in the past five decades too little initiative has been taken by the curators of the Florence Herbarium to attract and induce specialists to study the original BECCARI collections in Florence. We suppose that it is due to the understaffing of this great Herbarium. Especially the Herbarium Beccarianum is not a reliquia, not a closed chapter, but truly a thesaurus, still containing unknown botanical treasures.

As this is not always realized by specialists, we urge them to borrow material of their speciality from this century-old, inexhaustible source. We sincerely hope that a revival of interest in the Herbarium Beccarianum is welcome to the future curators of the Florence Herbarium. Its possession brings with it the scientific obligation of using it, not just in honour of the Maestro, but mainly for the benefit of scientific botany and as a contribution to the fame of the Florence centre.

After publication of *Nelle foreste di Borneo* in 1902, BECCARI decided to concentrate, for the rest of his life, on the study of one large family on which he possessed more field knowledge than anyone, before or since, namely the palms. His first contribution to their knowledge dates from 1871, with a provisional account of those of Borneo. Old love never dies! In 1877 he had accounted for the palms of New Guinea, in 1885 for those cultivated in the Botanic Gardens at Bogor, but in about 1890 he spread his wings towards those beyond Malesia, the Indian empire, Indo-China, and later to Madagascar, Africa, the Pacific islands, etc. Everybody entrusted him with palm material and from this emanated a massive knowledge of Asiatic palms, embodied partly in the Records of the Botanical Survey of India, in HOOKER's Flora of India, partly later in *Webbia*, founded by his old pupil and friend U. MARTELLI, but largely in the sumptuous volumes of the *Annals of the Royal Botanic Garden, Calcutta*, which also included those of Malesia. For the large folio plates of these massive plants BECCARI designed a special large camera with suitable accessories in order to achieve excellent illustrations¹. He devoted his attention mainly to the taxonomy of palms, but he also studied the cultivated species in some works which appeared in *L'Agricoltura Coloniale*, edited by that Institute once named Istituto Agricolo Coloniale, now Istituto Agronomico per l'Oltremare of which he had solicited the foundation in 1903. Of this big work a large number of unpublished manuscripts appeared in print after his death, through the untiring devotion of his pupil, friend, and colleague MARTELLI, who must be given a tribute of honour for his singularly unselfish efforts. The last of the manuscripts on palms which BECCARI left unfinished, that of the subfamily *Arecoideae*, was completed and published by PICHI SERMOLLI in 1955. We should also refer here to MOORE's important and competent evaluation of BECCARI's massive contribution to the knowledge of the fascinating palm family.

(1) The large camera and other microphotographic cameras designed by BECCARI are described by LUIGI PAMPALONI, *Apparecchio fotografico universale per laboratorio biologico ideato dal Dottor Beccari*. Rend. Congr. Bot. Naz. Palermo (1903) 164–168, cum fig., and *Gli apparecchi microfotografici del Dott. O. Beccari*. Bull. Soc. Fotogr. Ital. 14 (1902) 129–145, fig. 1–7.

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Dealing with his botanical activity we cannot silently pass over his descriptive work. Also in this BECCARI excelled and showed that he had a remarkable insight into affinities. It appears that his new genera were always placed in the proper plant family and, moreover, that hardly ever were new species proposed by him reduced later, stamping him as a most accurate taxonomist. Indeed he was a taxonomist, but BECCARI showed his sharp intelligence in other branches of botany often including his considerations in taxonomical papers. Describing the details of *Gnetum* led him to considerations about the ancestry of the flowering plants from the Gymnosperms. The plant geography of the palms led him to hypothetical ideas about former landbridges and sunken continents. His gatherings in Sumatra led him to consider the affinities of its flora with those of South-east Asia and Java, concluding that the flora of volcanic ranges must be much younger than that of the more ancient and more stable Sunda lands. Other observations deal with the dissemination by earthworms; the double dispersal, anemochorous and zoochorous, of the plants of the periodic swamp forest provided with floating fruits and succulent seeds; pollination by pigeons; the various colours of flowers of the forest plants, and some others on physiology and ecology.

BECCARI also left traces of his versatile genius in various writings (papers and letters to his friends) which lie outside botany but must be mentioned briefly to understand how great he was as a naturalist. Particularly interesting are the letters to E.H. GIGLIOLI and G. CORA in which he disclosed his views on the origin of the peoples of Malesia, in particular of the Papua-Mafor which he regarded as derived from a crossing of aboriginals, perhaps descended from Negritos and Hindu peoples. Other interesting observations are those on the connections between mosquitos and malaria which he was one of the first to suppose, those on the agent of the bee pest which he suspected to be due to a protozoon later discovered in America, those on the connections between flies and cholera and numerous other observations particularly on the customs of animals.

It was in Borneo that BECCARI perceived the true value of evolution and was primarily fascinated by the importance of adaptation to environmental conditions. But only later did his views on the processes of evolution take shape in his mind. It is a fact that the prolonged stays of gifted naturalists in the tropical wilderness, when their minds are set free from daily minutiae and domestics and solely occupied with the bewildering structural wealth of tropical plants and animals, allows their minds to open to new, big ideas and syntheses, generating philosophical thought. For this, one has only to think of VON HUMBOLDT, JUNGHUHN, WALLACE, DARWIN, and CORNER. To this, BECCARI, with his eager mind and astute power of observation, was no exception.

BECCARI was used to going back from the facts to the causes, and his views on the evolutionary processes, which arose from the observations he made in nature, were consolidating in his mind in the course of time. Thus we find his views sketched in some papers and later resumed in others, whenever he had the chance to develop them on the basis of particular new observations. He did not supply us, or perhaps he did not want to supply us, with a synthesis of his views on evolution in an *ad hoc* publication, perhaps out of humility, since he disliked giving the impression that he was able to explain the laws of evolution, or perhaps out of honesty, because he perceived that his ideas had made their way into his mind by intuition and reasoning, without adequate investigation.

BECCARI was undoubtedly an evolutionist, but he was one in a very original manner. The first foundation of his theory of '*plasmation*' was explained in his paper (1876) on the huts and gardens of *Amblyornis inornata*, the small bower-bird of paradise which builds a pretty hut with, in front, a lovely garden of soft moss on which it scatters flowers in shining colours changing them when they wither. This theory was resumed in the introduction to his work on ant plants (1884) and was later developed in his paper (1889) on the flowering of *Amorphophallus titanum*, the gigantic Aracea, and was summarized in his book, *Nelle foreste di Borneo*.

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According to this theory the evolutionary processes of living beings took place, beginning with the most ancient geological times, fundamentally in two different epochs: a first epoch of *plasmation*, and a second epoch of *conservative heredity*, displaying in the course of time the two fundamental rules of variability and fixity. In the first epoch, the plasmative strength, unhindered by heredity, may have given free play to the variability and to the adaptation stimulated by environmental conditions. In that epoch, the organism may have been liable to yield to the stimulus of external factors and more subject to modelling itself to them, the modifications occurring with the greatest of ease and even quite suddenly without the offspring necessarily being like the parents. This epoch may have been a period of youth for living beings in which each individual was allowed to modify itself in conformity with its needs, or rather even according to its wishes, its vanities, its whims.

This epoch of plasmation, with a maximum of variability and a minimum of fixity, may have been followed by an epoch of conservative heredity, characterized by that strength which aims at the conservation of the acquired characters and owing to which the individuals belonging to a species transmit to their descendants the characteristics they have inherited from their ancestors. Thus the plasmative epoch may have been replaced by an epoch with a minimum of variability and a maximum of fixity. The strength of the conservative heredity becoming stronger in the course of time may consequently have weakened the faculty to vary, perhaps even to cancel it entirely, thus impressing the stamp of fixity on all living beings.

He recognized the great influence of environmental factors on the plasmation of living beings and pointed out several cases of correlation between the morphology of some apparatuses and the environmental factors. For instance, he was the first to correlate the life form of flood-resistant plants with the environment and was struck by their similarity in leaf-shape: his 'stenophyllous plants', now called 'rheophytes'. A still more important correlation amply studied by him was that of the symbiosis between plants and ants, the 'piante ospitatrici', or formicarian plants, to which he devoted a very large and detailed account (1884). However, he clearly and repeatedly recognized that plasmation could also be stimulated by an interior strength, by the wish of having some particular functions facilitated, such as defence, pollination, seed dispersal, etc. But BECCARI also supposed that plasmation was even influenced, particularly in the animal kingdom, by a psychic push stimulated by the beauty of the environment, as could have happened in the birds of paradise desirous of imitating with their feathers the glowing colours of the aurora and dusk of the tropics, which they greet from the highest trees of the forest with very lively dances.

Though recognizing that the extant being cannot, as a rule, undergo modifications because of the environment, BECCARI admitted however that even today some changes can take place in the species on account of a cross between individuals of different species or of the sudden appearance of hereditary modifications of various, even if unknown, origin. He admitted that these could be induced by new poisonous substances or by new enzymes arising in the substratum; thus he foresaw the existence of mutations and mutagenic substances.

BECCARI was a man of great intelligence, versatility and intuition, who united an exceptional personality and liberality with uncommon integrity and strength of mind. He was an indefatigable worker, who devoted hours and hours to his research, without a moment of rest. But he did not work out of a wish to be praised; prizes and honours did not interest him. He loved his research studies since he was zealous of the beauty and perfection of nature and only happy when he could entirely devote himself to investigating its manifold and marvellous aspects. For the same reason he liked to draw plants and animals and very few excelled him in scientific drawing.

BECCARI had an austere and inflexible character, but he was neither obstinate nor autocratic. His temperament was based on a keen sense of duty. Also in private life, although deeply fond of

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his wife, sons and friends, every action was characterized by a clear austerity, and he was greatly beloved but at the same time he always inspired a certain awe. But this austerity concealed a great goodness of heart.

He had also a great sense of justice and was a very courageous and stalwart man. These gifts united with the wish to inspire respect and love rather than fear, were greatly esteemed by native people and on his dangerous expeditions he never suffered injury from anybody. Undoubtedly he must have encountered serious danger, but he faced them with resolution, and he recounts them with indifference and without boasting.

BECCARI is described as a proud, almost misanthropic spirit and perhaps he was not an easy character and we understand why some regarded him as a troublesome person. From his youth, moulded in his long and solitary explorations in Malesia, he was set apart, destined to travel and to work alone, and he was not afraid of solitude; on the contrary, in his ripe age he found refuge in it, the better to devote himself to his studies and serve his single purpose and sole end: the science of nature.

R.E.G. PICHİ SERMOLLI & C.G.G.J. VAN STEENIS

Appendix 1 — Bibliography of Odoardo Beccari

A — Books and papers
(excluding reviews of books)

1861. Escursione botanica. — L'Araldo Cattolico, Lucca, anno XVIII, 14 agosto 1861, n. 33: 264 (not seen).
1862. Illustrazione dell'*Arnoldia cyathodes* Massal. — Comment. Soc. Crittog. Ital. 1: 128–130, t. 7.
1868. Descrizione di tre nuove specie di piante Bornensi. — Atti Soc. Ital. Sc. Nat. 11: 197–198. — Cenno di un viaggio a Borneo. — Boll. Soc. Geogr. Ital. 1: 193–214.
1869. Illustrazione di nuove specie di piante Bornensi. (*Balanophoreae*, *Rafflesiaceae*). — Nuovo Giorn. Bot. Ital. 1: 65–91, t. 2–5.
— Varietà e notizie. — Ibid.: 158–160.
— Lamenti del Redattore. Rivista bibliografica. — Ibid.: 222–224.
1870. Illustrazione di nuove specie di piante Bornensi. (*Aristolochiaceae*). — Nuovo Giorn. Bot. Ital. 2: 5–8, t. 1.
— Nota di una nuova specie del genere *Stenomeris*. — Ibid.: 8–12, t. 2.
— Nota sul *Trichopodium zeylanicum* Thw. — Ibid.: 13–19, t. 3.
— Nota sull'embrione delle *Dioscoreaceae*. — Ibid.: 149–155, t. 4.
— *Disepalum coronatum* nuova specie di *Anonacea bornense*. — Ibid.: 155–156, t. 5.
— (O. Antinori & A. Issel). Relazione sommaria del viaggio nel Mar Rosso dei Signori Antinori, Beccari e Issel. — Boll. Soc. Geogr. Ital. 5(2): 43–60.
1871. Descrizione di due nuove specie di *Hydnora* d'Abissinia. — Nuovo Giorn. Bot. Ital. 3: 5–7.
— *Petrosavia*. Nuovo genere di piante parassite della famiglia delle *Melanthaceae*. — Ibid.: 7–11, t. 1.
— Note sopra alcune palme Bornensi. — Ibid.: 11–30.
— *Le Hydrocotyle* d'Europa. — Ibid.: 102.
— Sui generi *Bihania* ed *Eusideroxylon*. — Ibid.: 102–103.
— Cattedra di Botanica nell'Università di Torino. — Ibid.: 103–104.
— Illustrazione di nuove o rare specie di piante Bornensi. (*Anonaceae*). — Ibid.: 177–193, t. 2–7.
1874. Descrizione di una nuova specie del genere *Myrmecodia* della famiglia delle *Rubiaceae*. — Nuovo Giorn. Bot. Ital. 6: 195–197, t. 6.
1875. Osservazioni supra alcune *Rafflesiaceae*. — Nuovo Giorn. Bot. Ital. 7: 70–75.
1876. Le Capanne ed i Giardini dell'*Amblyornis inornata*. — Ann. Mus. Civ. St. Nat. Genova 9: 382–400, t. 8.
— Lettera del Dr. A.B. Meyer al Mse. G. Doria (con nota di O. Beccari). — Ann. Mus. Civ. St. Nat. Genova 8: 333–334.
1877. Relazione intorno alla Baia di Assab. — Cosmos 4: 230–232.
— Della organogenia dei fiori feminei del *Gnetum gnemon* L. — Nuovo Giorn. Bot. Ital. 9: 91–100, t. 7 (reprinted in Amer. Journ. Sc. 13: 469–471).
— Sulla *Cardiopteris lobata* Wall. — Nuovo Giorn. Bot. Ital. 9: 100–108, t. 8.
— Die Flora der Aru-Inseln. — Ausland 50: 759–760.
— Sul nuovo genere *Scorodocarpus* e sul genere *Ximenia* L. della famiglia delle *Olacineae*. — Ibid.: 273–279, t. 11.

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- Della disseminazione delle palme. — Bull. R. Soc. Tosc.ortic. 2: 167–173.
- Il sagu della Nuova Guinea, *Metroxylon rumphii* Mart. — Ibid.: 247–249.
- Catalogue of the plants of the Fly River (New Guinea) collected by De Albertis, 1877. — Journal of Melbourne Logbook 30 Jan. 1877 (not seen).
- Le specie di palme raccolte alla Nuova Guinea da O. Beccari e dal medesimo adesso descritte, con note sulle specie dei paesi circonvicini. — Malesia 1: 7–96, t. 1 & 2.
- Nuove osservazioni sulle palme della Nuova Guinea. — Ibid.: 97–102.
- Studio monografico sopra le piante della famiglia della Icaceae e delle Menispermaceae sin qui scoperte nella Malesia e nella Nuova Guinea. — Ibid.: 103–165, t. 3–8.
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B — Letters by Odoardo Beccari

During his travels BECCARI wrote several letters to his friends in Italy, chiefly to G. DORIA, E.H. GIGLIOLI, G. CORA, T. SALVADORI, R. GESTRO, and O. ANTINORI. They contain a wealth of very interesting observations and comments on the botanical, zoological, ethnological and other naturalistic aspects of Malesia. These letters or fragments of them were published in various Italian periodicals, usually accompanied by information and comments on BECCARI's scientific discoveries, and on the itineraries and the main events of his adventurous travels.

The bibliographic citations of the papers in which these letters are published are given below together with an indication of the name of the friend to whom the letter was addressed, and the date and place in which it was written. In order to facilitate and render more systematic the consultation of these letters, they are quoted according to the periodicals in which they were published.

Letters published in the *Nuova Antologia*

BECCARI's travels in Malesia, Assab and the country of Bogos between 1865 and 1876 were described by ENRICO H. GIGLIOLI in various instalments published in the *Nuova Antologia* with the general title of 'Odoardo Beccari ed i suoi viaggi'. They were also reprinted, with independent pagination, and assembled in a special book (Firenze, Le Monnier, 309 pp., 9 fig., 2 small maps, 1872–76) with the title 'I viaggi del Dott. Beccari da Firenze tracciati e commentati'. There GIGLIOLI published several letters or fragments of letters by BECCARI to his friends and also some passages from his original diaries. All of them are quoted verbatim between GIGLIOLI's descriptions and comments.

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Letters published in *Cosmos*

The editor of the journal *Cosmos* of Turin, GUIDO CORA, gave ample information on BECCARI's travels in Malesia. He published several letters by BECCARI to his friends in Italy, which are listed below. Furthermore, CORA gave various reports on the different stages of BECCARI's journeys. The references to the latter are given in Appendix 3 dealing with BECCARI's itineraries.

Recenti spedizioni alla Nuova Guinea. Spedizione di Beccari e D'Albertis:

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2. Da Amboina a Sorong. — *Ibid.*: 15–20. (Letters to G. Doria, from Kapaor, April 21; Sorong, May 3 and June 21, 1872).

Recenti spedizioni alla Nuova Guinea. Esplorazioni di Odoardo Beccari:

1. Ricerche geografiche nella Nuova Guinea. — *Cosmos* 2 (1874–75) 7–9. (Letter to G. Cora, from Makassar, December 1, 1873).
2. Note sulle Isole Kei. — *Ibid.*: 9–10. (Letter to G. Cora, from Makassar, December 1, 1873).
3. Da Makassar a Kandari. — *Ibid.*: 92–96. (Letters to G. Doria, from Kandari, May 2 and 11, 1874).
4. Escursioni intorno a Kandari. Ritorno a Makassar. — *Ibid.*: 203–207. (Letters to G. Doria, from Kandari, June 4; Makassar, August 30, 1874).
5. Notizie sull'ornitologia di Celebes. — *Ibid.*: 207–208. (Letter to T. Salvadori, from Makassar, August 30, 1874).
6. Appunti etnografici sui Papua. — *Ibid.*: 400–404. (Letter to O. Antinori, from Makassar, August 28, 1874).
7. Soggiorno a Ternate. Da Ternate ad Amboina. Preparativi pel terzo viaggio alla Nuova Guinea. — *Cosmos* 3 (1875–76) 83–88. (Letters to G. Doria, from Amboina, January 4, 8, 9, 1875).
8. Da Amboina a Dorei, per Soron e Wakkaré. Scoperta del fiume Wa Samson. Esplorazione della baia di Geelvink, determinazione della sua vera ampiezza. — *Ibid.*: 88–92. (Letter to G. Doria, from Dorei, June 5, 1875).
9. Esplorazione dei Monti Arfak. Ritorno a Ternate per la via di Salvatti, Batanta, Koffiao. — *Ibid.*: 92–95. (Letters to G. Doria, from Andai, June 15; Hatam, June 21; to T. Salvadori, from Ternate, August 4, 1875).
10. Viaggio a bordo del trasporto olandese 'Soerabaja'. Itinerario progettato. Da Ternate a Dorei, per Salvatti. Visita ad Ansum. Lavori idrografici. — *Ibid.*: 220–221. (Letters to G. Doria, from Ternate, November 7; Dorei, November 26, 28, 1875).
11. Viaggio a bordo del trasporto olandese 'Soerabaja'. Da Dorei alla baia di Humboldt per la baia Vandamen, l'isola Run, il sud di Jobi, le foci dell'Ambermo. — *Ibid.*: 349–352. (Letter to G. Cora, from Ternate, March 11, 1876).
12. Saggio statistico sulla Nuova Guinea Olandese. Popolazione, Commercio, Climatologia, Nomenclatura. — *Ibid.*: 352–360. (Letter to G. Cora, from Ternate, March 11, 1876).
13. Viaggio a bordo del trasporto olandese 'Soerabaja'. La Baia di Humboldt ed i suoi abitanti.

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La Baia del Disinganno, il Vulcano Ciclope e le isole Arimoa. — Ibid.: 364–372. (Letter to E.H. Giglioli, from Ternate, March 6, 1876).

14. Viaggio a bordo del trasporto olandese 'Soerabaja'. Dalla Baia di Humboldt a Ternate pel nord di Jobi, Dorei, Waigheu, Misol, il golfo Mac Cluer, la baia Gouns, Ghesser, Amboina. — Ibid.: 372–374. (Letter to E.H. Giglioli, from Ternate, March 6, 1876).
15. Questioni etnologiche sui Papua. — Ibid.: 375–379. (Letter to E.H. Giglioli, from Ternate, March 6, 1876).

Letters published in various journals

- Il viaggio di O. Beccari alla Nuova Guinea. — Nuov. Giorn. Bot. Ital. 4 (1872) 208–212. (Letters to a friend of Florence, from Wahai, N. Ceram, March 13; Ambon, March 21, 1872).
- Il viaggio di O. Beccari alla Nuova Guinea. — Ibid.: 291–294. (Letters to G. Doria, from Kapaor, April 21; Sorong, June 21, 1872).
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- Una pianta meravigliosa. — Bull. R. Soc. Tosc.ortic. 3 (1878) 270–271. (Letter to R. Corsi Salviati, from Sumatra, without date. Comment by E.O. Fenzi).
- Lettera ornitologica di O. Beccari intorno agli uccelli osservati durante un recente viaggio alla Nuova Guinea. — Ann. Mus. Civ. St. Nat. Genova 7 (1875) 704–720. (Letter to T. Salvadori, from Ternate, August 4, 1875. Introduction by T. Salvadori).
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C — Maps

In the period of preparation for his travels BECCARI carefully trained himself also in geodetics and topography. He also invented a new instrument (Nuovo orizzonte artificiale) for topographic survey.

During his explorations BECCARI devoted great attention to the topography of the places he visited and his surveys allowed him to draw some maps which greatly contributed to the delimitation of the coasts of certain areas of the Malesian Archipelago.

Some of these maps were published by BECCARI himself, others were utilized by G. CORA, together with surveys of other explorers, to elaborate some of the maps published in his periodical *Cosmos*.

BECCARI's itineraries are traced on all maps listed below.

Carta originale del viaggio di Beccari e d'Albertis nella Nuova Guinea ovest (Aprile 1872), costruita e disegnata da Guido Cora. Scala 1:700.000. — *Cosmos* (G. Cora) 1 (1873–74) Tav. I. — Explanatory notes in Cora G. *Recenti spedizioni alla Nuova Guinea. Memoria sulla Tavola I.* — Ibid.: 22–24.

Carta originale del viaggio di O. Beccari nel Sud-est di Celebes (Maggio–Agosto 1874), costruita e disegnata da Guido Cora. Scala 1:1.200.000. — Ibid. 2 (1874–75) Tav. V. — Explanatory notes in Cora G. *Viaggio di O. Beccari nel Sud-est di Celebes. Note sulla Tavola V.* — Ibid.: 201–202.

Carta originale della Nuova Guinea N.O. e delle isole Salvatti, Batanta, William, ecc. secondo i rilievi originali di Lovera, Cerruti, Beccari e le esplorazioni anteriori costruita e disegnata da

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- Guido Cora. Scala 1:1.000.000. — *Cosmos* (G. Cora) 3 (1875) Tav. II. — Explanatory notes in Cora G. Recenti spedizioni alla Nuova Guinea. Note sulle Tavole II e III. — *Ibid.*: 81–83.
- Carta originale della Baia di Geelvink e del litorale N.O. della Nuova Guinea secondo i rilievi di Odoardo Beccari, 1875 del Geelvink, di Duperrey, Dumont D'Urville, ecc. costrutta e disegnata da Guido Cora. Scala 1:1.800.000. — Including an inset map: Tracciato comparativo della Baia di Geelvink secondo la carta dell'Amm. Ingl. N° 2759a ed i rilievi di O. Beccari. Scala 1:4.800.000. — *Ibid.*: Tav. III. — Explanatory notes in Cora G. Recenti spedizioni alla Nuova Guinea. Note sulle Tavole II e III. — *Ibid.*: 81–83.
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- Abbozzo di carta (originale) del fiume Bintulu e suoi affluenti. — *Ibid.*: fig. 58 (p. 351).
- Carta del sistema idrografico e delle attuali divisioni politiche di Borneo, compilata sopra i documenti più recenti e le osservazioni dell'autore. — *Ibid.*: fig. 66 (p. 407).
- Carta originale degli itinerari dell'autore in Sarawak. — *Ibid.*: fig. 75 (facing page 504).
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Appendix 2 — Biographies of Odoardo Beccari

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- BARGAGLI PETRUCCI, G. L'opera biologica di Odoardo Beccari. *Pubbl. Ist. Stud. Sup. Firenze, Sez. Sci. Fis. Nat. In memoria di Odoardo Beccari*, pp. 5–16. 1921.
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- Brief Obituary, Itineraries and Bibliography — Manuscript compiled by Beccari's son Nello for *Flora Malesiana*, Oct. 1947 (in *Library Rijksherbarium, Leiden*).
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Appendix 3 — Accounts of Odoardo Beccari's itineraries in Malesia and Ethiopia (see also Letters and Maps)

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Appendix 4 — Studies based on Odoardo Beccari's botanical collections (incomplete)

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ABBREVIATIONS AND SIGNS

- acc. = according
 Ak. Bis. = Aklan Bisaya (Philip. language)
 Alf. Cel. = Alfuresse Celebes (language)
 alt. = altitude
 Anat. = Anatomy
 Ap. = Apáyao (Philip. language)
 app. = appendix, appendices
 appr. = approximate
 Apr. = April
 Arch. = Archipelago
 atl. = atlas
auct. div. = *auctores diversi*; various authors
auct(t). mal. = *auctores malayenses*; authors dealing with Malesian flora
auct(t). plur. = *auctores plures*; several authors
 Aug. = August
 Bag. = Bagóbó (Philip. language)
 basionym = original name of the type specimen; its epithet remains permanently attached to the taxon which is typified by it provided it is of the same rank.
 Bg. = Buginese (language)
 Bik. = Bikol (Philip. language)
 Bil. = Bilá-an (Philip. language)
 Bill. = Billiton
 Bis. = Bisaya (Philip. language)
 Bon. = Bontók (Philip. language)
 Born. = Borneo
 Bt = Bukit; mountain
 Bug. = Buginese (language)
 Buk. = Bukidnon (Philip. language)
 c. = *circiter*; about
 C. Bis. = Cebu Bisaya (Philip. language)
 cf. = *confer*; compare
 Chab. = Chabecáno (Philip. language)
 citations = see references
 cm = centimetre
 c.n. = see *comb. nov.*
comb. nov. = *combinatio nova*; new combination
 CS = cross-section or transversal section of an organ
 c.s. = *cum suis*; with collaboration
cum fig. = including the figure
cur. = *curante*; edited by
 D (after a vernacular name) = Dutch
 Daj. = Dyak (language)
 d.b.h. = diameter at breast height
 D.E.I. = Dutch East Indies
descr. added behind a reference = means that this contains a valid description
 diam. = diameter
 Distr. (as an item) = Distribution
 Distr. (with a geographical name) = District
ditto = the same, see *do*
 Div. = Division, or Divide
div. = *diversus* (masc.); various
do = *ditto* (Ital.); the same
 Dum. = Dumágat (Philip. language)
 dupl. = duplicate
 E = east (after degrees: eastern longitude)
 E (after a vernacular name) = English
 Ecol. = Ecology
 ed. = edited; edition; editor
 e.g. = *exempli gratia*; for example
elab. = *elaboravit*; revised
em(end). = *emendavit*; emended
 em(erg). ed. = emergency edition
 Engl. = English
etc., &c. = *et cetera*; and (the) other things
ex auctt. = *ex auctores*; according to authors
excl. = *exclusus* (masc.); excluding, exclusive of
ex descr. = known to the author only from the description
 f. (before a plant name) = *forma*; form
 f. (after a personal name) = *filius*; the son
 f. (in citations) = figure
 fam. = family
 Feb(r). = February
fide = according to
 fig. = figure
fl. = *flore, floret (floruit)*; (with) flower, flowering
 For. Serv. = Forest Service
fr. = *fructu, fructescit*; (with) fruit, fruiting
 Fr. (after a vernacular name) = French
 G. = Gunung (Malay); mountain
 Gad. = Gaddáng (Philip. language)
gen. = *genus*; genus
genus delendum = genus to be rejected
 Germ. = German
geront. = Old World
haud = not, not at all
 holotype = the specimen on which the original description was actually based or so designated by the original author
 homonym = a name which duplicates the name of an earlier described taxon (of the same rank) but which is based on a different type species or type specimen; all later homonyms are nomenclaturally illegitimate, unless conserved
 I. = Island
ib(id). = *ibidem*; the same, in the same place
 Ibn. = Ibanág (Philip. language)
ic. = *icon, icones*; plate, plates
ic. inedit. = *icon ineditum, icones inedita*; inedited plate(s)
id. = *idem*; the same
i.e. = *id est*; that is
 If. = Ifugáo (Philip. language)
 Ig. = Igorot (Philip. language)
 Ilg. = Ilongót (Philip. language)
 Ilk. = Ilóko (Philip. language)
in adnot. = *in adnotatione*; in note, in annotation
incl. = *inclusus* (masc.); including, inclusive(ly)
 indet. = indetermined
 Indr. = Indragiri (in Central Sumatra)
inedit. = *ineditus* (masc.); inedited
in herb. = *in herbario*; in the herbarium
in litt. = *in litteris*; communicated by letter
in sched. = *in schedula*; on a herbarium sheet
in sicc. = *in sicco*; in a dried state
in syn. = *in synonymis*; in synonymy
 Is. = Islands
 Is. (after a vernacular name) = Isiná (Philip. language)
 Ism. = Isámal (Philip. language)
 isotype = a duplicate of the holotype; in arboreous plants isotypes have often been collected from a single tree, shrub, or liana from which the holotype was also derived
 Iv. = Ivatán (Philip. language)
 J(av). = Javanese (language)
 Jan. = January
 Jr = Junior
 Klg. = Kalinga (Philip. language)
 Kul. = Kuláman (Philip. language)
 Kuy. = Kuyónon (Philip. language)
 Lamp. = Lampong Districts (in S. Sumatra)

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Lan. = Lánao (Philip. language)
 lang. = language
l.c. = *loco citato*; compare reference
 lectotype = the specimen selected *a posteriori* from the authentic elements on which the taxon was based when no holotype was designated or when the holotype is lost
 livr. = livraison, part
ll.cc. = *l.c.* (plur.)
 LS = longitudinal or lengthwise section of an organ
 m = metre
 M = Malay (language)
 Mag. = Magindanáo (Philip. language)
 Mak. = Makassar, Macassar (in SW. Celebes)
 Mal. = Malay(an)
 Mal. Pen. = Malay Peninsula
 Mand. = Mandáya (Philip. language)
 Mang. = Mangyán (Philip. language)
 Mar. = March
 Mbo = Manóbo (Philip. language)
 Md. = Madurese (language)
 Minangk. = Minangkabau (a Sumatran language)
min. part. = *pro minore parte*; for the smaller part
 mm = millimetre
 Mng. = Mangguágan (Philip. language)
 Morph. = Morphology
 ms(c), MS(S) = manuscript(s)
 Mt(s) = Mount(ains)
 n. = *numero*; number
 N = North (after degrees: northern latitude); or New (e.g. in N. Guinea)
 NE. = northeast
 nec = not
 neerl. = Netherlands, Netherlands edition
 Neg. = Negrito (Philip. language)
 N.E.I. = Netherlands East Indies
 neotype = the specimen designated to serve as nomenclatural type when no authentic specimens have existed or when they have been lost; a neotype retains its status as the new type as long as no authentic elements are recovered and as long as it can be shown to be satisfactory in accordance with the original description or figure of the taxon
 N.G. = New Guinea
 N.I. = Netherlands Indies
 no = *numero*; number
nom. = *nomen*; name (only) = *nomen nudum*
nom. al. = *nomen aliorum*; name used by other authors
nom. alt(ern). = *nomen alternativum*; alternative name
nom. cons(erv). = *nomen conservandum*, *nomina conservanda*; generic name(s) conserved by the International Rules of Botanical Nomenclature
nom. fam. cons. = *nomen familiarum conservandum*; conserved family name
nom. gen. cons. = see *nomen conservandum*
nom. gen. cons. prop. = *nomen genericum conservandum propositum*; generic name proposed for conservation
nom. illeg(it). = *nomen illegitimum*; illegitimate name
nom. leg(it). = *nomen legitimum*; legitimate name
nom. nov. = *nomen novum*; new name
nom. nud. = *nomen nudum*; name published without description and without reference to previous publications

nom. rej(ic.) = *nomen rejiciendum*; name rejected by the International Rules of Botanical Nomenclature
nom. seminudum = a name which is provided with some unessential notes or details which cannot be considered to represent a sufficient description which is, according to the International Rules of Botanical Nomenclature, compulsory for valid publication of the name of a taxon
nom. subnudum = *nomen seminudum*
nom. superfl. = a name superfluous when it was published; in most cases it is a name based on the same type as another earlier specific name
non followed by author's name and year, not placed in parentheses, and put at the end of a citation = means that this author has published the same name mentioned in the citation *independently*. These names (combinations) are therefore homonyms.
 Compare 56b line 5-4 from bottom. The same can happen with generic names.
 (*non* followed by abbreviation of author's name) before a reference (citation) headed by another author's name = means that the second author has misinterpreted the taxon of the first author.
 Compare p. 419a under species 47 the synonym *H. celebica*. DIELS misapplied the name *H. celebica* as earlier described by BURCK.
non al. = *non aliorum*; not of other authors
non vidi = not seen by the author
nov. = *nova* (femin.); new (species, variety, etc.)
 Nov. = November
 n.s. = new series
n. sp. = *nova species*; new species
n. (sp.) prov. = *nomen (specificum) provisorium*; provisional new (specific) name
n.v. = *non vidi*; not seen
 NW. = northwest
 Oct. = October
op.cit. = *opere citato*; in the work cited
 p. = *pagina*; page
 P. = Pulau, Pulu (in Malay); Island
 Pal(emb.) = Palembang
 Pamp. = Pampágan (Philip. language)
 Pang. = Pangasinán (Philip. language)
 paratype = a specimen cited with the original description other than the holotype
part. alt. = for the other part
 P. Bis. = Panay Bisáya (Philip. language)
 P.I. = Philippine Islands
 pl. = plate
plurim. = *plurimus*; most
p.p. = *pro parte*; partly
pr. max. p. = *pro maxima parte*; for the greater part
pro = as far as is concerned
prob. = *probabiliter*; probably
prop. = *propositus*; proposed
 Prov. = Province
pr.p. = *pro parte*; partly
 pt = part
quae est = which is
quoad basionym, syn., specimen, etc. = as far as the basionym, synonym(s), specimen(s), etc. are concerned
 references = see for abbreviations the list in vol. 5, pp. cxlv-clxv
 Res. = Residency or Reserve
 resp. = respective(ly)

Abbreviations and signs

S = south (after degrees: southern latitude)
S (after a vernacular name) = Sundanese (language)
Sbl. = Sambáli (Philip. language)
SE. = southeast
sec. = *secus*; according to
sect. = *sectio*; section
sens. ampl. (ampliss.) = *sensu amplo (amplissimo)*;
in a wider sense, in the widest sense
sens. lat. = *sensu lato*; in a wide sense
sens. str. (strictiss.) = *sensu stricto (strictissimo)*; in
the narrow sense, in the narrowest sense
Sept. = September
seq., seqq. = *sequens, sequentia*; the following
ser. = series
s.l. = *sensu lato*; in a wide sense
S.-L. Bis. = Samar-Leyte Bisaya (Philip. language)
Sml. = Sámál (Philip. language)
s.n. = *sine numero*; (specimen) without the collec-
tor's number
Sp. = Spanish (language)
sp(ec). = *species*; species
specim. = specimen(s)
sphalm. = *sphalmate*; by error, erroneous
spp. = *species*; species (plural)
Sr = Senior
s.s. = see *sens. str.*
ssp. = *subspecies*; subspecies
s.str. = see *sens. str.*
stat. nov. = *status nova*; proposed in a new rank
Sub. = Subánúm (Philip. language)
subg(en). = *subgenus*; subgenus
subsect. = *subsectio*; subsection
subsp. = *subspecies*; subspecies
Sul. = Súlu (Philip. language)
Sum. E.C. = Sumatra East Coast
Sum. W.C. = Sumatra West Coast
Suppl. = Supplement
SW. = southwest
syn. = *synonymum*; synonym
synonyms = the names of taxa which have been re-
ferred to an earlier described taxon of the same
rank and with which they have been united on
taxonomical grounds or which are bound together
nomenclaturally
syntypes = the specimens used by the original author
when no holotype was designed or more specimens
were simultaneously designated as type
t. = *tabula*; plate
Tag. = Tagálog (Philip. language)
Tagb. = Tagbanúa (Philip. language)
Tagk. = Tagaká-ólo (Philip. language)
Tapan. = Tapanuli (in NW. Sumatra)

taxon = each entity throughout the hierarchic ranks
of the plant kingdom which can be described and
discriminated from other taxa of the same rank
Taxon. = Taxonomy
Tg = Tandjung (Malay); cape
Ting. = Tinggián (Philip. language)
Tir. = Tirurai (Philip. language)
transl. = translated
type = each taxon above the rank of a species is typi-
fied by a type belonging to a lower rank, for in-
stance a family by a genus, a genus in its turn by
a species; a species or infraspecific taxon is typified
by a specimen. The name of a taxon is nomenclatu-
rally permanently attached to its type; from this it
cannot be inferred that the type always represents
botanically the most typical or average structure
found in the circumscription of the taxon.
type specimen = the specimen or other element to
which the name of a species or infraspecific taxon
is (nomenclaturally) permanently attached; botani-
cally a type specimen is a random specimen on
which the name was based by description. There-
fore, it does not need to represent the average or
most typical representative of a population. See
holotype, isotype, lectotype, syntype, paratype,
and neotype
typ. excl. = *typo excluso*; type excluded
typ. incl. = *typo incluso*; type included
typus = see type and type specimen
var. = *varietas*; variety
var. nov. = *varietas nova*; new variety
Vern. = Vernacular
vide = see
viz. = *videlicet*; namely
vol. = volume
W = west (after degrees: western longitude)
Yak. = Yakán (Philip. language)
± = about
& = and
∅ = diameter
♂ = male (flower, etc.)
♀ = female (flower, etc.)
♂, ♀ = bisexual (flower)
(♂) (♀) = dioecious with unisexual flowers
(♂♀) = monoecious with unisexual flowers
(♂♀) = polygamous
(♀♀) = polygamous
∞ = many
> = more than (in size, number, etc.)
< = less than (size, number, etc.)
× 2/5 = 2/5 of natural size
× *montana* = means that the epithet *montana* is that
of a hybrid