

The scientific career of the zoologist Max Wilhelm Carl Weber (1852–1937)*

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Abstract

It is shown that the pinnacle of Max Weber's scientific career was the organization and leadership of the Siboga Expedition to the former Netherlands East Indies (now Indonesia) in the years 1899–1900. Before that time, as Professor of both General and Special Zoology at the University of Amsterdam, he had devoted his research mainly to the anatomy of mammals, which resulted in the fundamental reference work *Die Säugetiere* published in first edition in 1904.

Just before his departure with the Siboga Expedition Weber was appointed Extraordinary Professor of Special Zoology in Amsterdam. This gave him more time to edit the results of the Siboga Expedition and for taxonomic studies, especially on the fishes of the Indo-Australian Archipelago. Nevertheless he kept a keen interest in general zoology, which resulted in his extensive contribution to the modern textbook *Lehrbuch der Biologie für Hochschulen* co-authored by Moritz Nussbaum and Georg Karsten, published in first edition in 1911.

Weber retired in 1921 and by the time he died in 1937 about 95% of the scientific results of the Siboga Expedition had been published – an outstanding achievement.

Résumé

On montre que le sommet de l'activité scientifique de Max Weber est représenté par l'organisation et la direction de l'Expédition Siboga aux Indes Orientales Néerlandaises (actuellement Indonésie), en 1899–1900. Avant cette période il s'était dédié – comme Professeur de Zoologie Générale et Spéciale à l'Université d'Amsterdam – à des recherches sur l'anatomie des mammifères, recherches devant aboutir à la publication (1ère édition en 1904) de son solide ouvrage de référence *Die Säugetiere*.

Avant son départ pour l'Expédition Siboga, Weber avait été nommé Professeur Extraordinaire de Zoologie Spéciale à Amsterdam. Ceci lui avait donné le temps nécessaire au travail d'édition des résultats de l'Expédition Siboga ainsi qu'à des recherches taxonomiques, surtout sur les poissons de l'archipel Indo-Australien. Cependant, il avait gardé beaucoup d'intérêt pour la zoologie générale, le résultat étant sa considérable contribution au manuel moderne *Lehrbuch der Biologie für Hochschulen* publié en collaboration avec Moritz Nussbaum et Georg Karsten (1ère édition: 1911).

Weber est sorti à la retraite en 1921. A l'époque de sa mort (en 1937) approximativement 95% des résultats scientifiques de l'Expédition Siboga avaient été publiés – une réalisation remarquable.

Introduction

Only rarely a historical landmark coincides with the turn of a century. Nevertheless, in the history of natural history the year 1900 is marked by two important events: Firstly, the rediscovery of Mendel's laws by Hugo de Vries, Carl Correns, and Erich Tschermak should be mentioned; subsequently, the Amsterdam Professor of Botany Hugo de Vries (1848–1935) developed the mutation theory, thereby laying one of the foundations of modern biology (Van der Pas, 1976).

Secondly, the turn of the last century is marked by the Siboga Expedition to the Netherlands East Indies (now Indonesia). This famous marine bio-

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Fig. 1. Max and Anna Weber about 1890 (photo: Wegner & Mottu, Amsterdam).

logical expedition was led by a colleague of Hugo de Vries: the Amsterdam Professor of Zoology Max Wilhelm Carl Weber, born 1852. These were golden times for the University of Amsterdam, especially in the Faculty of Science, as the physicist Pieter Zeeman (1865–1943) was honoured with the Nobel prize in 1902, simultaneously with his colleague from Leiden, Antoon Lorentz (1853–1928).

Max Wilhelm Carl Weber published most of his more than 150 scientific writings simply under the name Max Weber, thus he should not be confused with the, also German-born, Max Weber (1864–1930), now renowned as the founder of sociology.

To return to the Siboga Expedition as a landmark in natural history, we quote from a short notice published on the occasion of the celebration of Weber's 70th birthday in *Nature*, 9 December 1922, by William Thomas Calman:

"An enterprise of a very different kind carried out under Max Weber's personal leadership was the exploration of the Malayan

seas in the years 1899 and 1900 by the Dutch steamship *Siboga*. The stately series of reports on this expedition, which have been appearing under his editorship since 1902, form a contribution to the science of the sea scarcely surpassed in importance save by those of the *Challenger* expedition. Dealing with only a restricted area of the ocean, but paying far more attention to the fauna and flora of the shallower waters than the naturalists of the *Challenger* were able to do, it is not too much to say that the *Siboga* expedition has given a new aspect to many problems of the distribution of marine animals in tropical seas."

In the following we shall give a short survey of Weber's life and scientific work, culminating in the landmark of his personal scientific career: the Siboga Expedition.

Biography up to 1900

The main references for this section include: Thompson (1938), De Beaufort (1937) and an unpublished biography up to 1898 by Anna Weber-



*Fig. 2. An anatomical lesson. Group portrait of Professor Max Weber and some of his pupils; oil painting by Louis Stracké, 1886. From left to right, standing: laboratory assistant Sleking, Jacobus Marinus Janse (1860–1938), Johannes Theodorus Oudemans (1862–1934), Weber, Friedrich August Ferdinand Christian Went (1863–1935), the musician De Josselin de Jong (according to Mrs. Anna Weber), and Sleking's son. On the foreground a person known as "the last whaler", probably a member of the crew of the *Willem Barents*, partaking with Weber in the expedition to Nova Zembla in 1881. Actual canvas size: 240 × 117 cm. Donation of Anna Weber-van Bosse to the University of Amsterdam, now present in the hall of building II at the Biological Centre Anna's Hoeve, Kruislaan 320, Amsterdam. (Cf. Scheller, 1985.)*

ONTWERP-BESTEK VOOR PROF. WEBER'S MARITIEME ONDERZOEK
IN DEN MOLUKESCHEN ARCHIEPEL IN 1894/95.

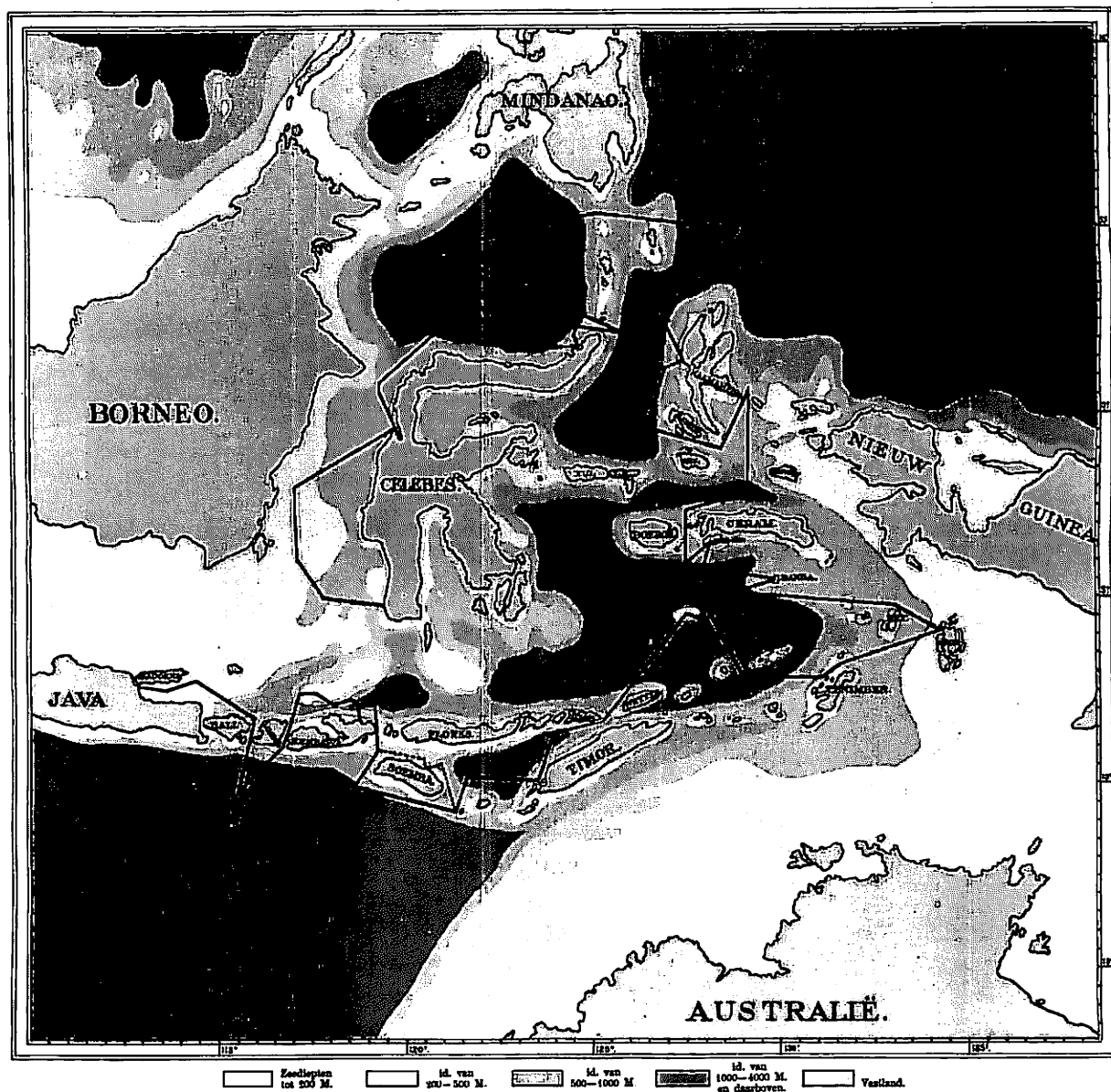


Fig. 3. Projected track for Weber's marine researches in the Moluccan Archipelago (Weber, 1898a: map). For the actual itinerary of the Siboga Expedition, see Fig. 12.

van Bosse in the archives of the Artis Library, University of Amsterdam. For other short biographies, see Pieters & De Visser, 1985.

Max Weber was born in Bonn, December 5, 1852. His mother, Wilhelmina van der Kolk, was Dutch and his father, Hermann Weber (an art

dealer) was German. Unfortunately, his father died just before he was two years old and Professor Clemens Theodor Perthès, a friend of his father, acted as guardian to the child. At the age of nine, Perthès sent him to a boarding school at Oberstein an der Nahe, and there he installed his first museum

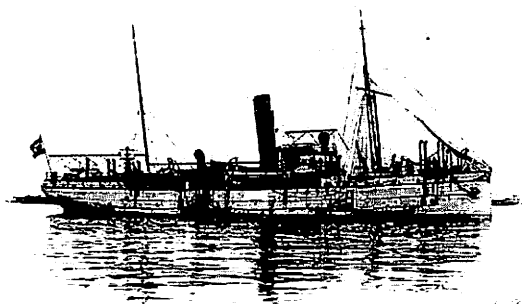


Fig. 4. The steamship *Siboga*. (For description of the ship and appliances used for scientific exploration, see Tydeman, 1902b.)

in a cupboard, as many boy-naturalists do. He passed on to the Progymnasium at Neuwied, where under the guidance of Dr. Eben, a dedicated teacher in whose house the boy was boarded, he became a field botanist. Next he attended the Gymnasium in Bonn. After having passed his final examinations he paid a visit to his relatives in Holland.

Weber was bilingual: he spoke both German and Dutch fluently. Nevertheless, his entire scientific education took place in Germany. In 1873 he entered the University of Bonn, and attended the lectures in natural history of Franz Hermann Troschel, A. de la Valette St. George, and especially Franz Leydig, whose assistant he became and to whom he owed his lifelong love of comparative anatomy. During the winter of 1875–76 Weber studied in Berlin under the zoologist Eduard von Martens, who had travelled and collected in the East. This teacher inspired Weber with the ambition to travel and to explore. During these years in Bonn and Berlin Weber was a medical student as well as a student of natural history, and he took a medical degree, as the naturalists of those days usually did. He returned to Bonn in 1877 and there took his Ph.D. with a thesis on the musculature of the eye and its innervation in native Lacertidae. After his medical qualifying examination on 25 January 1878, he did his year of military service, acting both as medical officer and hussar.

In 1879, Professor Max Fürbringer of Amsterdam invited him to become his Prosector in Anatomy and one year later another invitation came from

Utrecht, to become “Lector” in Anatomy under Professor Koster. In 1883, Koster’s health failing, the ordinary professorship in Anatomy was about to be offered to Weber, when an offer reached him from Amsterdam to become Professor-Extraordinarius of Zoology, Comparative Anatomy and Comparative Physiology. The temptations of Amsterdam, especially the famous zoological garden of the Royal Zoological Society *Natura Artis Magistra* with all its promise of anatomical work, carried the day. Thus, at the age of 30 he became a professor.

In 1883, Weber took out papers of naturalization (the actual record of naturalization was registered 27 December 1887; Pieters & De Visser, 1985) and married Anne Antoinette van Bosse, a wealthy widow of his own age (Anna for call-name, born 27 March 1852 in Amsterdam; Fig. 1). During her brief widowhood she had been a diligent pupil of Hugo de Vries and was on her way to become a skilful and learned botanist, specializing in marine Algae. She proved herself the perfect wife and helpmate as well, and she accompanied him during all his travels and expeditions after their wedding (Koster & Van Benthem Jutting, 1942).

In 1881, Weber had made a voyage to the Barents Sea in a small schooner 75 feet (23 m) long, the *Willem Barents*. She was built with private funds for this expedition and was manned by Dutch Naval officers and named after Willem Barents who discovered Spitsbergen at the end of the 16th century. The *Challenger* had not been home long when Weber, like many another young naturalist, was longing to fish in unexplored seas with dredge and trawl (as a matter of fact, he took the initiative to offer himself both as naturalist and as medical officer for the Willem Barents Expedition of 1881). He collected as much as he could from aboard so small a ship, apart from taking the watch with the other officers and acting as doctor to the crew. He had a good reputation in the Dutch Navy and his standing with the Navy was later shown by the *Siboga* Expedition under Naval Commander G.F. Tydeman. After their marriage the Webers spent three summer holidays in northern Norway, he mostly to dissect whales, she to study calcareous Algae, on which she was even then already becoming the chief authority.

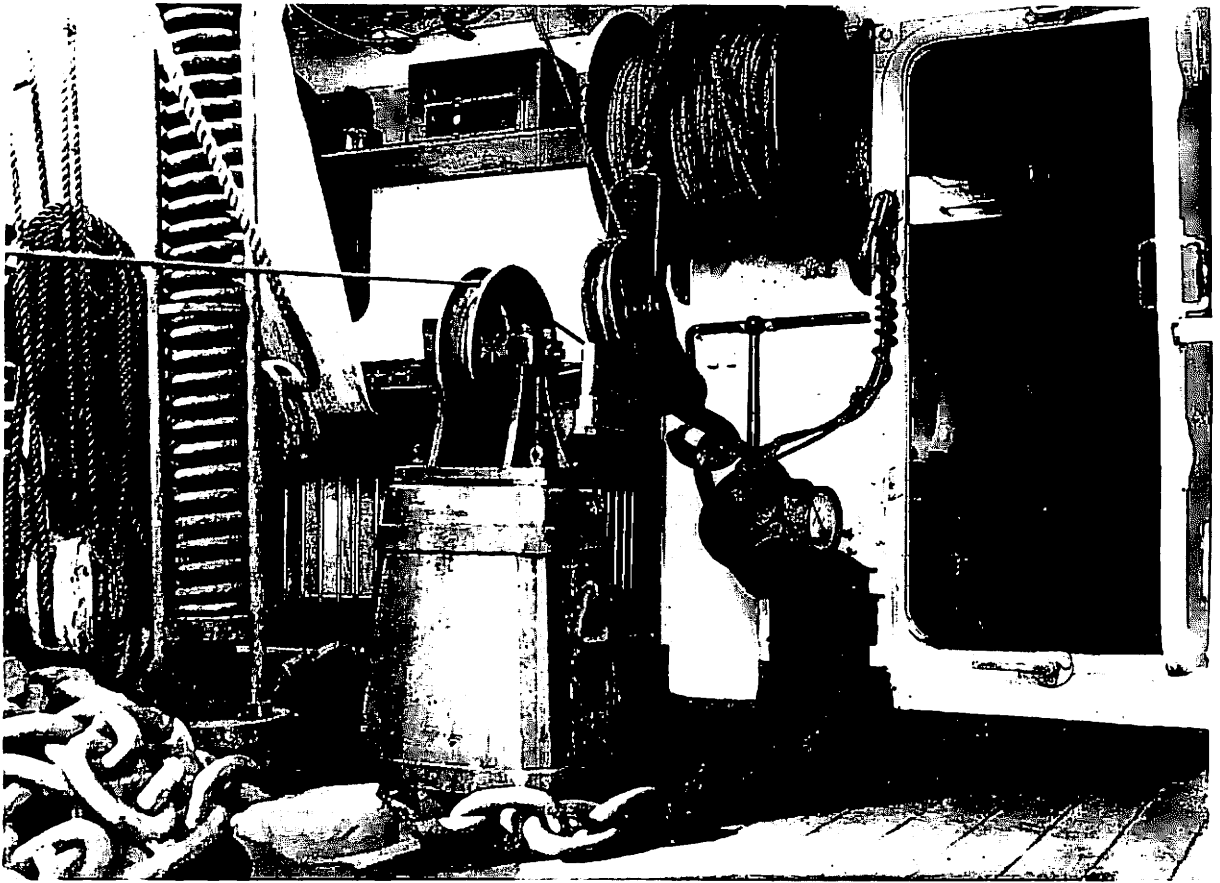


Fig. 5. View on deck of the *Siboga* with part of the dredging apparatus. At the left the spiral of the accumulator, in front of which the dredge rope is running horizontally over two steel blocks. The dynamometer is attached to the right steel block. At the right the entrance to the laboratory. (Cf. Weber-van Bosse, 1904: plate facing p. 2 and Tydeman, 1902b: pls. I–III.)

In 1884, Weber had been appointed Ordinary Professor of Zoology, Comparative Anatomy and Comparative Physiology in Amsterdam. The dissections he made of all kinds of animals, explaining all the while to the students what they saw and ought to know, excited the admiration of his pupils who became devoted to him. On a large painting “An anatomical lesson” by Louis Stracké, dated 1886 (Fig. 2), we see Weber dissecting a lioness, surrounded by some of his most talented pupils: Jacobus Marinus Janse (later Professor of Botany at Leiden), Johannes Theodorus Oudemans (later University Lecturer of Entomology in Amsterdam), and Friedrich August Ferdinand Christian Went (later Professor of Botany in Utrecht) (cf. Scheller, 1985).

Weber’s great experience in the comparative anatomy of mammals is recorded in his *Studien über Säugethiere*, of which the first part was published in 1885. In this work, he applied comparative anatomy to whales. According to the cetaceologist Everhard Johannes Slijper (1936: 3), Weber, together with Willy Küenthal and his school, may be called the founder of the comparative anatomy of Cetacea. At the end of his book Weber came to the following conclusion about the origin of Cetacea: they possess characters relating them not only to Carnivora, especially Pinnipedia, but also to Ungulata. So Weber was a Darwinist; in his lectures on adaptation, he sometimes seemed to be a Lamarckian. Typically, he was a man of the facts and he refrained from theorizing.

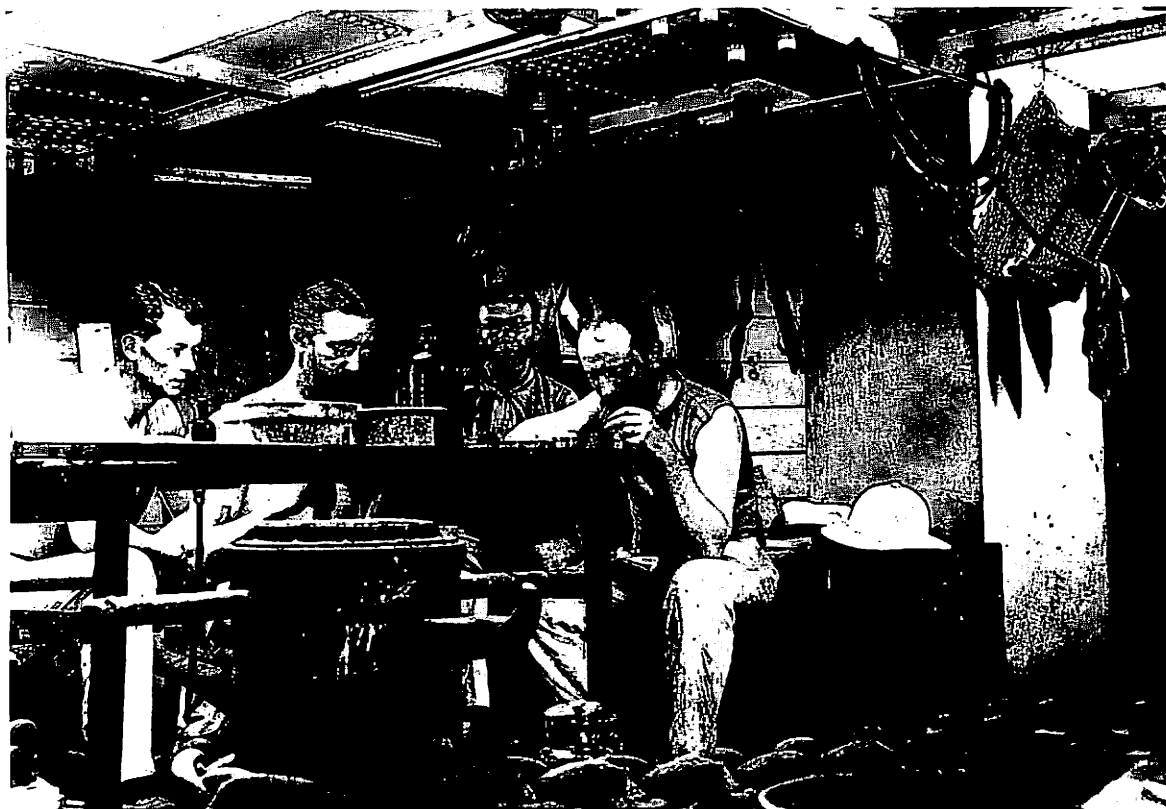



Fig. 6. Part of the scientific staff of the Siboga Expedition, working in the laboratory of the ship: from left to right J. Versluys (1st assistant), M.W.C. Weber (leader of the expedition), J.W. Huysmans (artist), and H.F. Nierstrasz (2nd assistant).

The second part of *Studien über Säugethiere* was published in 1898. This work was overshadowed by his handbook on mammals *Die Säugetiere* published in 1904, of which the second edition, written in collaboration with H.M. de Burlet and O. Abel, is still a much consulted reference work (Weber, 1927–28; facsimile reprint published 1967; Russian translation of the part on primates published 1936). Above all, he owed his knowledge of the anatomy of rare animals to the specimens that died in the Amsterdam zoological garden *Natura Artis Magistra*. These animals were immediately dissected by him with great skill and prepared for the Zoological Museum, of which he was appointed in 1892 as the first Director (De Meijere, 1932: 515; Sunier, 1949: 11).

Weber was a many-sided man and every branch of natural history claimed his attention. Thus, his interest was not restricted to mammals. On the con-

trary, he published on nearly every animal group, including Porifera, Coelenterata, Platyhelminthes, Arthropoda, Mollusca, and all five classes of vertebrates. Though anatomy and systematics were the principal topics, zoogeography, ecology, physiology, and even ethnography claimed his attention. His interest in zoogeography was aroused by a voyage to the Netherlands East Indies (Sumatra, Java, Celebes, and Flores) in 1888. After his return home Weber published the results of this expedition in *Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien* (Weber, 1890–1907). In the preface to this work, Weber tells us what he aimed at during this voyage. In the first place the study of the freshwater fauna was undertaken, which had until then been rather neglected. He concluded that a careful study of this fauna might throw new light on the difficult problem of the distribution of animals in the Indo-Australian Archipelago and

Ethnographica van Lirong op Salibabae.

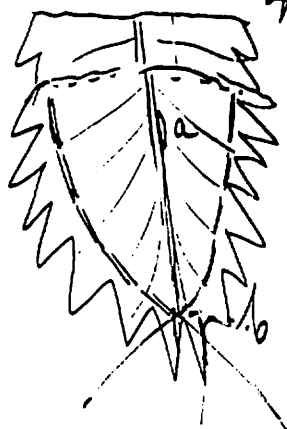
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Fig. 7. Page from Weber's diary of the Siboga Expedition, in which he describes ethnographical material from Lirong on Salebabu, dated 25 July 1899. The kite used for fishing, drawn at the foot, is described by Weber-van Bosse as well (1904: 127–130). For translation, see Appendix.



Fig. 8. Gustaaf Frederik Tydeman, commander of the Siboga Expedition.

their relation to either the Indian continent or Australia. The *Zoologische Ergebnisse* appeared in four volumes and contained several papers by Max Weber and a number of other scientists, among whom his old master Eduard von Martens.

Lecturing, sectioning, and working out the booty of the Indo-Australian voyage filled the years from 1889 up to 1894 when the Webers left for a voyage to South Africa. The main object of this voyage was again the freshwater fauna, but the time of their visit proved to be most unfavourable because the rains had not yet come and many rivers carried little water or had completely run dry. Nevertheless, they enjoyed the trip, bargaining with Bushmen and

Hottentots for ethnographic items, exchanging tobacco and calico for any animal they might bring. It was their wish to return once again to South Africa, but that desire was never fulfilled. The results of this expedition were published in the *Zoologische Jahrbücher*.

The Siboga Expedition

Weber's last and most important travel venture was the Siboga Expedition. He had been one of the initiators of the Society for the Advancement of Scientific Research in the Netherlands' Colonies in 1889. One of the most important initiatives taken by this Society (now called Treub Maatschappij, after the botanist Melchior Treub) was the organization of the Siboga Expedition. Consequently, the early history of this expedition can be deduced from the printed minutes of the meetings of this Society, *Notulen Maatschappij ter Bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën*.

A vague project for research of the marine fauna of the Malayan Archipelago was launched in May 1896. At a meeting on 19 September of the same year Weber declared himself willing to accept the leadership of an expedition with the object to study the marine flora and fauna of the archipelago, especially of its deep basins (Sluiter, 1897; Weber, 1897). This proposition was accepted. In April 1898, Weber sent an explanatory statement to the Minister of Colonial Affairs in which he pleaded in favour of the availability of a steamship rather than a little schooner (Weber, 1898a). This memorandum was accompanied by a map (Fig. 3) in which the projected track of the expedition was indicated. The itinerary could be executed in three stages, each of about three months – provided a steamship was used. The reply was favourable, as the Dutch East Indian Government put the steamship *Siboga* at Weber's disposal, according to a decree of 21 May 1898 (Weber, 1902: 7).

The *Siboga* (Fig. 4) was a brand-new gunboat with two screw propellers, destined for military purposes in the Dutch East Indies. She had been put on the stocks in Amsterdam on 14 August 1897 and



Fig. 9. Group photograph of the crew of the Siboga Expedition.

was launched on 28 April 1898. The ship was about 170 feet long (50.6 m) and of 810 tons displacement (Tydeman, 1902b: 1; for comparison: the *Willem Barents* was 75 feet long, the *Beagle* 90 feet, and the *Challenger* 200 feet – the latter of 2300 tons displacement; cf. Thompson, 1938: 348, Moorehead, 1969: 38, and Linklater, 1972: 15, respectively). The *Siboga* had an engine of about 1400 horse-power (for comparison, the *Challenger* had an engine of about 1200 horse-power, but was still essentially a sailing-ship).

It was extremely fortunate that the *Siboga* was nearly seaworthy when the decision came to make her available for this expedition, because it was still possible to introduce certain changes. For instance, two sounding machines with enormous steam-driven winches were installed on the bridge instead of guns (Tydeman, 1902b). Of course, a laboratory had to be installed as well. On Fig. 5 we see part of

the dredging apparatus and the entrance to the laboratory. Fig. 6 shows the scientific staff working in the lab (except Mrs. Weber and the physician Dr. A.H. Schmidt): Dr. J. Versluys, 1st assistant (later Professor in Vienna), Professor Max Weber, leader of the expedition, Mr. J.W. Huysmans, artist, and Mr. H.F. Nierstrasz, 2nd assistant (later Professor in Utrecht).

In his introduction and description of the Siboga Expedition, Weber (1902: 9) acknowledges the indefatigable help and wise advice of Mr. J. van der Struyff who, as engineer of the Dutch Navy, was charged with the construction of the ship. He even accompanied Weber to Hamburg, in order to see the installations of the *Valdivia*, where Professor Carl Chun showed them all the instruments. Weber's narrative, the first monograph in the series *Siboga Expeditie*, published in January 1902, is written in French and is therefore accessible to most

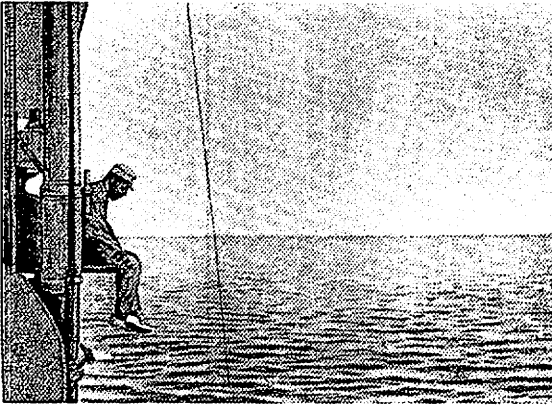


Fig. 10. Weber sitting on the "rack", peering after his instruments.

foreign readers. However, the popular account by Mrs. Weber, of which the first edition appeared in 1904 in a magnificent Jugendstil binding, is less accessible; it was written in Dutch and it was only translated into German (Weber-van Bosse, 1905). She relates some anecdotes that cannot be found anywhere else. Weber himself kept a diary of the expedition, written in six notebooks that were re-discovered about a decade ago in the attic of the Zoological Museum in Amsterdam, together with the original glass negatives of the photographs made during the expedition, and all his correspondence with the authors of the Siboga monographs. Furthermore, a beautifully carved wooden box was found in this museum with the original sepia

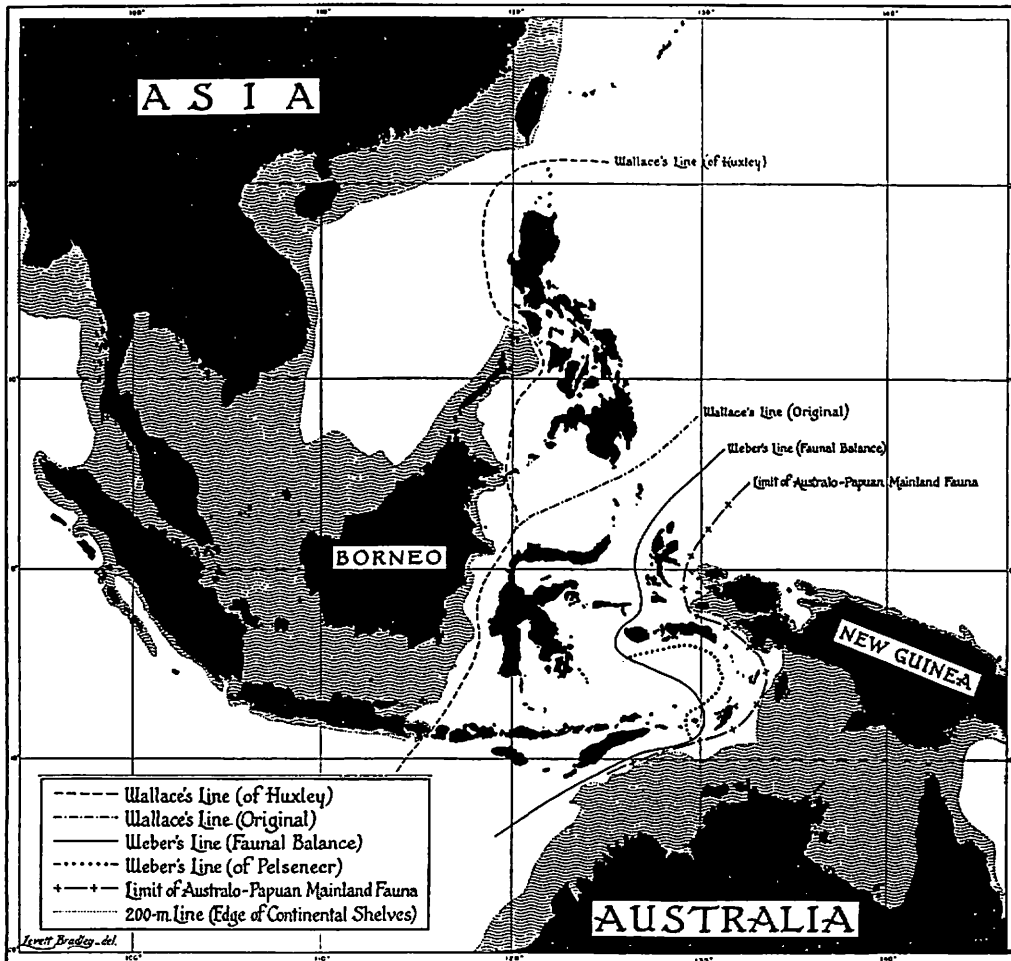


Fig. 11. Zoogeographic borderlines in the Malay Archipelago. The shaded areas are the continental shelves (reproduced from Mayr, 1944: Fig. 1).



Fig. 13. Max and Anna Weber and some natives on the beach of the islet Barrang (Weber-van Bosse, 1904: 70–71). (Photo: H.F. Nierstrasz.)



Fig. 14. Lowering the dredge.

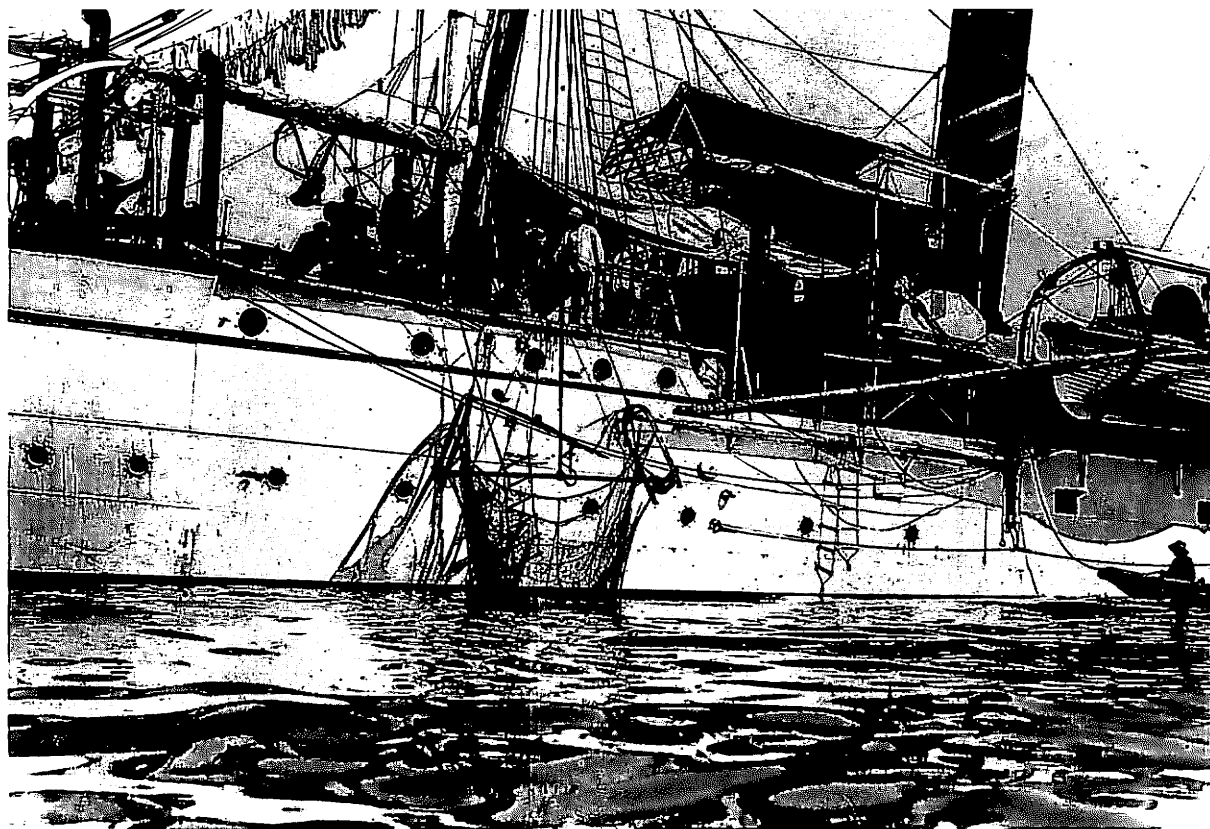


Fig. 15. The trawl is dragged on board. One of the bars is broken by the pressure of the water column (cf. Weber, 1902: 98–99).

prints of the photographs, often with notes in pencil on the reverse. All this archival material, including Weber's remaining scientific correspondence, and his extensive private correspondence with his good friend Coenraad Kerbert, Director of the Amsterdam zoological garden *Artis* (1849–1927; e.g., letters written aboard the *Siboga*) is now preserved in the Artis Library, University of Amsterdam. A page of Weber's diary is reproduced in Fig. 7 (note that Weber wrote this diary in Dutch; for translation, see Appendix).

Fig. 8 shows Captain Gustaaf Frederik Tydeman (1858–1939). He was the author of the second and third monograph in the series *Siboga Expeditie*, dealing with the ship and its scientific equipment, and the hydrographical results, respectively (Tydeman, 1902b; 1903). Later he became Vice-Admiral and in 1975 the oceanographical research vessel of the Dutch Government was named after

him (Van Oosten, 1979). Weber had a healthy respect for him, as is proved by the following remark in his diary, dated 1 April 1899, translated: "Difficulty to find anchoring-ground on reef or in vicinity in reliable depth (not less than 7 fathoms) is here very considerable too. Suddenly we touch the reef, so that we dislodge pieces of coral. Tydeman stays as calm as ever". From the narrative by Anna Weber we learn that he had ceded his captain's cabin to the Weber couple and slept in the open air, on the dinner table on deck. When it was raining a sailcloth was spread above him. Several new species and genera were named after him, e.g., the alga *Tydemanian expeditionis* described by Anna Weber (in Weber-van Bosse & Reinbold, 1913: 116) and the fish *Tydemanian navigatoris* described by Weber (1913: 570–571).

The *Siboga Expedition*, charged with the research of the fauna and flora of the varied seas in



Fig. 16. Mr. J.W. Huysmans, artist of the Siboga Expedition, with a giant sailfish, *Istiophorus orientalis* (Schlegel, 1842), of 2.68 m length.

the Indo-Australian Archipelago, departed from Surabaya on 7 March 1899. The crew (Fig. 9) consisted of 63 people, viz. 10 Dutch Navy Officers, 6 members of the scientific staff, among them Mrs. Anna Weber, 45 (mostly Javanese) sailors, and 2 private servants (cf. Tydeman, 1903: 88). (The participation of a lady in a marine expedition in 1899 constitutes another landmark.)

Before dredging the depth had to be sounded. With each sounding the temperature of the deep water was determined, and a water sample and a bottom sample were taken. The thermometer and water sample bottle had to be tied to the sounding cable far above the lead. This had to be done outboard. In Fig. 10 we see Weber seated on a small plank outboard, popularly called the "rack", peering after his instruments.

Weber was especially interested in the soundings in the Lombok Strait. According to Alfred Russel Wallace, this strait between Bali and Lombok would mark the limit between the Asian and the Australian faunas. At present this zoogeographic boundary, running between Bali and Lombok in the south, and then through Makassar Strait between Borneo and Celebes northward, is known as Wallace's line. According to Wallace, the difference between the faunas of Bali and Lombok would be greater than that between England and Japan (Weber, 1902: 16). According to Weber, a sharp limit between the Asiatic and Australian regions does not exist, but the eastern part of the archipelago gradually gets poorer in Asiatic animals, while the Australian fauna becomes more and more prominent. Rightly, Weber moved Wallace's line



Fig. 17. Weber (in khaki) and the three officers forming the nautical staff of the Siboga Expedition in their white uniforms, on Banda (photo: Nederlands Historisch Scheepvaart Museum, Amsterdam).

far more to the Australian side, but, more importantly, he abandoned the idea of a borderline. In this context, it is hard on him that his “border”, which he conceived as a 50/50 proportion of Australian and Asiatic fauna elements, was called Weber’s line by Paul Pelseneer in 1904 and is still known as such (Fig. 11).

Wallace’s line was, among other things, based on the idea that the Lombok Strait was very deep. Therefore Weber was curious to measure the depth of this strait. The *Siboga* sounded a maximum depth of only 312 m, so Weber thought he had proved in this respect that Wallace was wrong. Nowadays it is generally accepted that the region between Wallace’s line and Weber’s line is a transition zone, called Wallacea. In the modern view, Wallace’s line between Borneo and Celebes reflects the edge of the Asiatic continental shelf, while Weber’s line between Celebes and the Moluccas is the line of faunal balance (Mayr, 1944). When we look at the track of the Siboga Expedition (Fig. 12), it can be roughly summarized as a circumnavigation along Wallace’s line to the north and along Weber’s line to the south.

Although the *Siboga* was primarily charged with research of the deep basins of the archipelago, reefs, shallow waters, and beaches were investigated as well (Fig. 13). In his narrative Weber

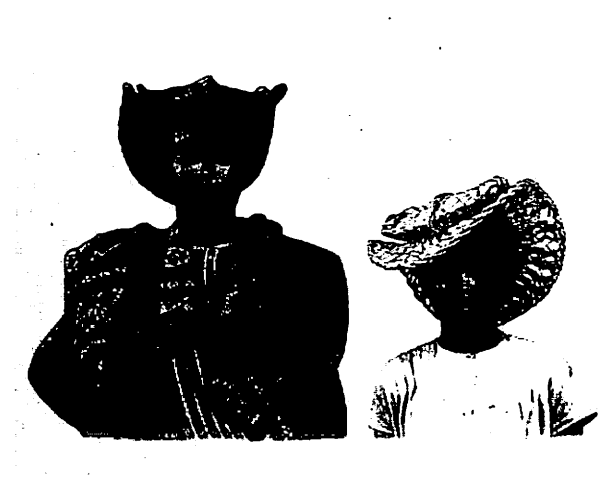


Fig. 18. The inhabitants of Rotti, near Timor, were very elegantly dressed. According to Anna Weber-van Bosse (1904: 52) these elegant straw hats by chance came into fashion in Paris the next year; perhaps because she had brought some home?

(1902) acknowledges John Murray’s advice (who had participated in the Challenger Expedition) also to examine shallower areas (up to 1000 m), as they mostly have a richer fauna than the deep-sea. After his return from the expedition, Weber received a letter from Alexander Agassiz, stating that he had always found very few animals on certain substrates at great depths in the Pacific. His letter ended with the words: “I am not happy to have been the man to find that out” (Weber-van Bosse, 1904: 19).

Both Max and Anna Weber narrate some mishaps with the dredges and trawls. In Fig. 14, the dredge is undamaged. In Fig. 15, one of the bars of the trawl appears to be broken, “imploded” as Sir Wyville Thomson (leader of the Challenger Expedition) would have called it, by the pressure of the water column (Weber, 1902: 98). This trawl had fished at 4391 m depth. Nevertheless, the total catch was considerable. Sometimes even huge animals were fished with baited hook and line, e.g., sharks and the sailfish *Istiophorus orientalis* (Schlegel, 1842) which was 2.68 m long (Fig. 16).

Excursions on land took place regularly as well (Fig. 17: Weber in khaki and the three officers forming the nautical staff in their white uniforms [G.F. Tydeman, H.J. Boldingh, and C.E. Hoorens



Fig. 19. Max Weber with his staff in his laboratory at the Zoological Museum in 1907. From left to right, standing: L.F. de Beaufort (later Weber's successor as Director of the Zoological Museum and Professor of Special Zoology), J.E.W. Ihle (later Sluiter's successor as Professor of General Zoology), Sluiter's daughter To, D. de Lange Jr., and J. Hogendoorn; sitting: J. Versluys, Weber, Carl Philip Sluiter (Professor of General Zoology), and Petronella ("Nelly") Johanna de Rooy.

van Heyningen] on Banda). Weber was eager to obtain freshwater fishes as well and he collected a great many of them. Since he was a very charming man, often the native people (Fig. 18) offered him rare species or he bought them at the local market place.

Tobacco and cotton was exchanged for fishes, molluscs, and ethnographic material. The ethnographical collections went to the Ethnographical Museum of the Royal Zoological Society *Natura Artis Magistra*. At present they are extant in the Royal Tropical Institute in Amsterdam. Geological observations were made as well, and as far as botany was concerned, the Algae were studied by Mrs. Anna Weber.

Epilogue

The Siboga Expedition ended in Surabaya on 26 February 1900; it had lasted for almost one year. The most difficult and time-consuming work had still to be done, viz. the study of the material, the elaboration of the hydrographical data, and the publication of the results.

In 1898, the year before the expedition started, Weber had resigned from his ordinary professorship to become Extraordinary Professor again, but he remained Director of the Zoological Museum. Beside him, Carl Philip Sluiter had been appointed Ordinary Professor of General Zoology. This gave him more time to work on and edit the results of the



Fig. 20. Max and Anna Weber after Weber's retirement (photo: Godfried de Groot, Amsterdam, ca. 1930).

expedition in his house at Eerbeek. In Fig. 19 we see him in his laboratory at the Zoological Museum in Amsterdam with his staff.

The results of the Siboga Expedition surpassed all expectations (Weber, 1904b; De Beaufort, 1963). It appeared that especially the coastal fauna of the Indo-Australian Archipelago displays a richness and diversity of species, unsurpassed by any other region of the earth. This can be explained by the fact that these coasts are broken into many isolated islands and it is well known that isolation is an important factor in speciation. This isolation also occurs in closed deep-sea basins, and therefore the results of the Siboga Expedition could equal the results of expeditions around the world, like the Challenger Expedition: about one half to one third of the species sampled by the *Siboga* appeared to be new to science.

Weber was an arduous worker: from the cover of the first monograph in the series *Siboga Expeditie* (containing his narrative and the list of stations revised by Tydeman, published January 1902: Weber, 1902; Tydeman, 1902a) it appears that 65 monographs had been envisaged at the outset. Conspicuous among the many *Siboga* reports are Max Weber's own on the fishes (both marine and freshwater) and on the cetaceans (Weber, 1913; 1923), and his wife's on the coralline Algae (Weber-van Bosse & Foslie, 1904; Weber-van Bosse & Reinbold, 1913; Weber van-Bosse, 1921; 1923; 1928). Anna

Weber dedicated her great work on the Algae of the Siboga Expedition to Professor Hugo de Vries (Weber-van Bosse, 1928: v). In 1910 the honorary degree of Doctor of Science was bestowed upon her by the University of Utrecht. She thus became the first woman ever honoured with the degree of Doctor *honoris causa* in The Netherlands (Buisman, 1935). Max Weber dedicated his great work on the fishes of the Siboga Expedition to his wife. We quote him in translation (Weber, 1913: v): "who has been always a joyful and helpful travelling-companion to me, in the extreme North, in South Africa, in the Indo-Australian Archipelago and also during the Siboga Expedition". In his later years, with the help of his pupil and successor, Professor L.F. de Beaufort, Weber undertook the task of revising the whole Indo-Australian fish fauna, some three thousand species in all. As a result of this great and laborious work eleven volumes have appeared (Weber & De Beaufort, 1911–1962).

Despite all these undertakings Max Weber had found the time to publish his monumental handbook *Die Säugetiere* in 1904 and 1927/28. He also contributed extensively to a textbook called *Lehrbuch der Biologie für Hochschulen* co-authored by Moritz Nussbaum and Georg Karsten, published in 1911 (second edition 1914). He wrote the section on the biology of animals, and here we can see that Weber was also interested in ecology, physiology, embryology, etc. In these respects, it is really a modern textbook, one of the first of its kind (cf. De Visser, 1984).

Weber retired in 1921 (Fig. 20) and by the time he died in 1937 about 95% of the scientific results of the Siboga Expedition had been published. At present, the work is nearly completed, as only the following groups are still being treated: Asteroidea, some groups of Decapoda, and some holoplanktonic groups.**

Max Weber had everything that should accom-

** In our library we always use the prospectus (De Beaufort, 1963) issued by Brill to find our way in the bibliographical babel called *Siboga Expeditie*. Since De Beaufort's death in 1968, the series is edited by his successor at the University of Amsterdam, Jan H. Stock. Two more *Siboga Expeditie* monographs have been published since 1963 (Pettibone, 1970; Griffin & Tranter, 1986).

pany old age. He was rich in honours. He had both charm and dignity, though some called him a potentate (cf. our interviews with Professor H. Engel and other old pupils of Max Weber; De Visser, 1984: 3–4). He enjoyed for many years such general admiration and esteem as are only given to the very best of men. In 1922, when he reached his 70th birthday, a special volume of *Bijdragen tot de Dierkunde* (vol. 22) was dedicated to him. Moreover, he received a letter from 35 English zoologists, published in *Nature* (Thompson et al., 1922). They spoke with unaccustomed warmth, saying in conclusion: "Your solid learning has upheld the great scientific traditions of your country, your investigations have influenced and stimulated many of us, your broad interests, your singleness of purpose, the simplicity of your life and your genius for friendship have set an example to us all."

Max Weber died on 7 February 1937 and Anna Weber on 29 October 1942. They had no children and bequeathed their estate at Eerbeek to the foundation "Het Gelders landschap". At present their house, built on the foundations of a castle that once belonged to the counts of Gelre, functions as an adult education centre. Weber donated his library and his scientific correspondence to the library of the Royal Zoological Society *Natura Artis Magistra* (now Artis Library, University of Amsterdam) and to the Zoological Museum (now called Institute of Taxonomic Zoology (Zoological Museum), University of Amsterdam). A bibliography of his work has been published by De Beaufort (1937; five additional references to Weber's body of work are given by De Visser, 1984: 12–13). Anna Weber donated her herbarium of about 50,000 specimens to the Rijksherbarium at Leiden (Koster, 1942). A bibliography of her work has been published by Koster & Van Benthem Jutting (1942).

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Appendix

Translation of the fragment from Weber's diary of the Siboga Expedition, reproduced in Fig. 7.

Ethnographic material from Lirung on Salebabu.

harpoon for fishing.

A blue Japanese(?) plate.

An earthenware bracelet.

A kris without hilt from Mindanao

} from the president

Djoegoegoe. (formerly

Rajah) of Lirung.

A complete prau with sail.

Kite used for fishing.

undersurface of kite:

through a fishing-line is sticked &

wrapped around both ends of the pierced little sticks

at b

kite

± 10 m

fishing-line

roll with fishing-line

with europ.

held by the man

hook at

end, which flies through the water.

Koffo: of which fishing-nets are made.