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The Travels of Jena Zoologists in the Indo-Malayan Region

Uwe Hoßfeld

*Ernst-Haeckel-Haus, Friedrich-Schiller-Universität Jena,
Berggasse 7, D- 07745 Jena, Germany
Tel.: +49/03641-949505; Fax: +49/03641-949502
Email: b7houw@nds.rz.uni-jena.de*

In 1865, the young zoologist Ernst Haeckel occupied the first professorship of zoology at Jena University. This position was established by his friend and colleague, the comparative anatomist Carl Gegenbaur (Hoßfeld et al., 2003). Haeckel spent his entire academic career in Jena. In time he became known as the "German Darwin," and during this time he published his ideas on morphology, evolution, politics and society, art, and philosophy. From Jena he often traveled to places of cultural or scientific interest in Europe (for instance, 24 times to Italy) and beyond (e.g., twice to the tropics). Some students, colleagues, and friends followed in his footsteps, e.g., Willy Kükenenthal, Richard Semon, and Gerhard Heberer. This essay looks at Haeckel's influence on the journeys and research subjects of other Jena zoologists, most notably their activities in the Indo-Malayan region. For each of the scientists, I shall give a brief biographical sketch. This will be followed by facts about the expedition(s) undertaken (dates, travel route etc.) and close with a discussion of the scientific results of the expedition(s). Finally, I shall give some of my own impressions based on my own expedition to the Lesser Sunda Islands in 1993, that followed in the footsteps of the Sunda Expedition of the zoologist Bernhard Rensch (1927).

The Indo-Malayan region (today largely the nation of Indonesia, in Haeckel's terminology "Insulinde") — the largest archipelago in the world — unites 13,677 islands (6,000 of which are inhabited). The total land-area encloses 1.9 million km², the water area 3.3 million km². There are more than 400 volcanoes in the archipelago, of which nearly 100 are active today. There are more than 230 million inhabitants. These geographical facts show us how large the region is, and the distances that must be dealt with in one's travels (Blair, 1991; Camerini, 1993, 1996; Geo-Spezial, 1995; Rauchwetter, 1980; Whitten & Cubbit, 1992).

This Indo-Malayan became more interesting for naturalists because of the research successes of travels of Alfred Russel Wallace — the father of evolutionary biogeography — during the mid-19th century, (Beddall, 1988; Ghiselin, 1993; England, 1997; Armstrong, 1998).¹ In 1869, Wallace published *The Malay Archipelago*, an important book he wrote after spending the period between 1854 and 1862 in what are now Indonesia, Malaysia and New Guinea, often in areas where Europeans had never been before:

If we look at a globe or a map of the Eastern hemisphere, we shall perceive between Asia and Australia a number of large and small islands, forming a connected group distinct from those great masses of land, and having little connexion with either of them. Situated

¹ For further information on Alfred R. Wallace see: <http://www.wku.edu/~smithch/second.htm#selected>.

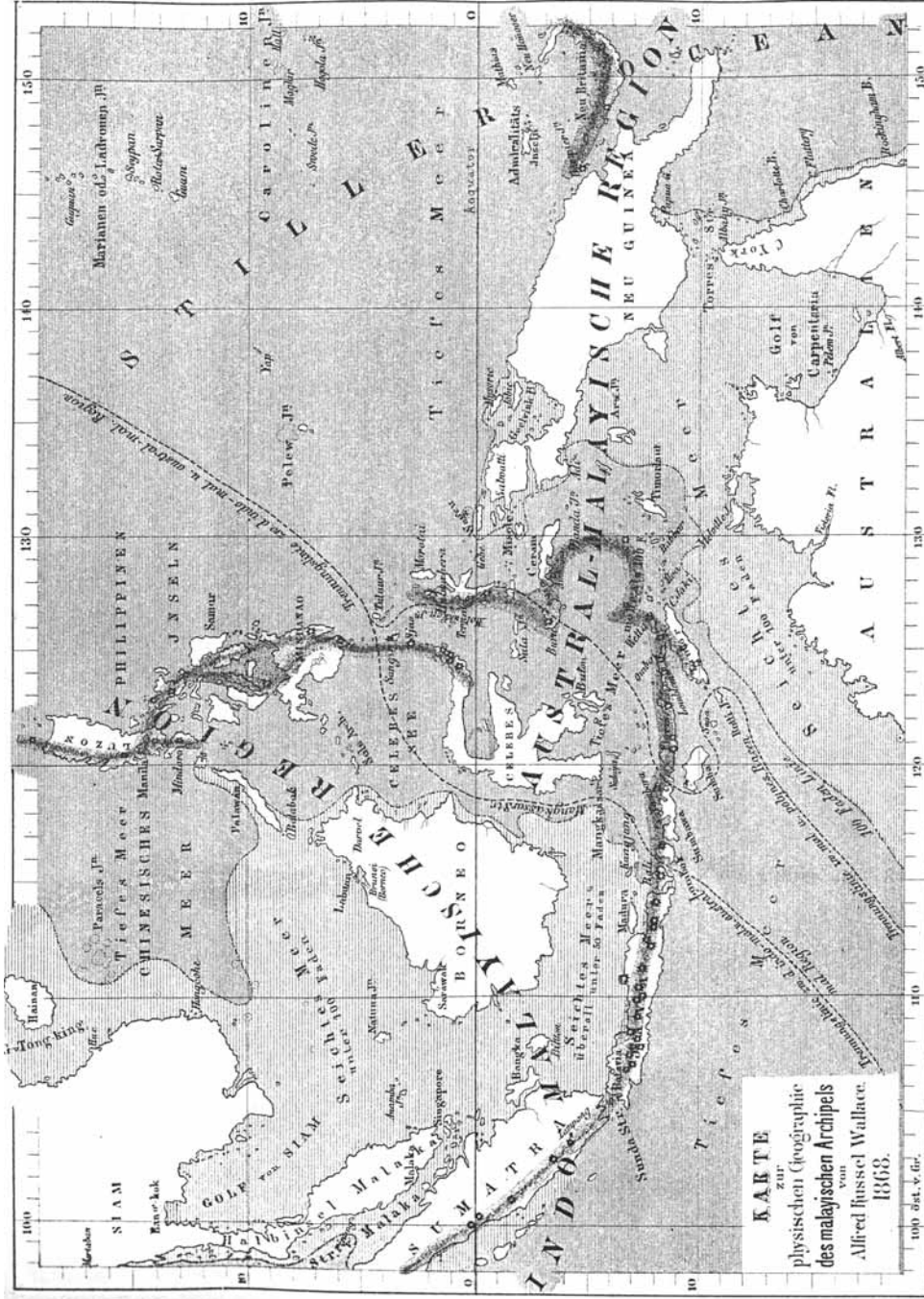


FIGURE 1. Geographical map of the "Malay Archipelago" (Wallace 1893). Courtesy Library of the Ernst Haeckel House Jena.

upon the Equator, and bathed by the tepid water of the great tropical oceans, this region enjoys a climate more uniformly hot and moist than almost any other part of the globe, and teems with natural productions that are elsewhere unknown. The richest of fruits and the most precious of spices are here indigenous. It produces the giant flowers of the *Rafflesia*, the great green-winged Ornithoptera (princes among the butterfly tribes), the man-like Orang-Utan, and the gorgeous Birds of Paradise. It is inhabited by a peculiar and interesting race of mankind — the Malay, found nowhere beyond the limits of the insular tract, which has hence been named the Malay Archipelago. (Wallace 1893:1).

A German version in two volumes was published in 1869 (Wallace, 1869a, b). We now know much more about Wallace's life and work, his influence on Darwinism and zoogeography (the Wallace-line story), because of the brilliant book *When Worlds Collide*, published by Penny van Oosterzee in 1997, and the new books by Jane R. Camerini, *The Alfred Russell Wallace Reader* (2001), and Peter Raby's *Alfred Russell Wallace: Life* (2001).

Following these earlier British field-oriented activities, and especially toward the end of the 19th century, the Indo-Malayan region began to attract the attention of zoologists elsewhere, including several biologists at Jena University, namely Ernst Haeckel and his students.

With respect to fieldwork *per se*, Camerini (1996:44) has astutely observed,

Fieldwork presented new opportunities in nineteenth-century Britain, with its peculiarly English blend of enlightenment, romantic, and natural theological values, and with the industrial and territorial expansion of the Empire. To understand how individuals used these opportunities, we need to look at fieldwork as a complex practical activity. In particular, a very few trusting relationships, in conjunction with Wallace's status as a European in colonial society in East Indies, were crucial to his identity and success as a naturalist.

Thus, in this paper, I focus on four of the scientists mentioned in Table 1 whose expeditions took place between 1891 and 1927. I begin with Ernst Haeckel, then his students Willy Kükenthal and Richard Semon, and end with the anthropologist Gerhard Heberer. And, as I mentioned earli-

TABLE 1: Biologists from Jena University in the Indo-Malayan region

Scientist	Profession	Expedition and dates
Haeckel, Ernst (1834-1919)	Zoologist	1881/1882 Ceylon and India; 8/1900–4/1901 Ceylon, Singapore, Java, Sumatra
Stahl, Ernst (1848-1919)	Botanist	11/1889–3/1890 Buitenzorg
Semon, Richard (1859-1918)	Zoologist	1891–1893 Australia and Malay Archipelago
Kükenthal, Willy (1861-1922)	Zoologist	10/1893–10/1894 Mollucas
Detmer, Wilhelm (1850-1930)	Botanist	end of 1904–spring 1905 Java
Herzog, Theodor (1880-1961)	Botanist	1905/1906 Ceylon area
Plate, Ludwig (1862-1937)	Zoologist	1913/1914 Ceylon-South India
Harms, Jürgen W. (1885-1956)	Zoologist	1926 Sumatra; 12/1928–12/1929 Mollucas; 12/1932–4/1933 Singa- pore; 1939 Sumatra
Heberer, Gerhard (1901-1973)	Zoologist and Anthropologist	1927 Lesser Sunda Island; 1928 Mentawai Islands (near Sumatra)

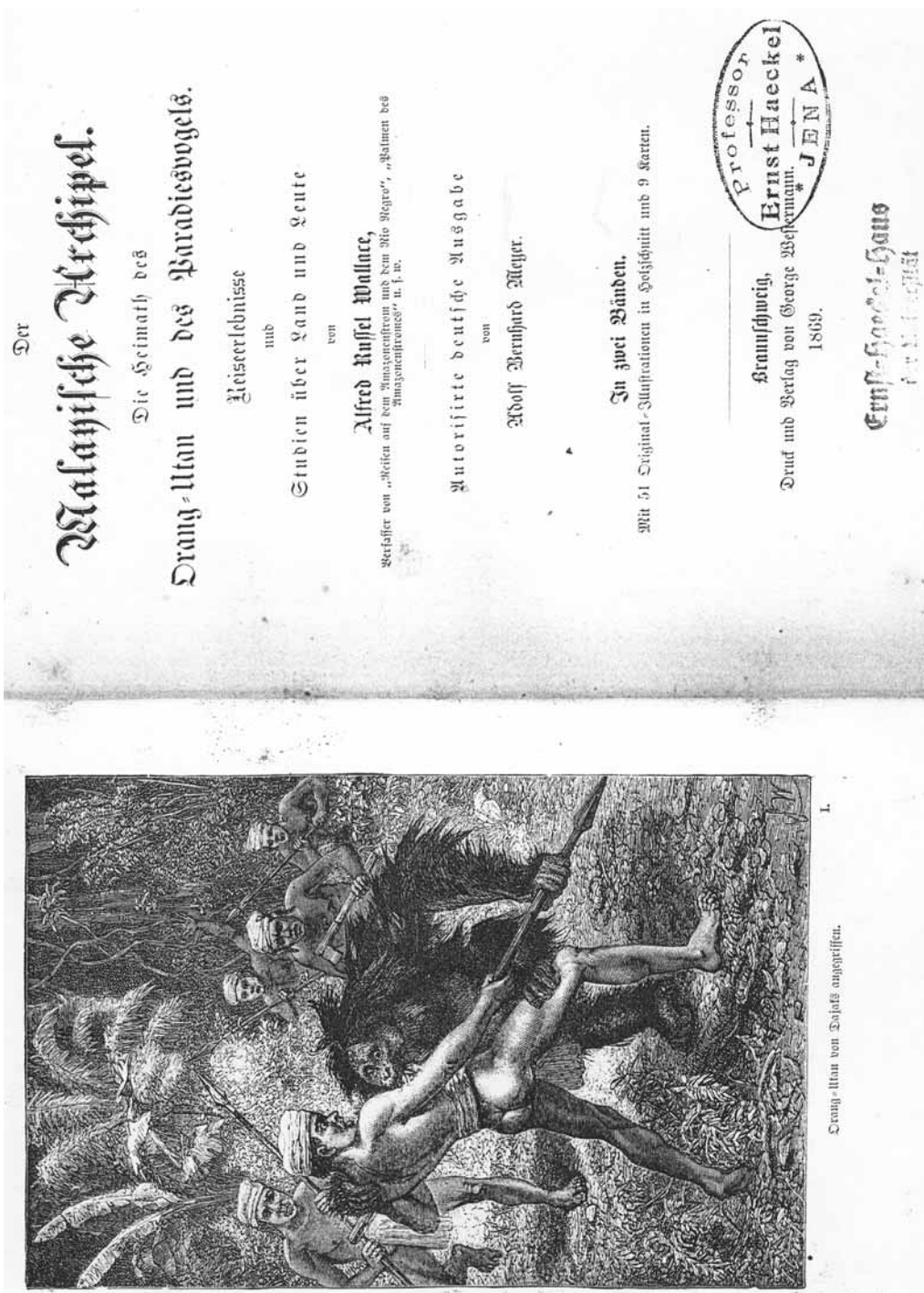


FIGURE 2. Title page from the German edition of Wallace's book "Malay Archipelago" (1869) - Orang-Utan attacked by Dyaks. Courtesy Library of the Ernst Haeckel House Jena.

er, I have divided my presentations for each of these men into three parts: first I present some information on the biography of the scientist, then facts about the expedition(s) he undertook (dates, travel route, etc.), and I end with a discussion of the scientific results from the expedition(s). Lastly, I shall give some of my own impressions based on my own expedition to the Lesser Sunda Islands in 1993, in which I followed in the footsteps of the Sunda Expedition of the zoologist Bernhard Rensch (1927).

FOUR SCIENTISTS FROM JENA UNIVERSITY AND THE INDO-MALAYAN ARCHIPELAGO

Ernst Haeckel — Biography

1834: 16 February: born in Potsdam, Germany

1852: graduated from the Domgymnasium in Merseburg

1857: after studying medicine in Berlin, Würzburg, and Vienna, he earned his medical degree in Berlin under Johannes Müller and passed the state medical examination one year later

1861: qualified as a lecturer in comparative anatomy in the Faculty of Medicine at Jena University with the thesis "*Monographie der Radiolarien*"

1862: appointed associate professor of zoology in Jena

1865: promoted to full professor and director of the Zoology Department

1866: published the two volumes "*Generelle Morphologie der Organismen*"

1868: published the book "*Natürliche Schöpfungsgeschichte*"

1874: published the book "*Anthropogenie*"

1881/82: first tropical journey to India and Ceylon

1882: book "*Indische Reisebriefe*" was published (6th ed. 1922)

1899: published the book "*Die Welträthsel*"

1900/01: second tropical journey to Ceylon, Singapore, Java and Sumatra

1901: book "*Aus Insulinde. Malayische Reisebriefe*" was published

1904: published the book "*Die Lebenswunder*"

1909: retired

1919: 9 August: dies in Jena, Germany



FIGURE 3. Ernst Haeckel (left) together with his assistant Nikolaus Miklucho-Maclay on the island of Lanzarote (1866). Courtesy Photo Archive of the Ernst Haeckel House Jena.

Schedule

Haeckel first published his expedition impressions from the second 8-month journey to the

tropical islands in volume 27 (February to September 1901) of the newspaper “*Deutsche Rundschau*” (Berlin), and later as a book with the title *Aus Insulinde. Malayische Reisebriefe*. The book included 10 chapters, 261 pages, and 79 tables and pictures. We find here chapter titles like: *Von Jena nach Singapur* (ch. 1), *Auf der Insel Singapur* (ch. 2), *Im Garten Buitenzorg* (ch. 3), *Auf der Insel Sumatra* (ch. 8), or *Der Menschenaffe von Java* (ch. 9). On the first leg of his journey, Haeckel traveled from Jena via Paris and Genoa to the island of Singapore. Then he moved on to Java, where he visited the Botanical Garden in Buitenzorg (now Batavia) under the leadership of the Dutch botanist Melchior Treub. He then spent Christmas 1900 in Tjibodas, a biological laboratory in the primeval forest. Later he visited Sumatra. The journey ended with Haeckel’s arrival in Jena in April 1901. His scientific aims were primarily to finish the plankton studies and to describe new marine material (Haeckel 1901:VI). Two different English translations of his interesting *Letters of Indian Travel* were later published (Haeckel 1883a, b).

Results

Here is not the place to discuss Haeckel’s entire work in this context (Haeckel 1863–1917). The only information we have about his tropical journeys is from his two travel books of 1882 (*Indische Reisebriefe*) and 1901 (*Aus Insulinde. Malayische Reisebriefe*) (Figs. 4–5), with travel notes on the fauna and flora, inhabitants, ethnography and so on. On the other hand, in the archive of the Ernst Haeckel House (Jena) we have some letters and paintings from these trips, where we can see how deeply impressed Haeckel was by his stays in the tropical world. Haeckel did not primarily do research during his trips — he was rather on holiday and painted a lot. About his influence on the history of science we can recapitulate: We know that Haeckel’s historical importance

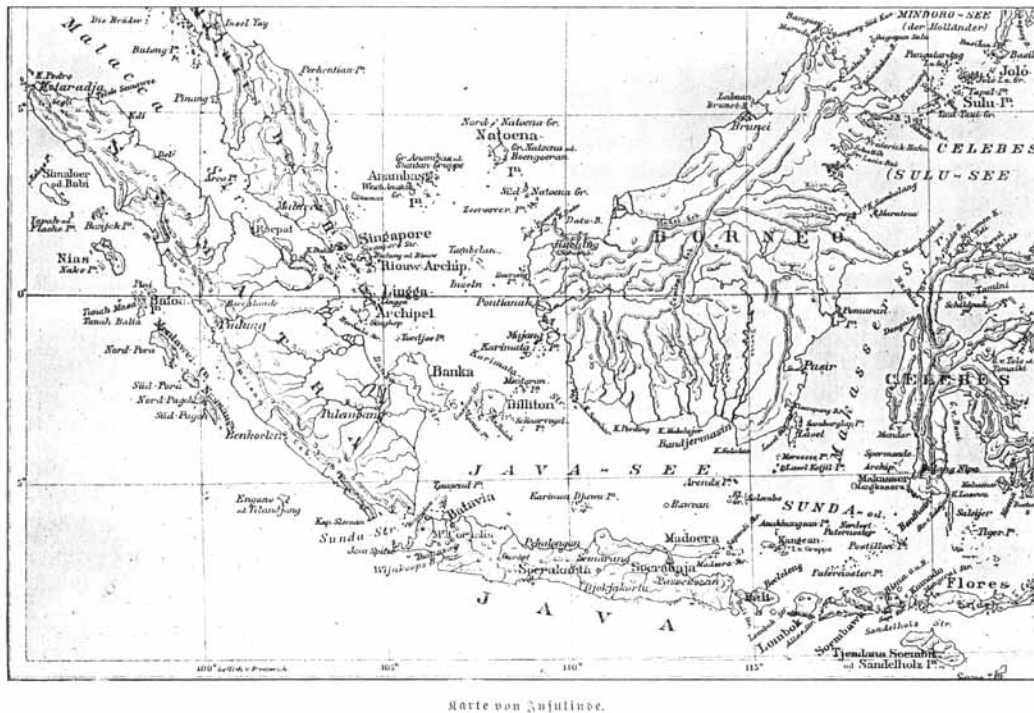


FIGURE 4. Geographical map of “Insulinde” (Haeckel 1901). Courtesy Library of the Ernst Haeckel House Jena.

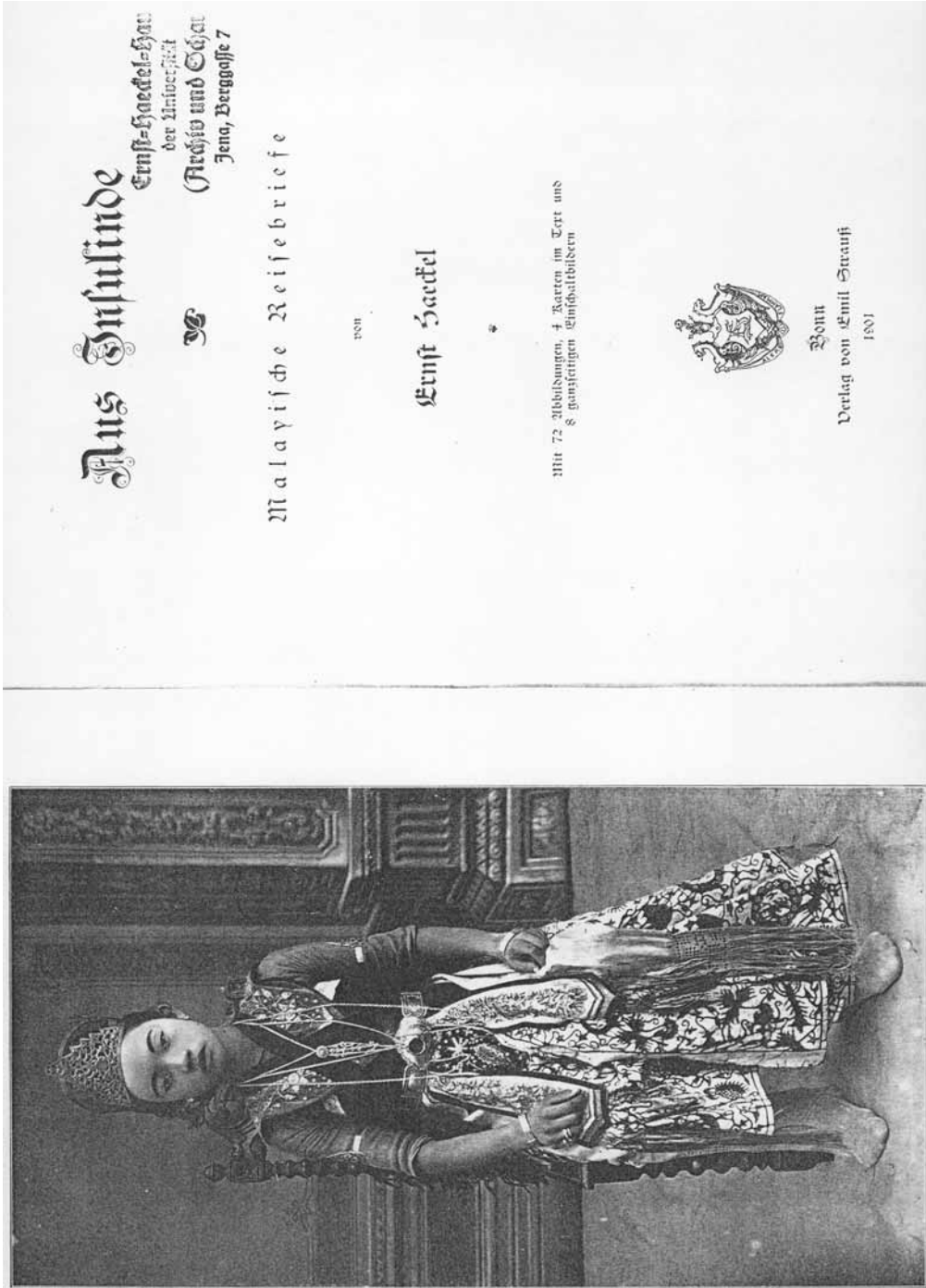


FIGURE 5. Title page from Haeckel's book "Aus Insulinde" (1901). Courtesy Library of the Ernst Haeckel House Jena.

consists principally in his suggestions that stimulated further work by others. His spirited advocacy of Darwin's ideas contributed to the breakthrough of evolutionary thinking in the construction of biological theories. Moreover, terms for concepts that Haeckel was the first to formulate, such as "ontogeny," "phylogeny," "ecology," and "chorology," have been widely adopted (Haeckel 1866, 1868, 1974). The characteristic elements of his life's work were already evident in 1866 in the *Generelle Morphologie*. Haeckel did not really form a school (Krauß 1991). Nevertheless, he did inspire many students to take up zoology, especially research on marine animals, and to undertake expeditions (May, 1909; Bölsche 1911; Schmidt 1934; Uschmann 1959).

Willy Kükenthal – Biography

1861: 4 August: born in Weißenfels, Germany

1880–1884: studied mineralogy for 2 years in Munich and later zoology for 2 years in Jena

1884: received his Ph.D. with a thesis "*Über die lymphoiden Zellen der Anneliden*"

1884/84: stayed in Naples and together with B. Weißenborn traveled to the North Sea

1885: became an assistant in Ernst Haeckel's Zoology department in Jena

1887: habilitation with the thesis "*Über das Nervensystem der Opheliazeen*"

1889: received an endowed professorship for phylogeny ("Ritter-Professur")

1886, 1889: journeys to the Arctic Ocean

1893–1894: supervised an expedition to the Moluccas and Borneo

1898: professorship for zoology and comparative anatomy, director of the Zoology Museum in Breslau (now Wrocław in Poland)

1906–1907: expedition to the Antilles

1911: expedition to Scotland

1912: guest professor in California

1914: expedition to Corsica

1918: moved to Berlin as *Ordinarius* for zoology and director of the Zoology Museum

1922: 22 August: dies in Berlin



FIGURE 6. Portrait of Willy Kükenthal. Courtesy Photo Archive of the Ernst Haeckel House Jena.

Schedule

In 1893, the "*Senckenbergische naturforschende Gesellschaft*" in Frankfurt am Main announced a call for applications for a one-year travel grant to the Moluccas. The aim was to collect material for setting up a zoological collection. In August 1893 the young zoologist Willy Kükenthal from Jena University won the grant. With the help of this grant, Kükenthal had the opportunity to follow in the footsteps of scientists from Jena University in Indonesia. With the help of Kükenthal's travel notes and letters to Haeckel, we can follow his schedule (Fig. 7). He started his journey from Genoa by boat via Port Said, Colombo and the Strait of Malakka. A first visit was

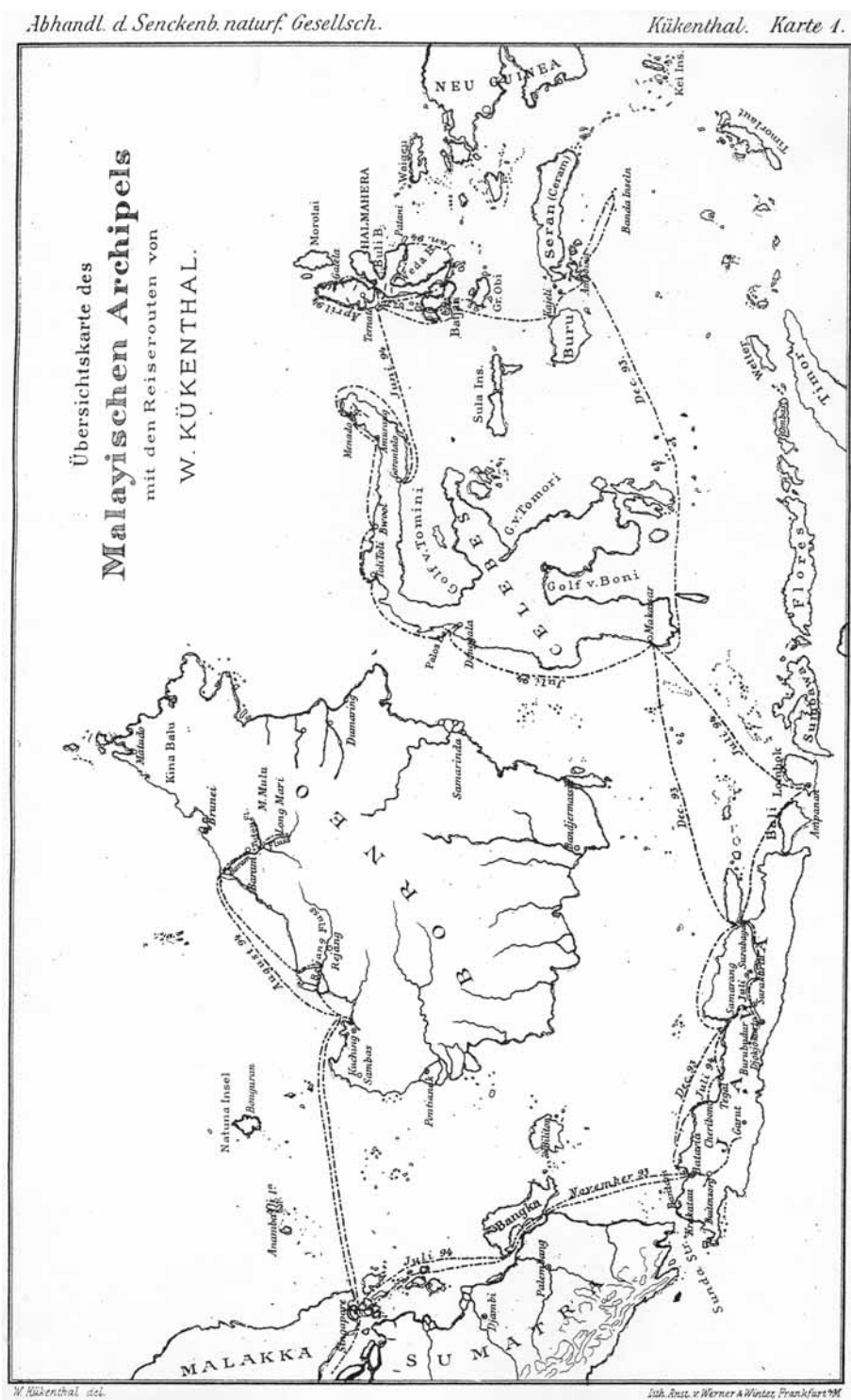


FIGURE 7. Travel map from Kükenthal (1896). Courtesy Library of Zoology at Jena University.

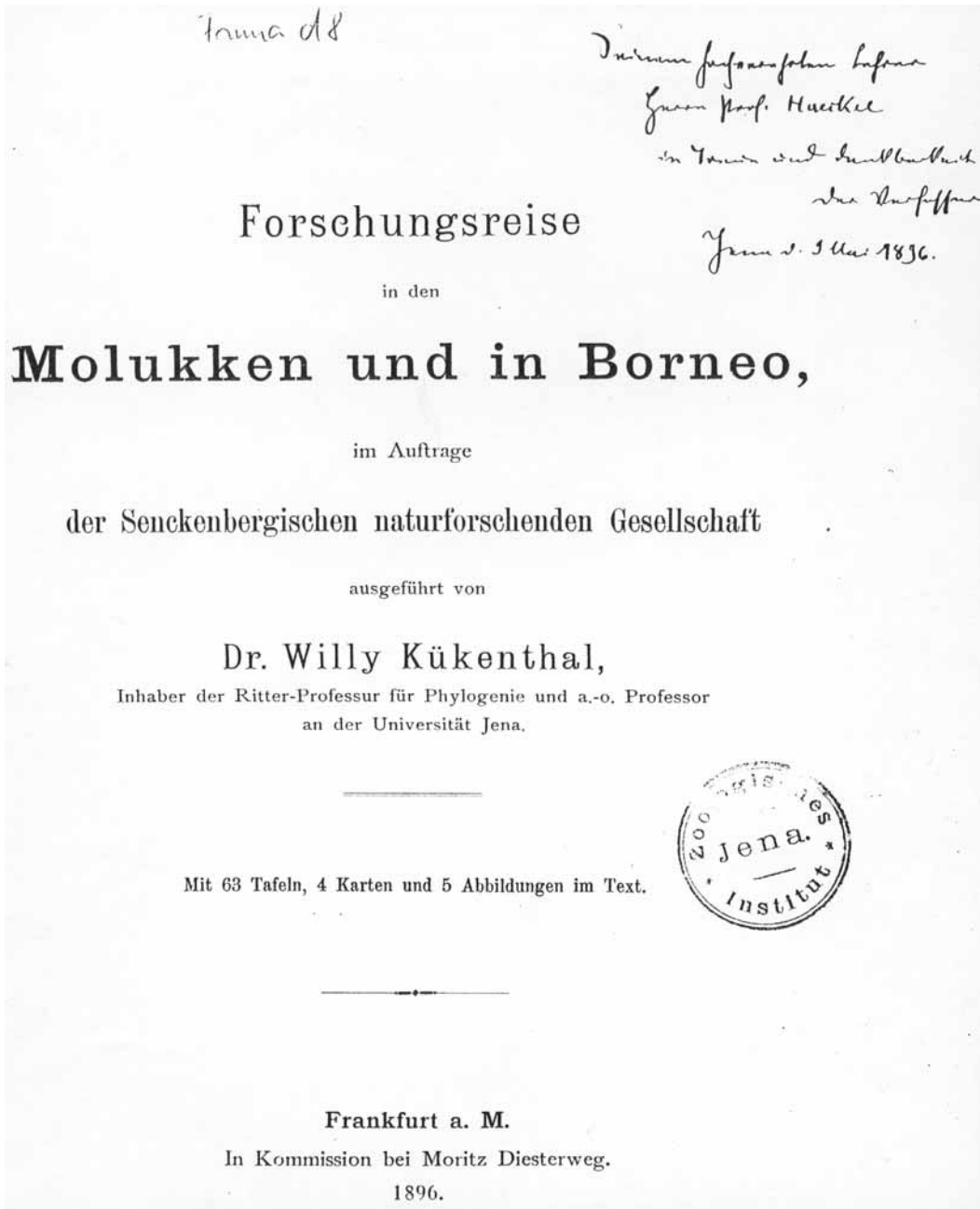


FIGURE 8. Title page from Kükenenthal's book with a dedication from him to Haeckel (1896). Courtesy Library of Zoology at Jena University

planned in Java (Botanical Garden in Buitenzorg). Then the journey went on to the Mollucas over Ambon, Buru to Ternate — the main island, where A.R. Wallace discovered his Darwinian principles (Wallace 1879, 1891). During his stay in this area he investigated the fauna and flora, made

ethnographic studies and visited the neighboring island of Celebes (now Sulawesi). He left the archipelago via Lombok and East Java and started his journey home.

Results

Kükenthal — like Haeckel and others — based his zoological work on embryological and comparative anatomical studies of different animals. Kükenthal's favorite objects were whales and other marine organisms (Kükenthal 1893, 1906, 1919). With his embryological ideas, he took part as an active protagonist in the discussions about Haeckel's biogenetic law. He also did research on the biology and systematics of the coelenterates and on the development of teeth and sets of teeth in mammals. In the history of biology, we recognise Kükenthal as an important figure and author of the *Leitfaden für das Zoologische Praktikum* (1898) and since 1913 as co-founder (together with other authors like Thilo Krumbach) of a major reference work, the *Handbuch der Zoologie*.

Kükenthal published three volumes (1896–1898) about his research in Indonesia under the title “*Forschungsreise in den Molukken und in Borneo*” (Fig. 8).

Vol. 1, 1896 — *Abhandlungen von der Senckenbergischen Naturforschenden Gesellschaft* 22 (travel notes).

Vol. 2, second part — Vol. 1: scientific research results, 1896–1897: *Abhandlungen von der Senckenbergischen Naturforschenden Gesellschaft* 23.– 1. Heft 1896, 2.–4. Heft 1897.

Vol. 3, second part — Vol. 2: scientific research results, 1897–1898: *Abhandlungen von der Senckenbergischen Naturforschenden Gesellschaft* 24 – 1. Heft 1897, 2.–4. Heft 1898.

Richard Semon — Biography

1859: 22 August: born in Berlin, Germany

1879: after reading the works of Darwin and Haeckel he became interested in biology when still in the gymnasium, and thereafter began to study zoology in Jena under Haeckel

1881: Semon studied medicine in Heidelberg and at the same time prepared a dissertation on “*Das Nervensystem der Holothurien*” under the supervision of Otto Bütschli

1883: obtained the Ph.D. (Dr. phil.) in Jena with a thesis on “*Das Nervensystem der Holothurien*”

1884: passed the state medical examination in Heidelberg

1885: served as a physician on an expedition to Africa led by Robert Flegel, but had to withdraw from the journey because of malaria

1885–1886: worked at the zoological station in Naples

1886: became an assistant in the Anatomy department in Jena, and received his medical degree (Dr. med.) with the thesis “*Unter-*



FIGURE 9. Portrait of Richard Semon. Courtesy Photo Archive of the Ernst Haeckel House Jena.

suchungen über den Bau und die Entwicklung der kalkführenden Stützgewebe im Tierreich”

1887: qualified as a university lecturer (Privatdozent) in Jena with a habilitation thesis “*Die indifferente Anlage der Keimdrüsen beim Hühnchen und ihre Differenzierung zum Hoden*”

1891–1893: supervised an expedition to Australia and the Indo-Malayan region

1891: became *außerordentlicher Professor* in Jena

1897: gave up his professorship for personal reasons and began working as a private scholar in Munich

1899: married Maria Krehl, who became known for her translation of the works of Auguste-Henri Forel and the young Charles Darwin

1918: 27 December: dies in Munich, Germany

Schedule

In 1890, Semon planned to undertake a longer expedition to Australia and the Malay Archipelago (Fig. 10). During the journey, he wanted to investigate the vertebrate fauna, including systematic, morphological and zoogeographical aspects. He found moral and financial support from Haeckel, Dr. Paul von Ritter (a great enthusiast for Haeckelian ideas and founder of the endowed Ritter professorship for phylogeny at Jena) and Max Fürbringer (Uschmann 1959). The anatomist Fürbringer would later collect Semon’s material in Jena; see also the second part of the title of his volumes: “*Zoologische Forschungsreisen in Australien und dem Malayischen Archipel mit Unterstützung des Herren Paul von Ritter ausgeführt in den Jahren 1891–1893.*”

Semon started his journey in June 1891, traveled via Colombo, Adelaide, Melbourne, Sydney and in August, after a journey of six weeks, he landed in Brisbane. From September 1891 to January 1892, he “*führte ein Lagerleben im australischen Busch*” (lived a camp life in the Australian outback). In 1892, he returned to various places that he had visited on his first journey to undertake further research during another season. From February to mid-April in 1892, he traveled to the Thursday Islands near Queensland, and from mid-April to May to British New-Guinea. At the end of October, he left Brisbane and traveled across the northwest coast of Australia, thence to the Thursday Islands, and on to Bali and Java. In mid-November 1892, he visited the botanical garden in Buitenzorg (now Batavia), met Melchior Treub (the director), and continued via central and western Java to the Mollucas. In Ambon, he spent three months from January to March 1893 doing marine research. On April 1, he started his journey home via Singapore and then by boat from Bombay directly to Germany. He arrived in Jena at the beginning of May 1893. The “*Medicinisch-naturwissenschaftliche Gesellschaft*” in Jena, a society founded in 1853 on the initiative of the botanist August Batsch, published the results of Semon’s expeditions as *Denkschriften* in five large volumes (Olsson et al. 2004).

Results

Semon based his zoological work on comparative anatomical and embryological studies of echinoderms, snails, fishes, and birds (Semon 1894–1903, 1896). In Australia and the Indo-Malayan region, he was concerned mainly with the habitats, reproduction, and development of the lungfish, *Ceratodus forsteri* (nowadays called *Neoceratodus forsteri*). His travel accounts contain entries on zoogeography, paleontology, and geology, as well as anthropological observations, ethnographic aspects and vivid descriptions of landscapes. After the expedition, five volumes of research results titled *Zoologische Forschungsreisen in Australien und dem Malayischen Archipel* (Fig. 11) were published as *Denkschriften der medicinisch-naturwissenschaftlichen Gesellschaft zu Jena* by the publishing house of Gustav Fischer between 1893 and 1913. The volumes contain the following subjects:

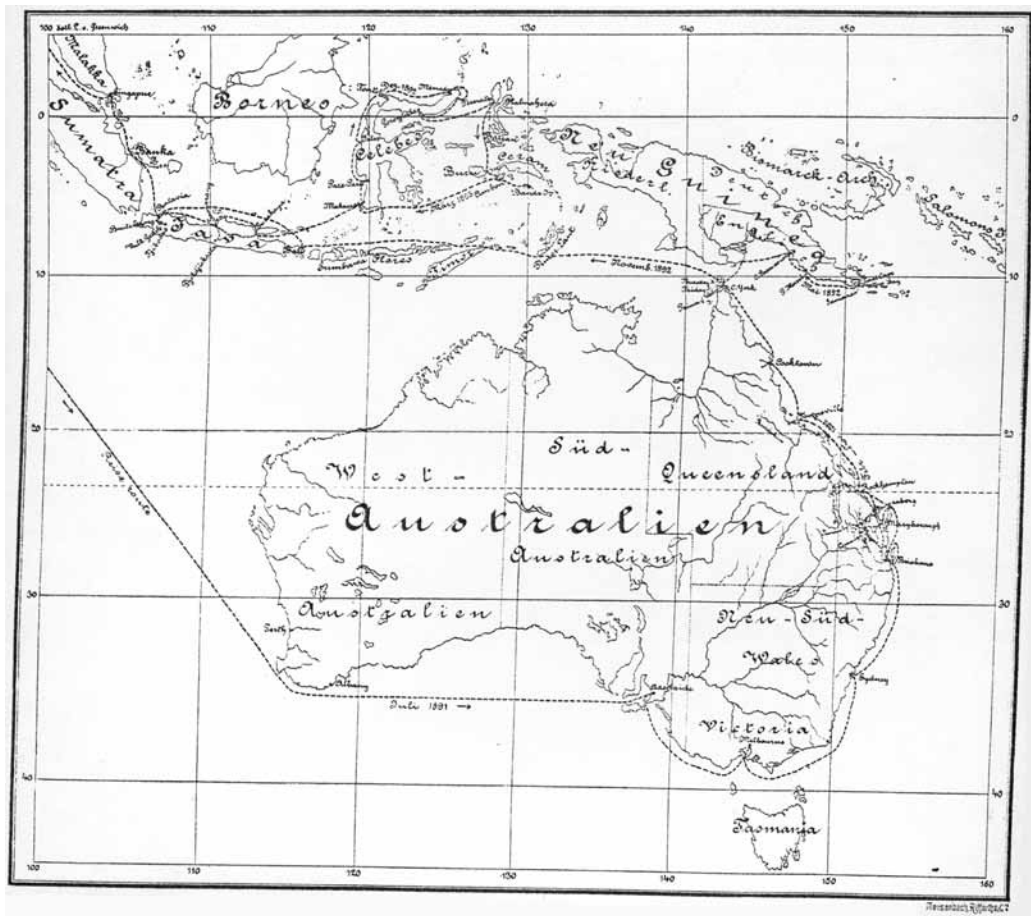


FIGURE 10. Travel map from Semon (1893–1913). Courtesy Library of Zoology at Jena University

Ceratodus (80 tables, 600 figures), 1554 pages

Ceratodus — Atlas

Monotremen und Marsupialier (39 lithographic tables, 86 figures), 1. Vol., 433 pages

Monotremen und Marsupialier — Atlas — 2. Vol.

Monotremen und Marsupialier — II. Teil, 1. Theil (32 lithographic tables, 236 figures), 798 pages

Monotremen und Marsupialier — Atlas

Monotremen und Marsupialier — II. Teil, 2. Theil (75 tables, 331 figures), 921 pages

Monotremen und Marsupialier — Atlas

Morphologie verschiedener Wirbeltiere (46 tables, 279 figures), 874 pages

Morphologie verschiedener Wirbeltiere — Atlas

Systematik, Tiergeographie, Anatomie wirbelloser Tiere (67 lithographische tables, 17 figures), 778 pages

All together 5358 pages of results from his tropical journeys were written. Semon was the editor and also wrote some chapters himself. He had sent out material to specialists who contributed chapters in their respective fields. Among the contributors we find important scientists such as Hermann Klaatsch, Georg Ruge, Ernst Göppert, Fritz Römer, Theodor Ziehen, Ernst Gaupp, Willy

ZOOLOGISCHE
FORSCHUNGSREISEN IN AUSTRALIEN
UND DEM MALAYISCHEN ARCHIPEL

MIT UNTERSTÜTZUNG DES HERRN
DR. PAUL VON RITTER
AUSGEFÜHRT IN DEN JAHREN 1891—1893
VON
PROF. DR. RICHARD SEMON

ERSTER BAND: CERATODUS

MIT 80 TAFELN UND 600 FIGUREN IM TEXT

TEXT



JENA
VERLAG VON GUSTAV FISCHER
1893—1913

FIGURE 12. Title page from Semon (1893–1913); Courtesy Library of Zoology at Jena University.

Mees-farzen die zu den meisten
 4. Cyprinae, die zu den meisten
 zu gehören, in der Regel
 sind (— auf bei O. Hartung) die
 einprächtigste Proben in der
 Embryologie, bei den J. Palaeo.
 tologie u. Vergleich. d. Chontoni
 bei. Nicht gefahren mit. Die
 Untersuchungen von R. Geyger
 Gegenüberhalten und angestrichelt
 Hauptartikel über die Fossilien von
 Brauer die. Aus dem mit Hartung
 — Weiland ist es gut, wenn
 die Tierwelt von O. Hartung
 ist.
 Mit freundlichen Grüßen
 , Joh. S. Haackel.

Jena 25. 11. 1901.
 Lieber Semon!
 Mit Dr. G. Fischer habe ich
 gerade die feinsten Lege-Eier
 = Anaballische Fortkugeln
 = Die Eier, welche die in der
 Nollendung eingetragenen
 Lege-Eier sind, welche, trotz
 dem. Ovid. Kalkstein. Geprägt
 in der Form von Eier, das ist
 C. — also 5000 — die Eier
 G. Fischer! —) ist nicht
 sondern die Eier, die
 Geyger bei. Geyger
 Familie enthält! — und der
 Jena u. Ritters, Hartung, in
 mit den Lege-Eiern von
 den Nollendungen der Eier
 Lege-Eier, bei den
 Hartung



FIGURE 11. Letter from Haeckel to Semon from November 11, 1901 with information on Semon's published volumes. Courtesy Letter archive of the Ernst Haeckel House Jena.

Kükenthal, Wilhelm Lubosch and Max Fürbringer. At the beginning of the volume series is an introduction “*Zur Phylogenie der australischen Fauna. Systematische Einleitung*” written by Ernst Haeckel (Fig. 12).

Later Semon devoted himself primarily to an attempt at bringing together into a unified concept “all those phenomena in the organic world that involve reproduction of any kind”. He called his hypothesis “mneme” (cell-memory). Later Semon’s Lamarckian ideas were rejected by, among others, August Weismann and Wilhelm Johannsen (Semon 1904, 1912).

Penultimately, I want to describe an important expedition to Indonesia in the 20th century. This is the expedition to the Lesser Sunda Islands under the leadership of Bernhard Rensch, one of the architects of the synthetic theory of evolution (Hoßfeld 1998; Reif et al., 2001; Hoßfeld and Junker 2000; Junker and Hoßfeld 2001). Importantly, one member of the zoological scientific community in Jena took part in this expedition—the anthropologist and zoologist Gerhard Heberer (Hoßfeld 1997).

Gerhard Heberer — Biography

1901: 20 January: born in Halle (Saale)

1920–24: Studied anthropology, ethnology, comparative anatomy and zoology in Halle under the geneticist Valentin Haecker and the prehistorian Hans Hahne

1924: Received the Ph.D. degree with the thesis “*Die Spermatogenese der Copepoden*”

1924–1926: Half-time assistant at the museum of “Volkheitskunde” in Halle

1927: Member of Rensch’s Sunda expedition to Indonesia

1928–1938: Associate professor in the Zoology department in Tübingen with Jürgen W. Harms as head of department

1932: Qualified as a university lecturer (Privatdozent) in Tübingen

1938–1945: Moved as ordinarius for “Allgemeine Biologie und Anthropogenie” to Jena

1943: Published the edited book “*Die Evolution der Organismen*”—a theoretical milestone in the development of the synthetic theory of evolution

1945–1947: Captivity in Prague; then he moved to join his family in Göttingen

1947: De-nazification

1949–1970: Director of the “Anthropologische Forschungsstelle” in Göttingen

1973: 13 April: dies in Göttingen



FIGURE 13. Portrait of Gerhard Heberer from October 1970 in Göttingen. Courtesy Photo Archive Uwe Hoßfeld.

Schedule

From January to July 1927, Heberer was a member of the expedition together with the zoologist Robert Mertens (Frankfurt am Main), the anthropologist Wolfgang Lehmann (Kiel), the zool-

ogist Bernhard Rensch, who was also the leader of the expedition, and the botanist Ilse Rensch (Rensch 1928, 1930, 1936). His interests during the expedition focused on anthropological and zoological problems. After the expedition, he spent time doing research in Buitenzorg (Java), on the Mentawai Islands near Sumatra, and in the zoology laboratory in Tjibodas. In March 1928, nine months after finishing the expedition, he was back in Tübingen with a collection of scientific material, pictures (Figs. 14–16) and impressions.

The expedition's route (Fig. 17) through the islands started in Bali, and then to Lombok, Sumbawa, and Flores. With the help of the Indonesia diaries from Heberer, we can give details of the route traveled between January to July 1927: "22. 1. Genua; 24. 1. Auf See bei den Pontinischen Inseln, Höhe von Neapel; 25. 1. Auf See – Straße von Messina; 26. 1. Auf See – bei Kreta; 28. 1. Suez-Kanal; 30. 1.–2. 1. Rotes Meer; 6. 2. Indischer Ozean; 9. 2. vor Colombo; 12. 2. Golf von Bengalen; 14. 2. Insel Pulu Weh; 15. 2. Straße von Malakka, vor Singapore; 18. 2. Singapore; 19. 2. Auf See vor Java; 21.–27. 2. Batavia; 2.–3. 3. Buitenzorg; 4. 3. Bandung; 5. 3. Wonosobo - Djeng-Plateau; 7.–8. 3. Tempelanlage Borobudur und Djokjakarta; 10.–12. 3. Surabaia; 13. 3. Bali – Bululens, Gitgit; 14.–20. 3. Lombok, Narmada; 22.–27. 3. Swela; 31. 3. Sembalun-Hochebene; 1.–6. 4. Rindjani-Massiv mit Segare

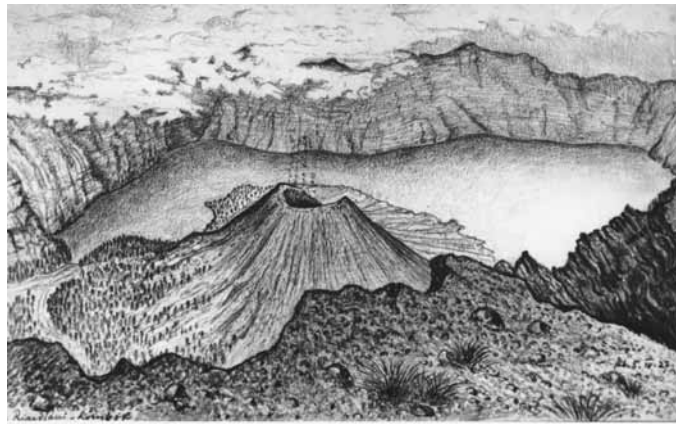


FIGURE 14. Pencil sketch from Heberer (1927, on the island of Lombok, Rindjani volcano). Courtesy Photo archive Uwe Hoßfeld



FIGURE 15. Water-colour from Heberer (1927, near Lombok island). Courtesy Photo archive Uwe Hoßfeld.



Figure 16. Water-colour from Heberer (1927, near Sumbawa island). Courtesy Photo archive Uwe Hoßfeld.

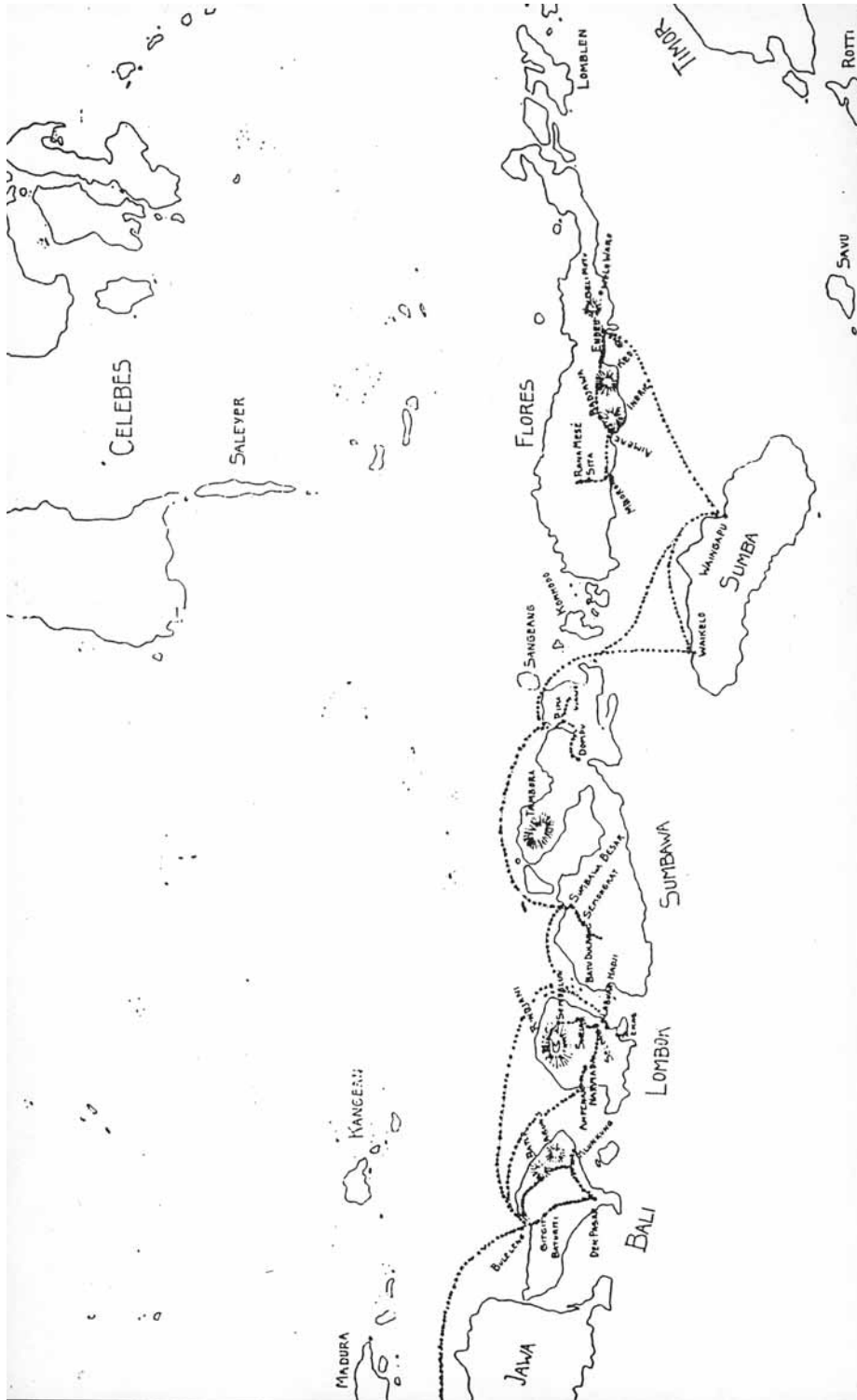


FIGURE 17. Travel map from the Rensch-expedition (Rensch 1930). Courtesy Library of Zoology at Jena University.

Anak; 7.–12. 4. Sembalun; 14. 4. Swela; 15.–21. 4. Selong (Ost-Lombok); 17. 4. Ekas; 23. 4. Alas-Straße; 2.–3. 5. Sumbawa Besar; 4. 5. Batu-Lanteh-Gebirge; 13.–16. 5. Alas-Region (Semongkat, Batu Dulang); 21. 5. bei Mojo; 22. - 29. 5. Dompui; 1.–3. 6. Wawo; 5. 6. Raba; 7.–16. 6. Flores (Endeh, Badjawa, Rana Mese); 6. 7. 1927 Badjawa (Mittel-Flores).” (dates from the diaries and letters from Heberer to his wife Gisela, archive Hoßfeld).

Results

The different members of the Rensch expedition represented a great variety of biological disciplines (Mertens 1929, 1936, etc.). The collections of animals and plants were correspondingly diverse: around 400 mammals, 1,000 birds, 2,000 reptiles and amphibians, many thousands of molluscs and 60,000 arthropods. In addition to the analysis of this material, 222 new species of animals and plants were described. The publications based on the expedition also covered a large variety of subjects: four titles with travel notes, 40 titles on systematic zoology, four titles on botany, five titles on general biology, and five titles on anthropology (Rensch 1936).² In total we have 1700 pages in 58 publications. The Sunda expedition of Rensch (Figs. 18–22) later became an important foundation for the development of ideas leading to an evolutionary synthesis in Germany (Hoßfeld 1998).

Special titles by Heberer were:

- 1928: Über einen Fall von Gametenbildung bei einem hypotrichen Ciliat. Extrait de *Treubia*, vol. 10, livr. 1, Archipel Drukkerij, Buitenzorg, pp. 27–29.
- a. Die anthropologischen Arbeiten der Sunda-Expedition Rensch 1927. *Anthropologischer Anzeiger* 5: 76–78 (with Wolfgang Lehmann).
 - b. Über eine Population von *Daphnia cephalata* King aus Flores. *Verhandlungen der Deutschen Zoologischen Gesellschaft in München*, 32. Jahresvollversammlung, pp. 70–78.
 - c. Die deutsche “Sunda-Expedition Rensch.” *Deutsche Wacht* 14.
- 1930: Am Mangrovenstrand der Ekasbai. Pages 59–66 in Bernhard Rensch, ed., *Eine biologische Reise zu den Kleinen Sunda-Inseln*.
- a. Beitrag zur Kenntnis der Rassenverhältnisse auf den Kleinen Sunda-Inseln. Ebd., pp. 106–116 (with Wolfgang Lehmann).
 - b. Das Hodeninterstitium von *Varanus komodoensis* Ouwens. *Zeitschrift für mikroskopisch-anatomische Forschung* 20: 388–416.
- 1932: Zur Kenntnis der Copepodenfauna der Sunda-Inseln. *Archiv für Naturgeschichte* 1:225–274 (with F. Kiefer).
- 1950: *Die Inland-Malaien von Lombok und Sumbawa. Anthropologische Ergebnisse der Sundaexpedition Rensch*. Musterschmidt, Göttingen (with Wolfgang Lehmann).

² See also in this context — with the help of the Rensch material — the publications of other biologists like E. Ahl: Zur Kenntnis der Leuchtische der Gattung *Myctophum*. *Zoologischer Anzeiger* 81, pp. 134–197, 1929; F. Kiefer: Neue Ruderfußkrebse von den Sunda-Inseln. *Zoologischer Anzeiger* 84, pp. 46–49, 1929; J. Rux: Süßwasserdecapoden von den Sunda-Inseln, gesammelt durch die Sunda-Expedition Rensch. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* vom 1. Mai 1929; C. Attems: Myriopoden der Kleinen Sunda-Inseln, gesammelt von der Expedition Dr. Rensch. *Mitteilungen aus dem Zoologischen Museum Berlin* 16, pp. 117–184, 1930; A. Schellenberg: Amphipoden der Sunda-Expeditionen Thienemann und Rensch. *Archiv für Hydrobiologie*, Suppl.-Vol. VIII, pp. 493–511, 1931; H. Ude: Beiträge zur Kenntnis der Gattung *Pheretima* und ihrer geographischen Verbreitung. *Zeitschrift für wissenschaftliche Zoologie* 1, N.F., pp. 114–190, 1932; P. Sack: Syrphiden (Diptera) von den Kleinen Sunda-Inseln. *Zoologischer Anzeiger* 100, pp. 225–234, 1932; E. Reismoser: Arachnoidea der Sunda-Expedition Rensch. *Mitteilungen aus dem Zoologischen Museum Berlin* 17, pp. 744–752, 1932; C. Heinrich: Farne und Bärlappe der Sunda-Expedition Rensch. *Hedwigia* 74, pp. 224–256, 1934; J. von Malm: *Die Phanerogamenflora der Kleinen Sunda-Inseln und ihre Beziehungen*. A. W. Hayns Erben, Potsdam 1934.

292D.

Herr Dr. Rensch übersandt dem Museum als Geschenk
aus seiner Sunda Exp. (Soembawa, Flores u/.) folgende Insekten-Artenliste:

6 Arachniden	trad. n. g. g.	} Herr Prof. Hesse	✓
10 Myriapoden	"			
9 Kröten	"			
5 Froxididen	"			
9221 Coleopteren	"	} Prof. Künzler	✓
197 Coleopteren	gemalt			
9982 Rhynchoten	trad. n. g. g.	} Prof. Ramme	✓
647 Rhynchoten	gemalt			
1935 Orthopteren	trad. i. d. d. v. d. Kellen			
20 Orthopteren	gemalt			
2021 Orthopteren	trad. n. g. g.			
99 Blattl. d. d.	trad. i. d. d. v. d. Kellen			
9 Blattl. d. d.	gemalt			
193 Blattl. d. d.	trad. n. g. g.			
176 Dermopteren	"			
3435 Hymenopteren	trad. n. g. g.	} Prof. Bischoff	✓
805 Hymenopteren	gemalt			
3821 Formiciden	trad. n. g. g.			
110 Neuropteren	gemalt			
1 Neuroptere	trad. n. g. g.			
539 Macro-Lepidopt. (Heter.)	gemalt	} Dr. Hering	✓
73 Macro-Lepidopt. (Heter.)	trad. i. d. d.			

6/7.28 Mde

Berlin, den 15/8 1928
Zu den Akten
Der Direktor
W. 19

FIGURE 18. Page with notes from Rensch on the insects collected during his expedition in 1927. Courtesy Archive of the Museum of Natural History in Berlin.

A



FIGURE 19. Title page from Rensch's habilitation (1936). Courtesy Library of Zoology at Jena University.

Zoologisches Museum
der Universität

Fernruf: Amt Norden 7153 u. 8996

Berlin N 4, Invalidenstr. 43

den 28. 11. 1927

Lieber Kleppin!

für Briefe, Photos sind
Brock-Brief herzlichsten Danke! Hoff-
entlich erreicht Dich dieser Brief noch
in Bräutertag. Ich sende morgen
an Bern die Bona-Messe-Copie. -
Meine Schilder sind bisher noch nicht
gepackt, da ich von meinem Museum
erst noch 1000 M. herausgeschleusen
müßte und dies erst vom Kultus-
ministerium besonders bewilligt
werden müßte. Wir haben ca. 5000
M. Schilder: davon soll die Hälfte
3000 decken, Frankfurter 1000 sind Berliner
Museum 1000. Wenn die Notgen ein-
schuft nicht soviel gibt, müssen wir
die anderen Geldquellen noch mal an-
klopfen. - Den Wettbewerb in Garmisch.

maschine hat das Museum in Halle
gekauft für 100 M. Ich will damit
bisher ungenutzte Kopieren bezahlen,
solltest Du noch Gelegenheit haben,
von Eric für mich einige lebende Schnecken
Ren sammeln zu lassen, so wäre ich
Dir für Mitbringen derselben sehr
dankbar: percent sind Father-Rosten Prot-
nirander? -

Grüß die unsere Martin sind
tag können, das ich allen ein paar
Kopieren schicken werde, ich bin bisher
mir noch nicht dazu gekommene.
Habe überhaupt wahrhaftig viel
zu tun (z. B. nicht ich noch meine
Wohnung in Dilldorf, (jetzt Willem)
wo ich mit meinen heimlichen Kerven
sehr harmonisch in das Museum passen
werde). Grüß die Kary, Frank sind
von Leere weg. Ich will allen täglich
sicheren, Romme aber nie dazu wegen
der denden Leistungskorrespondenz.

Aber warum als prima Bossi bangst,
welche Gründe, sich von der weg,

Dein B. Rennh.

← FIGURE 20 (left). Letter from Rensch (Berlin) to Heberer (Java island) from November 28, 1927 with information on the research results of the expedition. Courtesy Letter Archive Uwe Höbfeld.



FIGURE 21. Ilse and Bernhard Rensch during the preparation of a monitor lizard (1927). Courtesy Photo Archive Uwe Höbfeld.



FIGURE 22. The members of the Rensch Expeditions as guests with the sultan of Sumbawa (1927). Courtesy Photo Archive Uwe Höbfeld.

Private Biological Journey to the Lesser Sunda Islands in 1993

In 1991—during a stay in Göttingen—I obtained, for research purposes, *Gerhard Heberer's* private Indonesia-material from his wife Gisela (Hoßfeld 1997). After having read Heberer's diaries and letters, I had the wish to follow Heberer in his footsteps to Indonesia. The aim of the journey was to compare the actual situation with entries in the letters and diaries and to collect zoological material. In 1993, I had the opportunity to make a private expedition to Indonesia. During my biological journey in the Indonesian Archipelago in August 1993, I traveled through the island of Bali (2.–10. August) and the Lesser Sunda Islands: Lombok (10.–15. August) (Fig. 23), Sumbawa (16.–21. August) and Moyo (18. August) (Fig. 24). During this stay, in addition to my interest in history, I was able to collect a variety of biological materials (Mollusca, Hexapoda, Reptilia, Mammalia) (Figs. 25–26) in 10 locations. Moyo Island, to the north-east of Sumbawa Besar, was the most interesting place in which to pursue the research; it offered some of the very best snorkeling for biologists that I have experienced in Indonesia. Moyo offers bird-watchers a number of species to see, and there are deer, boar, fruit bats, snakes and lizards. Because of the richness of the wildlife, the southern two-thirds of these islands are a natural reserve. Later we published some of the results in various journals (Krüger and Hoßfeld 1994, 1999; Hoßfeld and Krüger 1999; Hoßfeld 1999).



FIGURE 23. Impression from Lombok island (1993, south). Courtesy Photo Archive Uwe Hoßfeld.



FIGURE 24. Impression from Pulau Moyo island (1993, north of Sumbawa island). Courtesy Photo Archive Uwe Hoßfeld.

CONCLUSION

What can we learn from these expeditions as historians of science?

FIGURE 25 (right, above). Collection of Porifera and Cnidaria (1993). Courtesy Photo Archive Uwe Hoßfeld.

FIGURE 26 (right, below). Collection of mussels (1993). Courtesy Photo Archive Uwe Hoßfeld.

First, fieldwork is only one part of producing knowledge, but relationships to other scientists are essential to the other parts, just as the relationship to Haeckel was important for the success of Jena-based naturalists in the 19th century (Camerini 1996:62).

Second, all important evolutionary biologists traveled — often to exotic places — and after the journeys they formulated theories of evolution or wrote important books: we can see in this tradition Charles Darwin, Alfred Russel Wallace, Ernst Haeckel, Ernst Mayr, the ornithologist Erwin Stresemann, and Bernhard Rensch.

For instance, “Wallace Line”— this invisible barrier, only 25 km wide between Bali and Lombok Islands, is as controversial today as it was one hundred years ago when Wallace used it to galvanize his theory of evolution, which forced Darwin’s hand: “The great contrast between the two divisions of the Archipelago is nowhere so abruptly exhibited as on passing from the island of Bali to that of Lombok, where the two regions are in closest proximity” (Wallace 1893:11).

And, it was Haeckel who gave his ideas on human origins (the missing-link theory of Asia — *Pithecanthropus alalus/erectus*) as one of the main reasons for these Jena expeditions. He exchanged his tropical ideas during his entire life with scientists around the world (Max Weber in Amsterdam — Weber 1890–1907, 1902, etc.).

Third, there is a direct and important relationship between sponsorship (private or public) on the one hand, and a successful expedition on the other hand.

Fourth, an analysis of the research results shows that zoological and botanical interests played a key role in the organization of the expeditions, whereas anthropological ones were less important. About this relationship Wallace once observed: “To understand the importance of this class of facts, and its bearing upon the former distribution of land and sea, it is necessary to consider the results arrived at by geologists and naturalists in other parts of the world” (Wallace 1893:8).

Fifth, we can observe a direct relationship between Darwinian research and the islands of Indonesia, in the tradition of Wallace and others. Biologists from Jena working in this tradition contributed important new results (see table; Harms 1933, 1941; Harms and Dragendorff 1933, etc.).

Sixth, with the help of the collected zoological material from tropical islands, a great tradition for museums of natural history was founded (Ghiselin and Leviton 2000).

Lastly, publishing houses such as Gustav Fischer Verlag in Jena played a crucial role during both the 19th and 20th centuries in making available tropical, biological, and medical knowledge worldwide (Schimper 1891; Lütge 1929, etc.).

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