

Citation:

Koorders, S.H., A brief contribution to the knowledge of endozoic seed distribution by birds in Java, based on a collection made by Mr. Barthels on the Pangerango and near Batavia I, in: KNAW, Proceedings, 12, 1909-1910, Amsterdam, 1910, pp. 108-116

of the boiling point of dihydromyrcene; with a mixture of glacial acetic and sulphuric acids it gives the characteristic odour of myrcenol. I am engaged in a closer investigation of this product and in working out the method.

The continuation and extension of this provisional research has been rendered possible to me by the support of the provincial Utrecht Society of Arts and Sciences. The optical determinations have been carried out in the organic-chemical laboratory at Utrecht.

's-Hertogenbosch, May 1909.

Botany. — “*A brief contribution to the knowledge of endozoic seed distribution by birds in Java, based on a collection made by Mr. BARTHELS, on the Pangerango and near Batavia.*” 1.
By S. H. KOORDERS.

(*Contribution to the knowledge of the Flora of Java.* V).

(Communicated in the meeting of May 29, 1909).

§ 1. General remarks and method.

Mr. M. BARTHELS of Tjisaat, Preanger, Western Java, who has such an intimate knowledge of the javanese bird-fauna, was kind enough to comply with my request for a collection of seeds and fruits from the stomachs and intestines of birds, shot by him on the Pangerango and near Batavia. This collection, though small, had been made with great care; it was accurately labelled and was preserved in alcohol.

For this collection, which I received here (at Leiden) from India last May, the scientific names of the birds had already been established by Mr. BARTHELS, but the botanical determination of the fruits and seeds had not yet been made. The botanical determination has now been accomplished, as far as time and the nature of the material would permit, the material of 's Rijks Herbarium at Leiden having been used for comparison.

In each case I have included in quotation-marks, adding the letters M. B. between parentheses, those data which were given by Mr. BARTHELS on the collecting labels, relating to the name of the birds, the place and date of collection and the serial number of his ornithological collection.

The ornithological investigations of the late Dr. VORDERMAN, of

Mr. M. BARTHELS and especially also of Dr. J. C. KONINGSBERGER ¹⁾ have supplied many data, particularly as regards the names of insects found in the stomachs of javanese birds and the animal food of "useful" and "harmful" birds; on the other hand our knowledge of the significance of various species of fruit-eating birds for the distribution of seeds and fruits in Java is still extremely limited.

At any rate, methodical observations on this question are almost completely wanting in the literature for Java (with numerical data about the number and botanical origin of the seeds and the scientific name of the birds). For only two Javanese plant species [*Lantana Camara* L., *Myrica javanica* Bl.] special data are to be found in the literature ²⁾.

I have therefore attempted to ascertain as well as possible at least the natural order and the genus of the seeds, collected by Mr. BARTHELS.

Thanks to the method of labelling employed, the further determination of the species can take place later, when more time and material are available. I have contented myself in most cases with the probable determination of the plant-genera.

Meanwhile germination experiments, made on the spot, remain very desirable for the future. In such experiments one portion of the seeds found in birds stomachs, will have to be sown at once, while the other portion is preserved with the seedlings for botanical determination. For the collection, which has now been examined, such comparative germination experiments are still wanting, because Mr. BARTHELS could not afford the necessary time for them.

¹⁾ KONINGSBERGER, J. C., Aanteekeningen over maaginhouden van vogels (in *Teijsmannia* XIX. (1908) p. 83—99).

²⁾ ERNST, A., Besiedelung vulkanischen Bodens auf Java, etc. (in KARSTEN & SCHENCK, Vegetationsbilder. I. Reihe, Heft 1 u. 2. (1909) IV. Text von Tafel 9 und 10).

KOORDERS, S. H., Contribution N^o. 1 to the knowledge of the flora of Java § 1. On the oecological conditions, means of dissemination and geographical distribution of the species of Myricaceae, growing wild in Java, especially in the higher mountains (in Kon. Akademie v. Wetenschappen in Amsterdam, Verslag der Gew. Vergadering d. Wis- en Natuurk. Afd. 12 Maart 1908. p. 645—652 and the literature quoted there; also the English translation in: Kon. Akademie v. Wetenschappen Amsterdam. Proceeding 24 April 1908 p. 674—680.

VALETON, TH., Distribution of fruits by animals. (Dutch) in *Teijsmannia*. IV. (1881) p. 205—222 (*Lantana Camara* L., p. 217).

CORDES, H. J. W. The djatiwoods of Java. 1881. (Batavia) p. 81—83 (Dutch). This deals with the distribution of the fruits of a shrub (*Lantana Camara* Linn.), which was introduced into Java from S. America about 1850 and now covers many thousands of acres in Java. See also the literature mentioned there: *Natuurk. Tijdschr. Ned. Indië* XXXI. p. 287 and *Tijdschrift voor Nijverheid en Landbouw Ned. Indië* XXII. p. 75.

For a large number of European plants Dr. SELIM BIRGER has recently made and published numerous feeding experiments¹⁾. For Java however, germination experiments with seeds and fruits from birds stomachs have, as far as I know, only been made with *Myrica javanica* Bl. (compare footnote 2 above on p. 109).

In order to obtain a better insight into the significance of endozoic seed-dissemination by birds in the Dutch East Indies and especially in Java, special comparative feeding-experiments are further very desirable with some species of birds, which are the most important from a phyto-geographical point of view. With these experiments on captive birds it would also be desirable to choose in each case a portion of the seeds and fruits from *common, wild plants* and always to keep a portion of the seeds in order to check the botanical determination. By combining the serial numbers (of the birds) with the letters *a, b, c*, for the seeds and fruits, the origin of each of the seeds can thus be sharply defined scientifically, and a confusion with other seeds and fruits be excluded.

As the first example of this simple method of numbering, which has been found to serve its purpose well, I choose here the following combination: BARTHELS n. 5903*a* means for instance the seeds and fruits of the plant species *a* found in the stomach of the bird Coll. BARTHELS n. 5903 on 18 X 1908 in Western Java on the Pangerango. And in this case (see below) the bird n. 5903 was, according to the original label, determined by Mr. BARTHELS as ♂ *Criniger gularis* Horsf., where as the vegetable stomach contents *a* has been provisionally determined by me as *Micromelum pubescens* Bl.

As a second example the following combination may serve: BARTHELS n. 6162*a* and BARTHELS a. 6162*b*. Here n. 6162*a* therefore signifies (see below) the seeds with portions of the fruit wall of the species of *Euphorbiaceae* while the combination 6162*b* indicates the fruit-stones of the species of *Myrsinaceae*, both of which were found in the stomach contents of the bird, shot by Mr. BARTHELS on 30 I. 1909 in Western Java on the Pangerango and determined by him as ♀ *Poliomyias luteola* Pall. (winter visitor!).

With the aid of this combination of a number and a letter, the provisional botanical determination can always be confirmed or corrected with ease.

¹⁾ Compare e. g. SELIM BIRGER, Über die Pflanzen mit endozoischer Verbreitung (in Botaniska Notiser 1907). — Abstract by ULBRICH in Literaturbericht in ENGLER'S Botan. Jahrb. Bd. 40 (1907) p. 215. — SELIM BIRGER, Über endozoische Samenverbreitung durch Vögel (in Särvtijek Svensk Botanisk Tidskrift. Bd. 1. (1907) 1—31 and abstract by ULBRICH in ENGLER'S Botan. Jahrb. Bd. 41 (1908) Heft. 3. p. 68.

§ 2. List of Javanese birds with the botanical origin of the seeds and fruits found in their stomach contents.

“*Aleippa solitaria* Cab. ♂. — 12. X. 1908. — Pangerango. — Coll. BARTHEL'S Nr. 5892” (M. B.).

Stomach contents (5892a): 4 fruits and 12 undamaged seeds of one species of Araliaceae, probably of the genus *Schefflera* Forst.

“*Carpophaga lacerunulata* Temm. ♂. — 20. IX. 1908. — Pangerango. — Coll. BARTHEL'S Nr. 5837” (M. B.).

Stomach contents 5837a: one undamaged seed, still surrounded by its arillus, of the order Myristicaceae and presumably of *Knema laurina* Bl. or of *Knema glauca* Bl.

“*Chloropsis nigricollis* Vieill ♂. — 8. II. 1909. — Pangerango. — Coll. M. BARTHEL'S”. Nr. 6180. (M. B.).

Stomach contents 6180a: Two ripe fruits of a species of Loranthaceae and presumably either of the genus *Loranthus* Linn. or of the genus *Elytranthe* Blume. Further in the same intestines: six ripe fruits of the same species of Loranthaceae.

“*Chloropsis nigricollis* Vieill. ♂. — 30. I. 1909. — Pangerango. — Coll. M. BARTHEL'S Nr. 6161. (M. B.).

Stomach contents 6161a: Three seeds of a Dicotyledonous species, not as yet further determined.

“*Chloropsis nigricollis* Vieill. ♀. — 12. X. 1908. — Pangerango. — Coll. M. BARTHEL'S. Nr. 5891” (M. B.).

Stomach contents 5891a: too much damaged; could not be determined.

“*Cochoa azurea* Temm; ♂. — 5. XI. 1908. — Pangerango. — Coll. M. BARTHEL'S. Nr. 5940” (M. B.).

Stomach contents 5940a: Seven undamaged ripe fruits of one species of Rutaceae, probably of the genus *Fagara* Linn.

“*Criniger gularis* Horsf. ♂. — 15. X. 1908. — Pangerango. — Coll. M. BARTHEL'S”. Nr. 5897. (M. B.)

Stomach contents 5897a: three undamaged ripe seeds with fragments of the fruit pulp of one and the same species of Araliaceae

and very probably of *Arthropodium diversifolium* Bl.

“*Criniger gularis* Horsf. ♀. — 2. X. 1908. — Pangerango. — Coll. M. BARTHEL. Nr. 5870”. (M. B.).

Stomach contents 5870a: Four undamaged ripe well developed seeds, and some young rudimentary ones, in addition to pieces of the fruit valves and wall of one and the same species of Euphorbiaceae and probably of the genus *Glochidion*.

„*Criniger gularis* Horsf. ♂ — 18. X. 1908. — Pangerango. — Coll. M. BARTHEL. Nr. 5903”. (M. B.).

Stomach contents 5903a: Two undamaged ripe seeds and some fragments of the fruit pulp of one species of Rutaceae, and presumably of *Micromelum pubescens* Bl.

“*Cyanops armillaris* Temm. ♂. — 21. I. 1909. — Pangerango. — Coll. M. BARTHEL. Nr. 6143”. (M. B.).

Stomach contents 6143a: Ten undamaged ripe seeds of one species of Euphorbiaceae, probably of the genus *Antidesma* and perhaps of the arborescent *Antidesma tetrandum* Bl. which is commonly wild on the Pangerango.

“*Cyanops armillaris* Temm. ♂. — 25. VII. 1908. — Coll. M. BARTHEL. Nr. 5645”. (M. B.).

Stomach contents 5645a: Fragments of ripe receptacula of one species of Moraceae namely of *Ficus*.

“*Hemiscus virescens* Temm. ♂. — 17. X. 1908. — Pangerango. Coll. M. BARTHEL. Nr. 5902”. (M. B.).

Stomach contents 5902a: Fragments of ripe receptacula of a species of Moraceae, of the genus *Ficus*.

“*Hemiscus virescens* Temm. ♀. — 20. XI. 1908. — Pangerango. — Coll. M. BARTHEL. Nr. 5973”. (M. B.).

Stomach contents 5973a: eighteen ripe undamaged seeds with fragments of the valves of dehiscent fruits of one species of the order Euphorbiaceae, presumably of the genus *Glochidion*.

“*Laniellus leucogrammicus* Swains. ♂. — 19. VII. 1908. — Pangerango. — Coll. M. BARTHEL. Nr. 5634”. (M. B.).

Stomach contents 5634a: Fragments of ripe fig fruits of one species of *Ficus* (order Moraceae).

“*Limonites ruficollis* *Pall.* ♀. — 18. XII. 1908. — Batavia. — Coll. M. BARTHEL. Nr. 6051. (Wintervisor!)”. (M. B.).

Stomach contents 6051a: seven ripe, partially damaged fruits of one species of *Cyperaceae*, presumably of the genus *Carex*, the fruit resembling that of *Carex baccans* Nees., but differing from it.

“*Poliomyias luteola* *Pall.* ♀. — 30. I. 1909. — Pangerango. — Coll. M. BARTHEL. (Wintervisor!). Nr. 6162”. (M. B.).

Stomach contents 6162a: seven undamaged ripe seeds with fragments of the walls of septa of the fruits of one species of *Euphorbiaceae*, presumably of the genus *Glochidion*.

Stomach contents 6162b (in the same stomach): three ripe stones of one species of *Myrsinaceae* and presumably of *Embelia* *Ribes* *Burm.* or of a closely related species.

“*Pycnonotus bimaculatus* *Horsf.* ♀. — 26. VII. 1900. — Pangerango. — Coll. M. BARTHEL. Nr. 5646”. (M. B.).

Stomach contents 5646a: Five undamaged ripe fruits of one species of *Myrsinaceae* and presumably of *Embelia* *Ribes* *Burm.*

“*Pycnonotus bimaculatus* *Horsf.* ♀. — 14. XI. 09. — Pangerango. — Coll. M. BARTHEL. Nr. 5958”. (M. B.).

Stomach contents 5958a: Twenty-four ripe seeds of one species of the order *Euphorbiaceae*, presumably belonging to the genus *Glochidion*.

§ 3. Brief survey, arranged alphabetically,
according to plant orders.

Araliaceae: *Arthrophyllum diversifolium* Bl. = Nr. 5897a (Criniger); *Schefflera* spec. = 5892a (Aleippa).

Cyperaceae: *Carex*? spec. = Nr. 6051a (Limonites).

Euphorbiaceae: *Antidesma* spec. = Nr. 6143a (Cyanops). *Glochidion* spec. = Nr. 5870a (Criniger); Nr. 5958a (*Pycnonotus*); Nr. 5973a (*Hemiscus*) and Nr. 6162a (*Poliomyias*).

Loranthaceae: *Elytranthe* or *Loranthus* spec. = Nr. 6180a (Chloropsis).

Moraceae: *Ficus* spec. div. = Nr. 5643a (*Laniellus*); Nr. 5645a (Cyanops) and Nr. 5902a (*Hemiscus*).

Myristicaceae: *Knema laurina*? Bl. = Nr. 5837a (*Carpophaga*).

Myrsinaceae: *Embelia Ribes* Burm. = Nr. 5646*a* (*Pycnonotus*).

Rutaceae: *Fagara* spec. = Nr. 5940*a* (*Cochoa*); *Micromelum pubescens* Bl. = Nr. 5903*a* (*Criniger*).

List of the birds' stomachs numbers and the generic names determined by Mr. M. BARTHELS of the birds of the collection BARTHELS: Nr. 5634 (*Laniellus*); 5645 (*Cyanops*); 5646 (*Pycnonotus*); 5837 (*Carpophaga*); 5870 (*Criniger*); 5891 (*Chloropsis*); 5892 (*Aleippa*); 5897 (*Criniger*); 5903 (*Criniger*); 5940 (*Cochoa*); 5902 (*Hemiscus*); (*Pycnonotus*); 5973 (*Hemiscus*); 6051 (*Limonites*); 6143 (*Cyanops*); 6161 (*Chloropsis*); 6162 (*Poliomyias*); 6180 (*Chloropsis*).

§ 4. Phytogeographical remarks on the occurrence of the enumerated plant-genera in the district where the birds were shot.

Araliaceae. — *Arthrophyllum pinnatum* BL. is a small tree, bearing fruit profusely. (See stomach contents Nr. 5897*a*, *Criniger*). It is very common in the woods on the lower slopes of the Pangerango and also elsewhere in Java, especially in young secondary woods at an altitude of 0—1500 m.

Of the genus *Schefflera* *Forst.* there occur wild in Java 14 more or less arborescent, or merely fruticose species. Some of these species occur wild in the lower and higher woods of the Pangerango and one arborescent species (*Schefflera rugosa* Harms) occurs very commonly in the highest forests on the summits of the Pangerango at 2500—3030 m. above sea-level.

Some species of *Schefflera* not only occur in the moist mountain forests of the Pangerango as soil plants, but are also found high up in the crowns of the forest-giants as epiphytes (Comp. Nr. 5892*a*, *Aleippa*).

Cyperaceae. The genus *Carex* is represented in Java by some species, especially in the higher cooler mountain regions and for instance also in the Pangerango. A few species (e. g. *Carex baccans* Nees., *C. filicina* Nees., *C. Rafflesiana* Boot. and *C. hypsophila* Miq.) are, for instance, common at 2500—3030 m. above sea level on the highest summit of the Gede and the Pangerango. In the lower regions *Carex* is rare in Java (comp. stomach contents Nr. 6051*a*, *Limonites*).

Euphorbiaceae. The genus *Glochidion* *Forst.* is represented in Java by a number of arborescent wild species, some of which

are very abundant e. g. in the lower mountain woods of the Pangerango. In the highest forests in the summit of the Pangerango at an altitude of 3000 m. the genus *Glochidion* is completely wanting. (Comp. stomach contents Nr. 5870a, Criniger, etc.).

Of the genus *Antidesma* there occur in Java, in addition to the much cultivated *A. Bunias* Linn., a number of tree like wild species especially in the lower mountain forests. A very common small forest-tree, bearing profuse fruit, and occurring in the mountain forests of the Pangerango is e. g. *Antidesma tetrandrum* Bl. (Comp. stomach contents Nr. 6143a, Cyanops).

Loranthaceae. The genera *Loranthus* and *Elytranthe* are represented in Western Java, among others also in the Pangerango by *Loranthus lepidotus* Bl., which at an altitude of 0—2500 m. occurs very commonly as a parasite on the most widely different species of trees, and further by *Elytranthe globosa* (Roxb.) Engler and *E. avenia* (Bl.) Engler. (See stomach contents Nr. 6180a, Chloropsis).

Moraceae. The genus *Ficus* is represented in Java by more than 80 wild-growing species of which some are trees, some are shrubs and a few are climbing-plants.

A large number of species live in their youth for a time epiphytically. Numerous *Ficus* species occur in the mountain-forests of the Pangerango and a few species ascend to the forests on the highest summit.

Among the very common, richly fruiting arborescent species of the lower Pangerango forests, the following may be mentioned, which occur also elsewhere in Java: *F. toxicaria* Linn., *Ficus Ribes* Reinv. and *Ficus variegata* Bl.

Myristicaceae. — *Knema laurina* Bl. and *Knema glauca* Bl. are two species of nutmeg trees which occur also in the forests on the lower slopes of the Pangerango. They generally do not ascend in Western Java higher than 1200 M. above sea-level. (Compare stomach contents Nr. 5857a Carpophaga).

Myrsinaceae. — *Embelia Ribes* Burm. is a woody climber, of frequent occurrence in the whole of Western Java and for instance also in the lower woods of the Pangerango; it bears fruit very copiously. (See stomach contents Nr. 5646a, Pycnonotus).

Rutaceae. — Of the genus *Fagara* the species *F. scandens* (Bl.) Engler occurs not infrequently in Western Java, for instance on the Pangerango in the lower mountain forests: it is a high-climbing, woody species bearing copious fruit and ascending to about 1300 M. above sea-level. (Compare stomach contents Nr. 5940a, Cochoa).

Micromelum pubescens Bl. is a small tree, which is extremely frequent in the whole of Java from the plain to the lower mountain forests, and also pretty abundant on the Pangerango, for instance, up to 1200 M. in young, secondary woods. It nearly always bears plentiful fruit frequently. (Compare stomach contents Nr. 5903a, Criniger).

In conclusion it is my very pleasant duty to offer my cordial thanks to Mr. M. BARTHELIS of Tjisaat, Preanger, for sending me the seeds etc. from birds' stomachs and for determining the bird species, from which the above mentioned material was collected by him.

All the botanical determinations and the above text, in as far as it has not been placed between quotation-marks (see above) are due to myself.

Leiden, May 25, 1909.

Botany. — “Some remarks on the nomenclature and synonymy of *Xylosma leprosipes* Clos., *X. fragrans* Decne and *Flueggea serrata* Miq.” By S. H. KOORDERS. (Contribution to the knowledge of the Flora of Java. VI.)

(Communicated in the meeting of May 29, 1909).

§ 1. On the authentic specimens of *Xylosma leprosipes* Clos.
and *X. fragrans* Decne.

I have received from Paris a fragment of the authentic herbarium specimen which was collected about 1805 by LESCHENAULT DE LA TOUR in Java (probably in the Rahoen-Idjen mountains) and which was described in 1857 by Prof. D. CLOS as a new species under the name of *Xylosma leprosipes* CLOS. The receipt of this specimen has enabled me to ascertain, that it is quite identical with a javanese species, described by MIQUEL in 1859 (Fl. Ind. Bat. I. 2. p. 105) as the type of a new genus under the name *Bennettia*