

ON A FORGOTTEN FLORISTIC MAP OF MALAYSIA
(H. ZOLLINGER, 1857)

by

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The worst use of theory is to make
men insensible to fact.

(Lord ACTON).

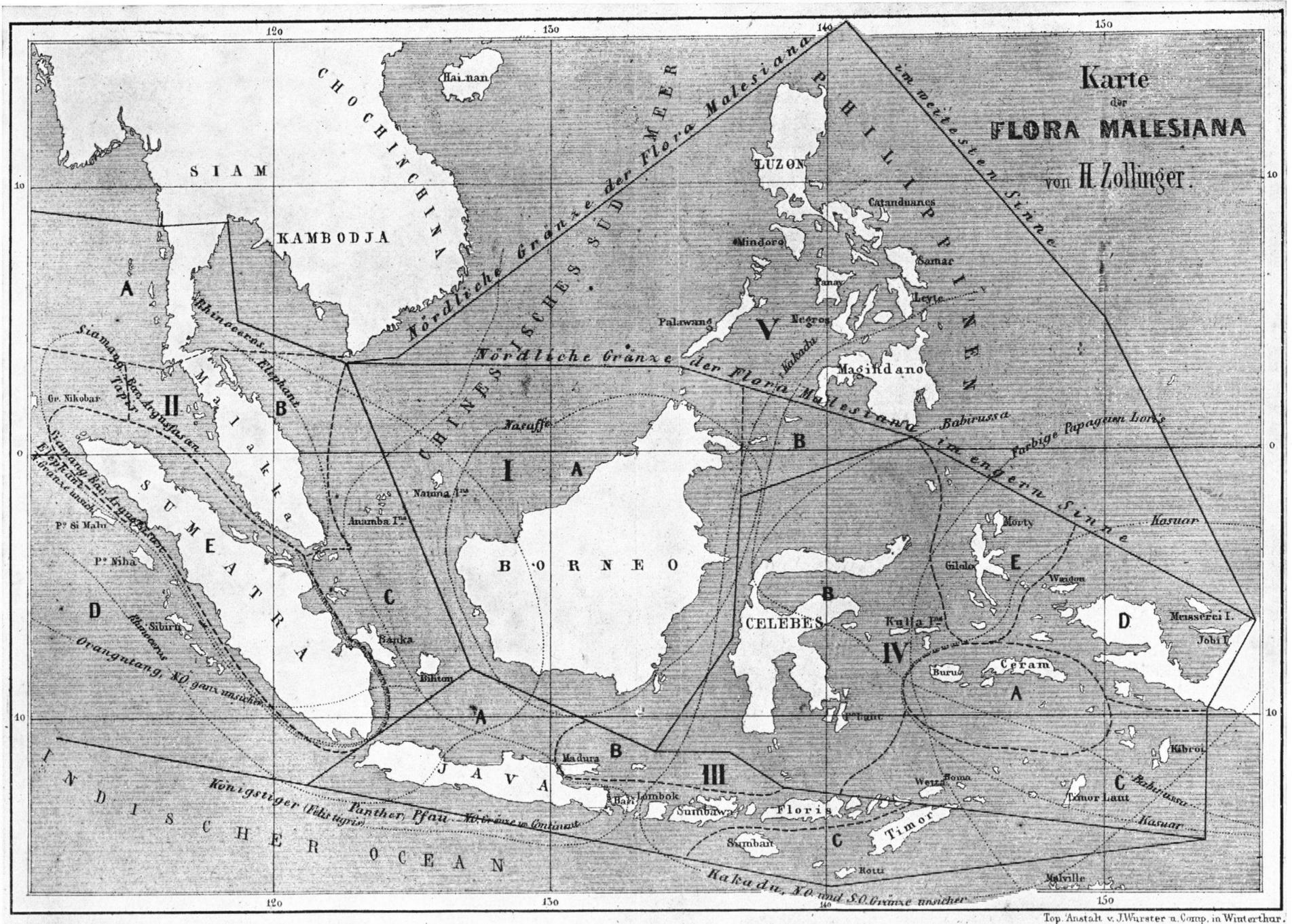
I have hesitated some time over the title of the present paper. The alternative was something like: "WALLACE versus ZOLLINGER" or "The idea of a demarcation line through Malaysia, a limiting factor towards the progress of biogeography". However, the first being too aggressive, and the second too melodramatic, the one found in the heading was chosen.

The above introductory lines mean to put the reader at once face to face with the nucleus of what I will discuss here: the question how ZOLLINGER's "Karte der Flora Malesiana" of 1857 was apparently almost entirely forgotten, although it well deserves to come under the eyes of modern biogeographers, for the sake of the honour of its author and of the priority of his work.

I wager hardly a few of my readers know of the existence of the map in question. It may be found in:

H. ZOLLINGER, Ueber den Begriff und Umfang einer "Flora Malesiana". In: Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich, 2, 1857, 318—349.

This paper, the first survey of the floristic relations in the Archipelago and surrounding countries, was written on the occasion of the publication of the first issues of F. A. W. MIQUEL's "Flora Indiae Batavae" (or "Flora van Nederlandsch-Indië") since 1855. It was published in Dutch under the title: Over het begrip en den omvang eener Flora Malesiana, in the "Natuurkundig Tijdschrift voor Nederlandsch-Indië" 13, 1857, 293—322, apparently at the same time, however, without the map!



Top. Anstalt v. J. Würster u. Comp. in Winterthur.

This map, which is of a remarkably modern conception, well deserves to be saved from oblivion. This is the reason why it has been reproduced here.

Before I will consider its features and details through the eyes of a biogeographer, living exactly 80 years later, I have to say a few words on the question mentioned above: the causes of the fact that this map seems to have escaped the attention of later investigators. Some minor causes may be:

1. that the two papers mentioned above, do not refer to each other¹⁾, possibly because they were published at the same time.

2. that both journals were not of sufficiently international rank to reach the leading investigators on the field of biogeography, the Swiss one being in its early youth, the Netherlands Indian one, although locally leading, for the same reason and also because it was printed in Dutch.

3. that the map was not published in the journal in which it would have had its best chances, viz. the "Natuurkundig Tijdschrift".

However, there is, in my opinion, another cause which is by far the most important one, viz.

4. the fact that the map was published in a period in which the idea of some demarcation line, dividing the Malay Archipelago into an Asiatic and an Australian part, became anchored in the mind of men.

The three first-named points were more or less incidental, the fourth, however, was so to speak a lethal factor to any broad and many-sided views on the problem of the biogeography of these parts. The demarcation idea, as is well-known, originated as early as 1845 by EARLE (1), who published the first map by which the attention was drawn to the "Great Asiatic Bank" on the one hand, the "Great Australian Bank" on the other and the region with deep sea basins between. Although EARLE's few biogeographical remarks are mostly erroneous and his geological statements, as far as I can see, not very well established, his paper has won a certain fame. It has been quoted by practically all authors in this field afterwards, except apparently by the man whose studies induced the origin of the first of the numerous demarcation lines that later on came *en vogue*, SALOMON MÜLLER.

With MÜLLER's elaborate paper (11), based upon another one as

¹⁾ The only indication of a relation between the two is, that the paper in Dutch is dedicated to the „Natuurkundige Vereeniging te Zürich" (Naturforschende Gesellschaft in Zürich). The figures on the last pages are somewhat different in both editions and each of them show their own mistakes concerning these figures. both editions and either of them show their own mistakes concerning these figures.

early as 1839 (10), ZOLLINGER's map was doomed to remain in the background even before it was published. Evolution of human thought in the field of the biogeography of the Archipelago had chosen its course and for the next four or five decennia nothing could withstand, let alone check, its progress.

Although MÜLLER's conclusions were mainly ecological, they gave rise to a faunistic "line", established by a later investigator (SCLATER). This line was repeatedly "corrected" later on, but no correction has ever surpassed in public fame that of MÜLLER's successor in this field, WALLACE. I need not remind the reader of the history of the line called after him, in referring to WALLACE's publications (17, 18, 19) and to what I wrote about it ten years ago (3). Suffice it to state that the whole problem had, almost up to our days, grown very much one-sided. The great authority of WALLACE, considerably strengthened yet by his relations with DARWIN and the principle of selection, made the trend of thoughts sketched dominate undisputedly so strong all ideas that impartial views could not rise or if risen, could not flourish.

Now that the period of the "lines" is over (or almost over), our minds are open again for other possibilities. The problem of the floristic relations in the Archipelago is far from being near its solution; on the contrary, it seems further from it than it did in WALLACE's days. WEGENER's theory of continental shift has set in between. Although accepted in its general form by most of those who may be deemed able to check it in some way, it seems to be more doubtful than ever, whether it is applicable to this region in the simplistic way of WEGENER's own ideas (cf. 4). Yet, since the middle of the preceding century, our knowledge of the flora of the many islands of this Archipelago, as well as of the areas of its species has considerably increased and we are therefore in a position to reconsider floristic problems. Apart from, or in connection with, the "line-of-Wallace problem", this has already been done by some investigators during the last decennia, first of all by MERRILL (7, 8, 9) and also by VAN STEENIS (15, 16) and LAM (2, 3, 4, 5).

Now in not a single one of the papers known to me, in which a quotation of ZOLLINGER's map could be expected, this earliest floristic map was found mentioned. I missed it in MERRILL's papers and in those by VAN STEENIS and I did not come to it myself until very recently. It is not quoted by SIRKS (13) nor by ZOLLINGER's biographers, SCHEIBENER and VAN SLOOTEN (12, 14), who mention the Dutch edition only and therefore missed the map. The only point of connection seemed to be the use of the term "Malaysia", a word that is coming into use

for indicating the Malay Archipelago. The origin of this term puzzled me for a long time and I concluded (cf. 6, p. 99, footnote 3) that MERRILL was the man who introduced it in 1923 (7, p. 1), until I found it in ZOLLINGER's papers, quoted above, from which I guess MERRILL may have taken it, purposely or unconsciously. ZOLLINGER is not sure of the derivation of the term but supposes that it was introduced by french geographers (22, p. 329), as a counter-part to the term Polynesia¹).

On considering ZOLLINGER's map, we are struck by its "modern" features. It is remote from any prejudice in favour of a certain theory. It merely gives a floristic subdivision of the Archipelago based on the contemporary knowledge of the flora; the only point that reminds us of later maps is the addition of a number of (partly incorrect) areal boundaries of animals. And it is remarkable and reassuring to state that after 80 years of research our conclusions, unbiased after the Wallacean period, must be almost the same.

¹) This is, of course, etymologically incorrect, as the last-named term contains the word "nesos" = island, which is lacking in Malaysia. Malaynesia would have been more correct, but not preferable, because of its easy confusion with Melanesia. Malaya = British Malaya = Malay Peninsula. ZOLLINGER uses the term "Flora Malayana" (22, p. 336) exclusively with reference to the area of Sumatra and the Malay Peninsula. In 1844 (cf. 20, p. 375) the last-named term was meant to comprise the whole region, but later on ZOLLINGER preferred "Malayana" in the more restricted and "Malesiana" in the wider sense.

Cf. VAN STEENIS, On the application of the terms Malaysia and Malaya in Plant Geography. Gardens' Bull. S. S. 9, 2, 1937, 187—189. — This paper, which came to hand only after the present contribution was in type, does not refer to ZOLLINGER's map either. I agree with VAN STEENIS' proposal to accept the term "Malaysia" as a biogeographical one comprising the Malay Archipelago *s. l.*, New Guinea and the Malay Peninsula inclusive.

Legenda to the map.

I. Central district ("Reich") — II. Western or Malayan district — III. Southern or Sunda district. — IV. Eastern or Moluccas district. — V. Northern or Philippine district. — The subdivision has only been mentioned in the text as far as the Moluccas are concerned, which are considered to repeat on a smaller scale, the configuration of the whole Archipelago: A. Central group; B. Western group; C. Southern group; D. Eastern group; E. Northern group.

N.B. The meridians are E. of Ferro; the parallels of latitude show an error of about 5° North. The text, however, gives correct latitudes (22, p. 330—332).
Reproduction in same size as the original, apparently a copperplate.

I am inclined to ascribe this modern character of ZOLLINGER's map to two causes of a different nature. The one is that ZOLLINGER was apparently not acquainted with the publications of EARLE of 1845 (he only mentions a publication by EARL [?], from 1853), and with that of SAL. MÜLLER neither; the other is that general floristic conclusions may already be drawn on the basis of a relatively restricted material and that additions thereto usually affect those conclusions only as to points of minor importance.

If we, for instance, compare ZOLLINGER's map with the floristic subdivision I am accustomed to employ since many years for my geographical work (cf. 3, p. 37 and fig. 2; 5, p. 307, pl. III), the difference is very small and as to some details ZOLLINGER's map is even still more modern than mine of 70 years later, e.g. insofar the Talaud Islands are included in the Northern Moluccas province instead of in that of Celebes (cf. results of the "Snellius" Expedition).

ZOLLINGER's untimely death in 1859 prevented him from carrying out his intentions (23, p. 8) "ganze Familien ganz aufzuzählen und damit "unsere Erkenntnis darüber, soweit sie den Indischen Archipel betrifft, "zu umschreiben und über dies die geographische Verbreitung "der Arten so genau als möglich anzugeben". This idea has only been realized 65 years later, when the Buitenzorg Herbarium started its series of local monographs (1922).

Taking MIQUEL's "Flora van Nederlandsch-Indië" as a starting point, ZOLLINGER accepts the Malaysian region in a much wider sense than MIQUEL could do in view of the scope of his work. Quite in accordance with our present ideas (cf. 2, p. 386; 3, p. 42—43; 5, p. 310) ZOLLINGER states that (22, p. 320): "der Indische Archipel... ein höchst natürliches botano-geographisches Gebiet (ist), das mit andern nicht leicht "zusammengeworfen werden kann", an utterance which is worth to be considered in the light of the more recent "lines-concepts". He distinguishes a "Flora Malesiana" in a wider sense (including the Andamans and the Philippines) and another in a more restricted sense (without those parts).

Prominently modern features in ZOLLINGER's concept are e.g.

1. the lack of any lines of demarcation, so as to divide the Archipelago into an Asiatic and an Australian part;
2. the inclusion of the Philippines in the "Flora Malesiana" in a wider sense but the exclusion of that region from the F. M. in a narrower sense. This perfectly agrees with our present knowledge of the Philippines as a secondary (recent) center of dis-

persal (high specific endemism with generic western and eastern relations, cf. 3, fig. 2).

3. the inclusion of the Malay Peninsula in the F. M. rather than a connection with the rest of the continent. This agrees perfectly with the sharp specific gradient to which I was able to call attention earlier (2, p. 386 and 5, p. 310).
4. the central position of Borneo. In the light of modern knowledge this western center has probably to be sought for in the center of the preglacial Sunda-land.
5. such minor points as the separation of the islands off the west coast of Sumatra, the subdivision of the Moluccas in a N., Central and S. part, the Talaud Islands included with the former, etc.

As a matter of course, ZOLLINGER's deductions are generally more exact as far as the western part of the Archipelago is concerned, since the knowledge of many of the eastern islands and especially of New Guinea was still very scanty, in spite of the splendid work of RUMPHIUS. Consequently some of his subdivisions are less successful, e.g. concerning the Southern Province (Java and the Lesser Sunda Islands). His ideas on the geomorphologic constellation of the islands in the Moluccas are even pretty phantastic.

The less correct points, however, are mostly due to the, at that time, more imperfect knowledge concerning the Archipelago as a whole and in details. And I am glad to pay a posthumous tribute to HEINRICH ZOLLINGER, the broad-minded and many-sided botanist, many of whose intuitive ideas on the floristic subdivision of Malaysia have the character of prophecies which now appear to come true.

Literature Cited.

1. W. EARLE, On the physical structure and arrangement of the islands of the Indian Archipelago — Journ. Roy. Geogr. Soc. Lond. 15, 1845, 358—365 — *with map*.
2. H. J. LAM, Further studies on Malayan Sapotaceae I — Bull. du Jard. bot. de Buitenzorg, Sér. III, 8, 1927, 381—493.
3. — Some remarks on the genetic phytogeography of the Malay Archipelago — Ann. du Jard. bot. de Buitenzorg — 37, 1927, 33—44 — *with maps*.
4. — Het genetisch-plantengeografisch onderzoek van den Indischen Archipel en Wegener's verschuivingstheorie — Tijdschr. Kon. Ned. Aardr. Gen. 47, 1930, 553—581 — *with maps*.
5. — The Burseraceae of the Malay Archipelago and Peninsula, etc. — Bull. du Jard. bot. de Buitenzorg, Sér. III, 12, 1932, 281—561.

6. — Phylogeny of single features — *Gardens' Bull. Str. Settle.* 9, 1935, 98—112.
7. E. D. MERRILL, Distribution of the Dipterocarpaceae — *Phil. Journ. Sci.* 23, 1923, 1—33 — *with maps*.
8. — The correlation of biological distribution with the geological history of Malaysia — *Proc. Pan-Pacific Sci. Congr. Australia 1923*, 1148—1155 — *with map*.
9. — An Enumeration of Philippine Flowering Plants IV, 1926, 77—105, 127—155 — *with maps*.
10. SAL. MÜLLER, Over de Zoogdieren van den Indischen Archipel — *Verh. over de Nat. Gesch. d. Nederl. Overz. Bezitt. door de leden der Nat. Comm.* 1, 1839, 1—57.
11. — Ueber den Charakter der Thierwelt auf den Inseln des Indischen Archipels, ein Beitrag zur zoologischen Geographie — *Arch. f. Naturgesch.* 12, 1, 1846, 109—128.
12. E. SCHEIBENER, Heinrich Zollinger (1818—1859) — *Mitt. d. Gruppe Niederl. Indien d. Neuen Helvetischen Gesellsch.* 8, 1929, 1—14.
13. M. J. SEEKS, Indisch Natuuronderzoek — *Med. Kol. Inst. Amsterdam No.* 2, 1915.
14. D. F. VAN SLOOTEN, Heinrich Zollinger als Botaniker und seine Bedeutung für unsere Kenntnis der Flora Java's — *Mitt. d. Gruppe Niederl. Indien d. Neuen Helvetischen Gesellsch.*, 8, 1929, 15—22.
15. C. G. G. J. VAN STEENIS, On the origin of the Malaysian Mountain flora I—III — *Bull. du Jard. bot. de Buitenzorg, Sér. III*, 13, 135—262 (1934) and 289—417 (1935); 14, 258—274 (1936) (to be continued).
16. — Maleische Vegetatieschetsen — *Tijdschr. Kon. Ned. Aandr. Gen.* 52, 1935, 25—67, 171—203 and 363—398 — *with coloured map*.
17. A. R. WALLACE, On the geography of the Malay Archipelago — *Journ. Proc. Linn. Soc., Zool. Pap.* 1860.
18. — On the physical geography of the Malay Archipelago — *Journ. Roy. Geogr. Soc.* 33, 1863, 217—234 — *with map*.
19. — The Malay Archipelago, the land of the orang-utan and the bird of paradise — London 1869 — *with map*.
20. H. ZOLLINGER, Observationes Phytographicae, etc. — *Nat. en Geneesk. Arch. v. Nederl. Ind.* 1, 1844, 372.
21. — Over het begrip en den omvang eener Flora Malesiana — *Natuurk. Tijdschr. voor Ned.-Indië* 13, 1857, 294—322.
22. — Ueber den Begriff und Umfang einer "Flora Malesiana" — *Vierteljahrsschr. d. Nat.forsch. Ges. in Zürich* 2, 1857, 318—349 — *with map*.
23. — Observationes Botanicae novae — *Natuurk. Tijdschr. voor Ned.-Indië* 14, 1857.