Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Part I.

(**Johs. Schmidt**: Introductory. — **F. Kränzlin**: Orchidaceae, Apostasiaceae.)

With Map (plate I).

Introductory

by **Johs. Schmidt.**

With the present contribution I am beginning the publication of a systematic list containing the plants collected by me during the stay of the Danish Expedition in Siam (1899—1900).

These contributions will be published gradually as the material will be examined and named by various specialists, who have kindly undertaken to work up my collections[1]).

The collections have all been made in the island Koh Chang (see Map) and adjacent smaller islands, thus originating in a small, fairly accessible area, of which the natural bounds are given by its position in the sea. On account of this and as catalogues of the plants growing in a certain locality have not hitherto been published from anywhere in Siam, as far as I am aware, I

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[1]) The authors in question are alone responsible for the content of their papers with the exception of the words that I have to insert about the occurrence of the plants in their natural localities.

hope this list will be of some interest, although it cannot claim to be complete as it is only the results of my collections during my stay in the island in three winter-months.

These contributions to which the present is an introduction only will deal with the systematic relations of the concerning plants and their geographic distribution. As I intend to publish later on a more detailed description of the vegetation of Koh Chang from a biological and ecological point of view where particulars will be given about the general climatic and geographic facts, I here confine myself to the most necessary informations.

The expenses of the Expedition were paid by the Danish Government and the „Carlsbergfondet“ and we undertook our voyage under the auspices and with the sanction of the Botanical and Zoological Museums of the University of Copenhagen both of which contributed to our outfit and supplied the funds on which we travelled.

On October 1st 1899 we started from Copenhagen onboard the Danish steamer „Siam“ bound for China. During the sea-voyages out- and homeward the time was occupied by collecting and studying the zoo- and phytoplankton of the seas, we passed through. After a short stay in Singapore, Bangkok was reached in the middle of December. About a week later we left that city onboard H. S. M. „Chamroen“ for our destination, the inner part of the east-coast of the Gulf of Siam. By the kindness of the Royal Siamese Government and our excellent countryman Admiral A. de Richelieu some very valuable support was granted us from the Siamese Navy. Thus we got residence on the Naval Stations at Lem Dan (Koh Chang) and Lem Ngob (Siamese mainland), and also men to assist us during our dredgings or inland trips. Until the end of March I lived at Lem Dan and spent the time collecting plants and studying the flora of Koh Chang, for which purpose I undertook numerous excursions by land to the hills or visited by boat the different coasts of the island.

At the end of March we left Siam in the Danish steamer „Cathay“ for Copenhagen, where we arrived on June 1st 1900. Our collections have all been placed in the Botanical and Zoological Museums of the University of Copenhagen.

The island Koh Chang (Elephant Island) is situated in the northeasterly part of the Gulf of Siam about 80 miles from the boundary between Siam and Cambodia[1]). A strait, $2^1/_2$ — 10 miles broad, separates the island from the Siamese mainland. The area of Koh Chang is about 70 square miles and it is the largest Siamese island in the Bay. Consequent to its position in 12° lat. N. the climate of Koh Chang is entirely tropical, the year being divided in a rainy and a dry season, the former during the blowing of the damp south-west monsoon (generally from May to August) the latter in the other months where the dry north-easterly winds are prevalent. The heat is most extreme in spring, in March, April and May before the south-west monsoon sets in and after the cessation of the north-east. The coolest season is the autumn- and winter-months. At Bangkok[2]) the annual average temperature is *26,7*° C. (80,1° F.), Decembers *24*° C. (75,2° F.) and Aprils *28,5*° C. (83,3° F.). The annual rainfall amounts to *1670*mm (65,7 inches) of which about $^4/_5$ during the months from May to October.

The times of tides in the Gulf of Siam are very irregular and the rise also varies along the shores from *4* to *9* feet. In the Inner Gulf the principal of the two tides occurs in the south-west monsoon at night, but in the north-east this gradually alters and the high tide will be found in the daytime.

Koh Chang is a mountainous island and ranges of peaks separated by valleys occupy its whole area especially running in the direction from NW to SE and growing in height and importance as they go south. The highest point is found in the southern

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[1]) The more exact position is given by the following indications: Northernmost point in *12° 10′* lat. N., southernmost in *11° 57′* lat. N., westmost in *102° 14′* long. E., eastmost in *102° 25′* long. E.

[2]) Bangkok (*13° 88′* lat. N., *100° 34′* long. E.) is the nearest place, from where some meteorological facts are present. During my stay in Koh Chang I made some measurements of temperatures and the degree of moisture, which later will be published.

part of the island (*Table Peak*), north of *Klong Sarlakpet*, and rises nearly to *2450* feet.

The hills of Koh Chang consist of a rather small-grained eruptive rock, most commonly light-brown or red in colour, more seldom greenish.

A narrow strip of plain surrounds the hills of Koh Chang; its soil is a very compact, reddish clay the presence of which is due to the denudation of the hills.

Whereas no lakes or ponds of any importance are found in Koh Chang, a great number of small rivers and rivulets intersect the island taking their rise from the hills in the interior. Their water usually streams very quickly and they are often broken by waterfalls. Most commonly these waterfalls are small; some more important ones are found near the east-coast in *Klong Munsé* and a little more southward in *Klong Majum*, near the west-coast in *Klong Prao*. In the dry season the rivers contain but little water; but during the south-west monsoon they swell and fill up their stony beds. When the rivers have reached the plains near the coast, their course becomes more quiet, their breadth increases and some of them are navigable for small crafts for some distance from the sea (*Klong Prao*, *Klong Sarlakpet*, the latter debouching in the great bay at the south-end of the island).

Especially in the more exposed west-coast of Koh Chang the steep rocks go right down to the sea, but in most other places the shores are low and flat, their soil consisting of coral-sand[1]) or stony gravel. Where rivers debouch and assume the proportions of more important estuaries, the ground is covered with a black mud and occupied by a luxuriant mangrove-vegetation.

The hills of Koh Chang are all covered with the densest jungle from the feet to their highest top. As the vegetation on the whole, this jungle has been but little influenced by the scarce Siamese and Chinese population scattered along the coasts, where *klongs* debouch.

Villages of some importance are situated at the mouths of *Klong Munsé* (east-coast) and *Klong Sarlakpet* (south-end); besides which some few people live at *Klong Son* (north-end), *Klong Prao* (west-coast), *Ao Savan* (south-end) and a few other places.

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[1]) The sand here is often much more large-grained than on our northern shores consisting of big coral-fragments. In some places however common quartzy small-grained sand can be found.

In the rains a little rice is cultivated in the plains; further some few vegetables, pine-apples, bananas, mangos and other fruittrees; and here and there one finds a small pepper plantation, but on the whole the cultivated area of Koh Chang is quite minimal.

I am indebted to Admiral de Richelieu for kind information about the geographic Siamese names within the explored area.

Notice. In Map and following lists of localities a few Siamese words are often used:

Koh: island,
Klong: river, canal, creek,
Lem: headland,
Ao: bay,
Noi: little, small,
Jai: great, large.

Orchidaceae and Apostasiaceae

by **F. Kränzlin** — Gross Lichterfelde.

Orchidaceae.

Oberonia Lindl.

1. **O. iridifolia** Lindl. G. & Sp. Orch. & Fol. Orch. Oberonia I. 1. var. *brevifolia* Hook. f. Fl. Brit. Ind. V. 675.

The specimens bear ripe capsules without any trace of flowers, but the whole habit agrees exactly with *O. iridifolia* Lindl.

Klong Munsé and Koh Kahdat, epiphytic near the sea.

Area: From the Northern Himalaya to the Tavoy-district and Moulmein.

Liparis L. C. Rich.

2. **L. disticha** Lindl. in Bot. Reg. sub. t. 882. *L. gregaria* Lindl. G. & Sp. Orch. 33; *Malaxis disticha* Thouars Orch. Il. Afr. t. 89; *Malaxis mucronata* Bl. Bijdr. 391.

Klong Majum 700 ft. above the sea, epiphytic in the jungle.

Area: Widely distributed from the Mascarene Islds. to Ceylon and farther to Malacca, Malay- and Sunda Islds.

Dendrobium Sw.

3. **D. anceps** Sw. in Act. Holm. 1800. 246. Hook. f. Fl. Brit. Ind. V. 724. *Aporum anceps* Lindl. G. & Sp. Orch. 71.

Without flowers, leaves and flower-buds showing the characteristic forms of *D. anceps* Sw.

Klong Munsé, epiphytic in the jungle.

Area: From Sikkim to the Sunda Islds.

4. ?**D. Serra** Lindl. in Journ. Linn. Soc. III, 3. Hook. f. Fl. Brit. Ind. V. 722. *Aporum Serra* Lindl. in Wall. Cat. 2021 & G. & Sp. Orch. 71. *D. aloefolium* Rchb. f.

Without flowers. The stem and leaves are quite different from those of the last number. I am not quite sure if it may be *D. Serra* Lindl. certainly it is not identical with *D. anceps* Sw.

Klong Munsé, epiphytic in the jungle.

5. **D. dixanthum** Rchb. f. in Gard. Chron. 1865. 674. Hook. f. Fl. Brit. Ind. V. 746.

I have seen no stem and leaves, but the flowers are almost identical with the flowers of the plant Bot. Mag. t. 5564.

Klong Son, epiphytic in the jungle.
Area: Moulmein, Tenasserim.

6. **D. Palpebrae** Lindl. in Journ. Hort. Soc. V. 33; Hook. f. Fl. Brit. Ind. V. 750.

Klong Munsé, epiphytic in the jungle. Flowers white, labellum yellow.
Area: From Sikkim to Burma.

7. **D. suavissimum** Rchb. f. in Gard. Chron. 1874, 406 & Xen. Orch. III, 2, t. 202. *D. chrysotoxum* Lindl. in Bot. Reg. 1847 and t. 19 & 36; Hook. f. Fl. Brit. Ind. V. 750.

The splendid specimens I had at hand agree in every respect with Reichenbachs plate.

Klong Sarlakpet, epiphytic in the jungle.
Area: Arracan and Burma.

8. **D. Schmidtianum** Krzl. n. sp. (Virgatae).

Caulibus approximatis curvulis ad 20 cm. altis e basi tenui in quarta parte inferiore fusiformibus supra attenuatis foliosisque, quo crassissimi 8—10 mm. diam., foliis oblongis lanceolatisve acutis basi laxe vaginantibus lamina 8—10 cm. longa, 1—1,5 cm. lata, scapo gracili subflexuoso, floribus succedaneis sat magnis e bracteis glomeratis griseis scariosis orientibus quam ovarium tenue 1,5 m. longum multo brevioribus. Sepalo dorsali petalisque lanceolatis acutis, sepalis lateralibus antice oblongis postice in pseudocalcar aequilongum omnino apertum rectum conicum v. extintoriiforme elongatis, labello e basi angusta dilatato cuneato antice retuso margine leviter crenulato (si mavis lobis lateralibus obtriangulis antice crenulatis), lobo intermedio minuto angusto triangulo acuminato, disco omnino nudo; gynostemio brevissimo. — Flores pulchri nivei, sicci diaphani, a sepalorum apicibus ad illum pseudocalcaris 3,2—3,5 cm. longi, labellum 2,5 cm. longum inter lobos laterales expansum 1,3 cm. latum.

In beauty and size the flowers of this plant are much like those of *D. crumenatum* Sw. but they differ by the lip, the middle-lobe of which is reduced to a very small triangle. In size and foliage the plant agrees very well with a big specimen of *D. podagraria* Hook. f. (*D. angulatum* Wall.) a plant widely spread over all the Indo-Malayan islands.

Lem Dan and Koh Kahdat, epiphytic, near the sea.

D. sp.

There is another species of aporoid Dendrobiums without flowers collected in the jungle and labelled N. 467 that I am quite unable to determine.

Bolbophyllum Thouars.

9. **B. tridentatum** Krzl. n. sp.

Rhizomate longe prorepente 2 mm. crasso, bulbis 5—8 cm. inter se distantibus obtuse tetragonis conicis 1,5—2 cm. altis basi fere 1,5 cm. crassis monophyllis, foliis oblongis lanceolatisve ad 8 cm. longis 1—2 cm. latis acutis coriaceis apice vix v. non biapiculatis, scapis nutantibus quam folia bene brevioribus basi vaginatis ceterum nudis, racemis subcapitatis pauci- — plurifloris nutantibus, bracteis parvis oblongis acutis quam flores bene brevioribus 2—3 mm. longis. Sepalo dorsali oblongo obtuso concavo, sepalis lateralibus ovati-oblongis plus duplo longioribus basi connatis subobliquis acuminatis apice ipso obtusis, petalis minutis subquadratis v. brevissime ovatis supra triapiculatis v. tridentatis, apiculis brevibus subulatis, mediano vix longiore, labelli lobis lateralibus falcatis acutis pellucidis incurvis, labello ipso crasso carnoso ovato medio sulcato supra et infra dense papilloso; gynostemii dentibus lateralibus latiusculis denticulo 1 laterali instructis integrisve. — Flores rufinuli, sepala lateralia 6 mm. longa, dorsale 3 mm., labellum 1,5—2 mm. longum.

The plant belongs to the group of mostly very indifferent looking species which are more or less similar to *B. neilgherrense* Wight and *B. Careyanum* Spreng. All have long creeping rhizomes, rather distant monophyllous bulbs, nodding more or less capitate spikes and most of them or all reddish flowers. The chief-character of this species consists in the three-pointed petals, a peculiarity not observed in any other species of the group. The lip in its shape does not differ very much from that of the allied species, but here the side-lobes are reduced to a thin transparent border whilst the middle-lobe consists of the strong fleshy body so common in Bolbophyllums.

Jungle near Klong Majum alt. 200 ft., epiphytic.

Eria Lindl.

10. **E. semiconnata** Krzl. n. sp.

Bulbis nummiformibus applanatis orbicularibus 8—10 mm. diam. margine subrepandis supra retinerviis, foliis sub anthesi nullis, mihi non visis, floribus semper unicis brevi-pedicellatis, bractea ovata cucullata acuta quam ovarium longiore, flore nutante. Sepalo dorsali obovato-oblongo brevi-acutato, sepalis lateralibus in unum basi gibbosum connatis apicem versus liberis acutis cum dorsali conglutinatis non connatis, petalis obovatis obtusis, tota superficie minute crystallino-glandulosa, labello simplice ovato acuto basi plicato ibique umbonato; gynostemio perbrevi. — Flores extus et intus glabri, intense rubri, sepala 5—6 mm. longa, labellum 2 mm. longum.

This curious little thing is the sixth species of the Porpax-group and is closely allied to *E. ustulata* Par. & Rchb. f. The differences are however considerable enough to keep the plant distinct from *E. ustulata*. The flowers of the latter are pubescent on the outside, those of our species are quite glabrous, the upper sepal is triangular and acuminate in *E. ustu-*

lata, in *E. semiconnata* oblong or obovate, the petals of this species are broadly obovate, those of *E. ustulata* according to Reichenbach lanceolate. At last the colour is somewhat different though not much.

On rocks in the jungle throughout the island. ascending to 2000 ft.

11. **E. Nummularia** Krzl. n. sp.

Bulbis crebris approximatis sese tangentibus orbicularibus margine repandis depressis radiatim jugosis 8—10 mm. diam., floribus plerumque solitariis, bracteis ovatis acutis ovarium subglobosum semiaequantibus. Sepalis per duas tertias longitudinis in tubum connatis, lateralibus basi bullatis omnibus antice longe oblongis acutis apice reflexis, petalis aequilongis obovati-oblongis antice rotundatis utrinque hyalini-papillosis, labello brevi oblongo obtuso, linea elevatula per totum discum decurrente. — Flores inversi extus et intus glaberrimi rubri, sepala circ. 4 mm. longa, petala aequilonga antice 2 mm. lata, labellum 1,5 mm. longum. — Januario.

The little plant resembles very much the latter, but 1. the flowers are not resupinate, 2. the sepals are not united except the third part below the top, 3. the petals are cuneate or obovate, 4. the lip has an elevated line running from the base to the apex but not a tubercle at the base; at last the dimensions of all these parts are still a little smaller than in *E. semiconnata*. For the other characters both species agree very much especially in the smallness of the flower. Also in this species leaves are missing.

On rocks in the jungle near Klong Munsé alt. 700 ft.

12. **E. lanata** Griff. Notul. III, 101; Lindl. in Journ. Linn. Soc. III. 49. *Er. flava* Lindl. var. *lanata* Hook. f. Fl. Brit. Ind. V. 801.

Klong Prao, Koh Kahdat, Koh Saket. Epiphytic near the sea.

Area: From tropical Himalaya eastward to Bhotan and southward to Tenasserim.

13. **E.** sp. (sect. *Trichotosia*) aff. *E. velutinae* Loddig.

Without flowers, but surely very near to *E. velutina* Lodd. if not identical.

Klong Munsé. Epiphytic in the jungle.

Agrostophyllum Bl.

14. **A. khasianum** Griff. in Calc. Jour. Nat. Hist. IV, 378, t. 19; Hook. f. Fl. Brit Ind. V. 824. — *Agrost. planicaule* Rchb. f. — *Appendicula Hasseltii* Wight.

Lem Dan near the sea and Klong Majum alt. 700 ft., epiphytic.

Area: Khasia-hills to Moulmein and Tenasserim.

Calanthe R. Br.

15. **C. biloba** Lindl. Fol. Orch. Calanthe p. 3; Hook. f. Fl. Brit. Ind. V. 848.

var. *obtusata* Par. & Rchb. f.

Klong Majum, on rocks; flowers red.

Area: Temperate Himalaya. Sikkim, Nepal. — Tenasserim.

Eulophia R. Br.

16. **E. graminea** Lindl. in Wall. Cat. 7372 & G. & Sp. Orch. 182; Hook. f. Fl. Brit. Ind. VI, 2.

Klong Munsé (common in the plains); Koh Chick. Terrestrial, in grassy spots.

Area: Bengal, Assam, Malacca to Singapore, Nicobar-Islands, Ceylon.

Cymbidium Sw.

17. **C. aloifolium** Sw. in Nov. Act. Upsal. VI, 73; Hook. f. Fl. Brit. Ind. VI, 10. *Cymb. pendulum* Sw.; *Cymb. crassifolium* Wall.

Lem Dan and Koh Kahdat, epiphytic, near the sea.

Area: Himalaya, eastward to East Nepal, southward to Tenasserim and Andaman Islands.

C. sp. indeterm.

Without flowers.

Luisia Gaudich.

18. **L. brachystachys** Bl. Rumph. IV, 50; Hook. f. Fl. Brit. Ind. VI, 23.

Without flowers but with all other characters of this species.

Klong Majum, epiphytic in the jungle.

Area: Western Himalaya. Silhet & Khasia-hills, Tenasserim.

Sarcochilus R. Br.

19. **S. hirtulus** Hook. f. Ic. Plant., t. 2121 & Fl. Brit. Ind. VI, 39.

Without flowers, but the plant resembles in every respect the plate in the Icones Plantarum especially in the roughness of the flower stalk.

Klong Prao, epiphytic, near the sea.

Area: Perak, Malacca.

Renanthera Lour.

20. **R. coccinea** Lour. Fl. Cochinch. II. 237; Hook. f. Fl. Brit. Ind. VI, 48.

Klong Majum, on rocks in the jungle, alt. 700 ft.

Area: Cochin China. Tenasserim, Tavoy-District.

Saccolabium Bl.

21. **S. ochraceum** Lindl. in Bot. Reg. 1842. Misc. 2; Hook. f. Fl. Brit. Ind. VI, 62. *S. lineolatum* Thw. *Acampe dentata* Lindl. *A. Wightiana* var. *longepedunculata* Thw.

Lem Dan. Epiphytic, near the sea. Flowers orange with red spots.

Area: Tropical Himalaya, Bhotan, Tenasserim, Ceylon.

22. **S. peperomioides** Krzl. n. sp.

Caule longe repente radicibus longissimis cortici affixo, folioso, foliis dorsiventralibus saepius paulum reflexis carnosis crassis oblongis obtuse acutatis 2—2,5 cm. inter se distantibus ad 8 cm. longis, 2,3—2,8 cm. latis, racemis brevibus 1- v.(rarius) 2-floris, bracteis minutissimis, Sepalo dorsali late obovato-oblongo apice rotundato, lateralibus oblongis infra brevi-auriculatis labello semiaffixis, petalis minoribus subsimilibus omnibus obtusis, labello compresso basi utrinque dentato, lobulis lateralibus erectis apice recurvis, lobo intermedio elongato oblongo acuto v. acuminato, callo crasso supra sulcato inter lobulos laterales, toto disco pilosulo, calcari cum labello continuo ipsi subaequilongo extinctoriiformi levissime ascendente; gynostemio brevi, rostello antice bifido; antheram et pollinia non vidi. — Flores inter minores generis, sepala petalaque 8 mm. longa, labellum cum calcari fere 8 mm. longum.

The stem is very long and attached to the bark of trees by roots of a considerable length; the habit of the plant resembles that of some peperomioid plants, from where I borrowed the name. The species which we may consider to be the nearest to it is perhaps *Saccolabium bipunctatum* Par. & Rchb. f. (referred to *Cleisostoma* by Sir Jos. Hooker) a very imperfectly known species from Tenasserim; it has the same habit, the same manner of growth, the same very short inflorescences of 1 or rarely 2 flowers and even some very slight resemblance in the flower, but no character is identical in both species.

Klong Sarlakpet, epiphytic on Bruguiera gymnorhiza in the mangrove.

Vanda? *Aerides*? *Sarcanthus*?

There are still 2 specimens of big Vanda-like plants without any trace of flowers.

Podochilus Bl.

23. **Podochilus** sp.

Without flowers, *Pod. lucescenti* Bl. similar.

Klong Munsé, on rocks and epiphytic in the jungle.

Stereosandra Bl.

24. **S. pendula** Krzl. n. sp.

Tuberidio 3 cm. longo, 1 cm. crasso; caule tenui fragili ad 30 cm. alto basi squamato ceterum aphyllo pallide roseo, racemo

paucifloro, bracteis linearibus pedicellos superantibus, floribus pendulis. Sepalis ovatis acuminatis lateralibus basi manifeste excavatis v. gibbosis, petalis subconformibus, labello simili e basi concava late triangulo acuminato antice complicato, tuberculis basilaribus globosis; gynostemio cum anthera dimidium sepali dorsalis aequante, anthera longa complicata basi dibrachiata, polliniis elongatis. — Flores albi violaceo-punctati, sepala 7 mm. longa, petala et labellum vix breviora.

Differs from *Ster. javanica* Bl. by its smaller flowers and the more prominent gibbosity of the lateral sepals and the lip. The tubercles at the base of the latter are very conspicuous. The flowers are white with violet spots, whilst in *St. javanica* they are whitish with violet tips of the sepals and petals. It is a very similar species.

Klong Son, terrestrial among withered leaves. Flowers white with violet spots, ovary with violet elevaled lines, stem and leaves pale reddish.

Area: The genus *Stereosandra*, as far we can judge for the moment, is confined to the islands of the indo-malayan archipelago. *Stereosandra javanica* Bl. has only been found in Java.

Anoectochilus Bl.

25. **A. Reinwardtii** Bl.? Orch. Archip. Ind. 48, t. 12 fig. 2.

Without flowers. The habit and the reticulations of the leaves agree exceedingly well with Blumes plate.

Klong Son and Nipple. alt. 2000 ft. Terrestrial.

Area: Malay Peninsula. Perak (ex. Ridley).

Hetaeria Bl.

26. **H. oblongifolia** Bl. Bijdr. 410 et Orch. Archip. Ind. 86, t. 56.

With nearly destroyed flowers, but otherwise easy to recognize.

Jungle near Klong Munsė and Koh Kahdat, terrestrial.

Area: Java.

Cheirostylis Bl.

27. **C. montana** Bl. Bijdr. 413, fig. 16.

Klong Majum, alt. 700 ft., on rocks in the jungle.

Area:- Java.

Didymoplexis Griff.

28. **D. pallens** Griff. in Calc. Journ. Nat. Hist. IV, 383. t 17; Hook. f. Fl. Brit. Ind. VI, 122. *Leucorchis silvatica* Bl. Mus. Bot. Lugd. Bat. I, 31; Orch. Archip. Ind. 147; *Apetalon minutum* Wight; *Arethusa ecristata* Griff. Notul. III, 378; *Epiphanes pallens* Rchb. f. in Fl. Vitiens. 296.

Klong Son, alt. 1000 ft., terrestrial in the jungle. Flowers white, labellum yellow, stem and leaves reddish, the latter very small.

Area: Lower Bengal, from Himalaya to Calcutta. Malacca, Perak.

Cypripedium L.

29. **C. Schmidtianum** Krzl. n. sp.

Scapo puberulo tenui, bractea lanceolata carinata acuta dimidium ovarii aequante. Sepalo dorsali latissime obovato explanato apice brevi acutato utrinque 9—11 nervio in nervis extus puberulo, sepalis lateralibus in phyllum multoties et inusitate parvum ovatum acuminatum coalitis, petalis late linearibus acutis arctissime deflexis, papillis minutis valde distantibus 3 v. 4 in margine superiore minute fimbriatis, labello petalis aequilongo marginibus ostii satis distantibus grosse papillosis, sacco amplo supra utrinque in lobulum acutum aucto; gynostemio gracili, staminodio antice profunde lunato medio sulcato (fere bipartito), dente in ima parte sulci paulum prosiliente (non proprie umbonato). — Sepal. dorsale 4,5 cm. altum et latum, sep. inferius 2,2 cm. longum, 8 mm. latum, petala 5,5 cm. longa, 1,2 cm. lata, labellum 5,5 cm. longum, supra 2,5 cm. latum; de colore nihil constat.

It is not without hesitation, that I found a new species of *Cypripedium* of which I am quite unable to give any particulars about the colours. The characters which make me believe that the species must be a new one are the extreme smallness of the lower sepal and the strictly deflexed petals. The first character is never observed in such a degree and the position of the petals is in similar manner only to be seen in *Cyp. Fairieanum* and *Cyp. Dayanum* but in neither the petals are so directly deflexed as in this species and both species are out of the question by numerous other characters. My material consists in 3 flowers preserved in alcohol and I am quite sure that I have seen all parts in their natural position and not injured by pressure.

Klong Son, alt. 1000 ft.; on rocks.

Apostasiaceae.

Apostasia.

30. **A. Lobbii** Rchb. f. in Flora Bd. 55 (1872) 278; Rolfe in Journ. Linn. Soc. XXV, 238; Krzl. Orch. G. & Sp. I, 9.

Nipple, alt. 2000 ft. Terrestrial.

Area: Borneo, Forests of Labuan.

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Part II.

Corallinaceae

by **M. Foslie** — Trondhjem.

Along the coasts of Asia from the Indian Ocean, eastward to the North Pacific Ocean and farther up to the Bering Sea the tracts have been almost unknown as regards the unarticulated calcareous Algae, setting aside a few species of *Melobesia* attached to other Algae, although on the other hand the other groups of Corallinaceae do not seem to be considerably known. Some species are lately known from the Pacific coast of Japan, but otherwise as far as I know not a single species has been formerly quoted with any degree of certainty from the said extended coasts. Therefore, every contribution from these tracts may be of importance as regards the knowledge of these up to late times rather neglected Algae and their geographic distribution.

During the Danish expedition to Siam 1899—1900 some calcareous Algae were collected in different places in the Gulf of Siam. The collection certainly comprehends but a small number of species which are to be recorded below, giving however some interesting facts as to the distribution of these Algae. The species not formerly described will be pictured on a subsequent occasion.

Mr. Th. Reinbold of Itzehoe has been kind enough to determine *Amphiroa* and *Corallina*.

Archaeolithothamnion (Rothpl.) Fosl. [1]).

1. **A. Schmidtii** Fosl. mscr.

Thallus forming crusts on Corals up to about 2 mm. thick, sending forth crowded wart-like excrescences or short, simple or subsimple branches about 2 mm. thick, occasionally up to 12 mm. long, in an advanced stage frequently knotty and rugged and in part rather anastomosing. Sporangia 50—65 μ long and 30—40 μ thick.

There are to be found two specimens of this characteristic species, attached to about 15 cm. long and 3—5 cm. thick, somewhat compressed pieces of dead Corals which it at length fully surrounds. The crust does not attain any considerable thickness, apparently not exceeding about 2 mm., frequently thinner. It produces in a rather young stage numerous small wartlike excrescences which little by little increase in size, becoming more and more crowded, frequently at length forming short, simple or subsimple branches 1.5—3 mm. thick, partly increasing in thickness upwards partly not, or with somewhat spherical thickened ends, occasionally almost truncate, and in an advanced stage nearly always knotty and rugged. The branches are up to 12 mm. long, but generally smaller, in part at length rather anastomosing. New crusts sometimes are formed upon the primary, or now and then stretched between the branches, or irregular excrescences are formed by growing over extraneous objects. The surface is feebly shining. The colour was in a fresh state a brownish red, however almost discoloured in drying.

On a vertical section the hypothallic layer is shown to be rather feebly developed, composed of elongated cells which are up to about 20 μ long. It sends forth perithallic rows the cells of which frequently are $1^1/_2$—2 times longer than broad, or 11—18 μ long and 7—10 μ broad, here and there alternating with very small square or roundish cells. Between the more or less densely crowded overgrown sporangia (or cavities after these) the cells are as a rule much elongated and narrow.

The sporangia are formed in more or less regular sori up to about 3 mm. in diameter. The sori are sometimes almost confluent, and appear especially in the excrescences or branches, being dissolved or nearly so in the middle of February. On a section the overgrown sporangia form rather regular layers over each other and parallel to the surface of the frond. They are cylindric-bean-shaped or oblong, 50—65 μ long and 30—40 μ thick, occasionally somewhat smaller and almost roundish-ovate.

The species reminds one in habit of *Lithothamnion rugosum* Fosl. Otherwise it stands nearest to *Archaeolithothamnion erythraeum* (Rothpl.) Fosl., from which, however, it seperates itself by essential characteristics.

Picked up from a depth of about 5 fathoms off Koh Kahdat, apparently scarce.

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[1]) With regard to the limit of the genera I refer to Revised Systematical Survey of the Melobesieae. Trondhjem 1900.

Lithothamnion Phil. emend.

2. **L. fruticulosum** (Kütz.) Fosl.

List of Lith. p. 6 (non Norw. Lith.); *Spongites fruticulosa* Kütz. Polyp. calcif. p. 33, Tab. Phyc. 19, t. 99.

Syn. *L. ramulosum* Solms, Corall. Monogr. p. 19; ex parte[1]).
L. fasciculatum Solms l. c. p. 20; saltem ex parte.
L. fasciculatum β fruticulosum Hauck, Meeresalg. p. 274.

The limits of the above species are not yet well fixed. I have taken it in the same sense as *L. fasciculatum β fruticulosum* Hauck l. c. Whether it also includes the coarser form delineated by Hauck l. c., t. 5, fig. 3 is as yet not quite certain.

In the collection from Siam are some specimens certainly rather young and not well developed, but on the whole fully agreeing with Adriatic and Mediterranean specimens of the present species. They surround small stones and shells of Mollusks, forming a very thin crust which sends forth partly crowded partly scattered wart-like excrescences or short and thin branches up to 5 mm. long. The latter are frequently knotty and rugged, often with somewhat spherical thickened ends.

A couple of the specimens were scantily provided with conceptacles of sporangia in the beginning of February. The conceptacles were however almost dissolved except one. This was about 400 μ in diameter seen from above, with four-parted sporangia about 150 by 40—50 μ. A solitary, probably cystocarpic conceptacle of a conical shape measured about 600 μ at the base[2]).

Between Koh Mesan and Cape Liant in 9 fathoms water.

Area: The Mediterranean, the Adriatic, and Mauritius.

3. **L. funafutiense** Fosl. mscr.

Lithothamnion Philippii f. *funafutiensis* Fosl. Notes Lith. Funaf. p. 3; Calc. Alg. Funaf. p. 5.

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[1]) Owing to a mistake I have in Rev. Syst. Surv. Melob. identified *L. ramulosum* Phil. with *L. fruticulosum* Kütz.

[2]) After this was in press, I have had the opportunity to examine authentic specimens from Hauck's herbarium. *L. fruticulosum* includes two forms, the one with 1—1.5 mm. thick branches as the above mentioned, which I propose to name f. *clavulata*. This form corresponds in the main with the quoted figure by Kützing l. c. as well as Hauck l. c., t. 5, flg. 5, the latter representing an old specimen. It sometimes assumes an almost globular shape with nearly fastigiate branches (specimens from the coast of Greece). The other form is rather coarse, in habit often much differing from the former and approaching *G. brassica-florida* (Harv.) Fosl., with the branches frequently 2—2.5 mm. thick. This form I name f. *crassiuscula*. On the other hand, the coarse form delineated by Hauck l. c., t. 5, fig. 3 seems to belong to another species.

f. **purpurascens** Fosl. mscr.

Thallus forming up to 2 mm. thick crusts on Corals, frequently with wart-like excrescences 2—3 mm. in diameter. Conceptacles of sporangia subprominent, 550—700 μ in diameter. Conceptacles of cystocarps subconical, about 500 μ in diameter.

In the quoted papers I mentioned a calcareous Alga from Funafuti which I considered a form of *L. Philippii*. In the collection from Siam are a few mostly fragmentary specimens which certainly differ in habit from the Funafuti plant, but on the whole are closely related to this. On the other hand, also the latter form much approaches *L. Philippii*. However, as both show almost the same divergences in their relation to *L. Philippii*, it appears that they must be considered as forms of a separate species. Both cling more firmly to the substratum than *L. Philippii*, the latter even sometimes almost loosens itself and develops rhizoids in the lower part of the frond which occasionally at length form small fronds as in *Lithophyllum expansum*. The conceptacles are smaller than in the said species, although in this respect no true limit is to be drawn. Besides, as mentioned in the quoted papers, the hypothallus differs rather much from that in *L. Philippii*, being more feebly developed with more narrow and thin-walled cells than the generally thick-walled cells in the latter. I have seen but some few specimens of *L. Philippii*. It seems to be rather varying, and the limits are not yet fully known. Perhaps it even includes more than one species in the sense formerly taken. This cannot be decided till a larger material is procured than that I at present possess. I think however to be entitled to adopt the said forms as specifically distinct.

The form *purpurascens* sticks especially to divers Corals. It forms more or less extended crusts up to about 2 mm. thick, frequently however thinner. The crust is more or less uneven and feebly shining, generally with wart-like excrescences 2—3 mm. in diameter, or sometimes thinner, scattered and branch-like processes appear at least in part by covering up small extraneous objects or penetrating animals. A new crust occasionally is formed upon the primary.

With reference to structure the cells of the feebly developed hypothallic layer are elongated and up to about 20 μ long, with thin walls or rather so. The lower anticlines form a slow convergence towards matrix. The cells of the perithallic layer are much varying in shape and size, and often without any distinct order, partly but 4—5 by 5—6 μ in diameter, square or rounded, not seldom with the longest diameter in horizontal direction, or especially upwards square or more frequently vertically elongated, 7—12 μ long and 5—7 μ broad.

The reproductive organs in the present specimens of this form are very scanty and not well developed. I have seen but a few conceptacles of sporangia and cystocarps. The former are slightly convex but little prominent, 550—700 μ in diameter and intersected with a number of delicate muciferous canals. The sporangia are four-parted, judging from a solitary conceptacle examined 140—170 μ long and 60—70 μ broad, with apparently enduring interwalls. The conceptacles of cystocarps seem to be rather varying, although I have seen but a couple of almost fully

developed ones. They almost coincide in shape with those in *L. Philippii* and *L. lichenoides*, but are smaller, about 500 μ in diameter at the base, and apparently as a rule more acute. The central parts of the „conjugation cell“ bear a bundle of somewhat elongated paranemata.

The present form does not differ much from the Funafuti plant, which I provisionally name f. *genuina*. The latter has a rosy colour, sometimes with a feeble purplish shade, while f. *purpurascens* is darker or lighter purplish. The crust is frequently a little thicker and less irregular, but on the other hand generally with slightly smaller cells than in f. *genuina*. So also the conceptacles of sporangia being a little smaller, and in the few ones that I have seen not flattened in the central parts.

Between Koh Mesan and Cape Liant on a depth of 9 fathoms (not quite certain); 15 naut. miles E. of Koh Chuen, 10 fathoms; the north side of Koh Mesan, 10—15 fathoms; between Koh Mesan and Cape Liant, 5—8 fathoms; the north point of Koh Chang on Coral-reefs; and Koh Kahdat in 2 fathoms water.

Area: South Pacific Ocean: Funafuti (f. *genuina*).

4. **L. siamense** Fosl. mscr.

Thallus forming delicate, light rosy, smooth crusts or nearly so on divers hard objects, 30—100 μ thick. Conceptacles of sporangia convex, rather prominent, 300—500 μ in diameter. Sporangia four-parted. Conceptacles of cystocarps conical, 350—600 μ in diameter.

f. **minuta** Fosl. mscr.

The crust 30—60 μ thick. Conceptacles of sporangia 300—400 μ in diameter. Sporangia 60—70 μ long, 25—30 μ broad. Conceptacles of cystocarps 350—450 μ in diameter.

f. **simulans** Fosl. mscr.

The crust 50—100 μ thick. Conceptacles of sporangia 400—500 μ in diameter. Sporangia 140—160 μ long and 60—80 μ thick. Conceptacles of cystocarps 500—600 μ in diameter.

This is one of the most delicate of the species of this genus attached to hard objects. It sticks especially to Corals, but is also met with on stones, shells of Mollusks or even attached to other calcareous Algae. The colour is in a dried state a light rosy, sometimes, however, with a greyish-green shade. The crust is at first almost orbicular, here and there with slightly crenulate margin. In an old state it becomes more irregular in outline, and more crusts founded near each other get fully confluent without any visible limit, at length forming an apparently solitary crust up to about 12 mm. in diameter, often, however, much smaller, or but 3 mm. in a fertile stage (f. *minuta*). But sometimes it almost covers small shells of Mollusks (f. *simulans*). It is smooth and not or very feebly shining. The smoothness of the crust depends however on that of the substratum, although it appears sometimes to become a little uneven in an old stage even on a plain substratum, partly by

covering up small extraneous objects partly by scars after emptied conceptacles being irregularly effaced, or the dropped conceptacles leaving small elevated edges not dissolved. The crust is in f. *minuta* frequently but 30—60 μ thick, in f. *simulans* up to about 100 μ thick.

A vertical section of the crust shows an almost coaxilate development. The hypothallic cells are frequently rather elongated, up to about 25 μ long, sending forth a rather feebly developed perithallic layer. The cells of the latter are partly roundish partly square, 7—10 μ in diameter, however often with the longest diameter now in horizontal now and more frequently in vertical direction, in the latter case exceptionally up to 14 long and 7 μ broad.

The conceptacles of sporangia are scattered or somewhat crowded in any part of the crust except the peripherical portion, convex, in f. *minuta* less prominent than in f. *simulans*, towards maturity sometimes a little flattened in the central parts, in the former 300—400 μ and in the latter 400—500 μ in diameter seen from above. The roof is intersected with about 40 delicate muciferous canals. The sporangia are four-parted in both forms, in f. *minuta* 60—70 μ long and 25—30 μ broad, but in f. *simulans* 140—160 μ long and 60—80 μ broad. However, this is perhaps not to be considered the average size, as I have examined but a couple of conceptacles owing to the scanty material.

The conceptacles of cystocarps frequently appear in other individuals than those of sporangia. They are conical and, as in other species of this genus, abruptly passing into a very short and thin tip. Also these are smaller in f. *minuta* than in f. *simulans*, in the former 350—450 μ in diameter at the base and in the latter 500—600 μ.

Both forms are provided with the said organs in February, carpospores however more scarce than sporangia.

I have been in doubt whether f. *simulans* ought not perhaps to be considered as a separate species, but as I have seen only a solitary well developed specimen of this form I do not hesitate to keep it distinct, especially since the material also of f. *minuta* is scarce and some of the specimens no doubt are somewhat stunted. Nor have I been able to draw any true limit, setting aside the proportionally large reproductive organs in the former. But also in other species a great difference as regards the conceptacles sometimes is to be seen, for inst. in *Lithothamnion laeve*. The forms have been found under different conditions which not unlikely have had some influence on their development such as for instance in the said species as well as *L. Lenormandi*.

The present species stands nearest to *L. Lenormandi* and reminds one in habit of young specimens of f. *sublaevis*. It approaches this form also as regards the conceptacles of sporangia, while those of cystocarps are different.

11 naut. miles NW. of Koh Kam on a depth of 10 fathoms (f. *minuta*); between Koh Mesan and Cape Liant, 9 fathoms (f. *minuta*); 15 naut. miles E. of Koh Chuen, 10 fathoms (f. *minuta*?); between Koh Mesan and Koh Chuen, 15 fathoms (f. *minuta*); the north side of Koh Mesan in 10—15 fathoms water (f. *minuta*); and Koh Sarlak, on *Septifer bilocularis* L. in shallow water (f. *simulans*), — almost everywhere in solitary individuals.

Lithophyllum Phil. emend.

Subgen. **Eulithophyllum** Fosl.

5. **L. racemus** (Lam.) Fosl.

List of Lith. p. 9; *Millepora* (Nullipora) *racemosa* Lam. Hist. an. s. vertebr. 2, p. 203.

f. **crassa** (Phil.) Fosl.

l. c. *Lithothamnion crassum* Phil. in Wiegm. Arch. 1837, p. 388.

Syn. *Lithothamnion racemus* Aresch. in J. Ag. Spec. Alg. 2, p. 521.
— *crassum* Hauck, Meeresalg. p. 273.

With some reservation I refer two specimens to the above form of this species. They are but 1—2 cm. in diameter, sterile and seem to have been dead when collected. Overgrown conceptacles are not to be found. The specimens agree however in habit with young ones of the said form. So also in the main with reference to structure.

Between Koh Mesan and Cape Liant on a depth of 9 fathoms.

Area: North Atlantic: South coast of England (only dead specimens known), Bahama; the Mediterranean and the Adriatic; the Red Sea; Indian Ocean: Mauritius, Rodriguez.

Subgen. **Lepidomorphum** Fosl.

6. **L. Yendoi** Fosl.

New or crit. calc. Alg. p. 25.

On the Pacific coast of Japan this rather easily recognisable species sticks to stones as far as hitherto known. In the Gulf of Siam it appears to be rather abundant on small Conchs, Cerithia, forming thin crusts little by little almost covering the host, and furnished with reproductive organs in the middle of March. The specimens from this place agree in the main both in habit and structure with the typical form of the species except that they are smaller.

Koh Sarlak on *Cerithium Morus* in shallow water (between tide-marks).

Area: North Pacific Ocean: Pacific coast of middle Japan.

Melobesia Lamour. emend.

7. **M. farinosa** Lamour.

Polyp. flex. p. 315; Rosan. Mélob. p. 59.

Also in the Gulf of Siam this widely dispersed species sticks to divers other Algæ. Well developed specimens have been found on *Halimeda macroloba* and *Padina*. On *Cystoseira latifrons* it grows together with Bryozoa, the one partly covering the other. The basal cells are on a section almost square and about 7 μ in diameter. It is provided with sporangia, antheridia and carpospores in the middle of February.

Koh Kahdat in about 2 fathoms water.

Area: Common almost everywhere except in the arctic and antarctic regions.

Dermatolithon Fosl.

8. **D. pustulatum** (Lamour.) Fosl.[1])

List of Lith. p. 11; *Melobesia pustulata* Lamour. Polyp. flex. p. 315, Rosan. Mélob. p. 72.

Koh Kahdat, in 1—2 fathoms water.

Area: Rather common almost everywhere except in the arctic and antarctic regions.

Amphiroa Lamour[1]).

9. **A. fragilissima** (L.) Lamour.

Polyp. flex. p. 298; *Corallina fragilissima* L. Syst. nat. ed. 12, vol. 1, p. 1305; Ell. et Sol. Zooph. p. 123.

Koh Lom and Koh Chick, on coral-reefs in shallow water.

Area: Common in all warmer seas.

Corallina (Tournf.) Lamour[1]).

10. **C. (Jania) tenella** Kütz.

Tab. Phyc. vol. 8, p. 41, t. 85, II.

It is a question whether this species is not but a very thin form of the much varying *C.* (*Jania*) *rubens* which is common everywhere.

Koh Lom and Koh Chick, on coral-reefs in shallow water.

Area: The Mediterranean, Mexico, Samoa and Fidji Islds.

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[1]) Auctore Th. Reinbold.

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

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Part III.

(**C. B. Clarke**: Cyperaceae. — **E. Hackel**: Gramineae. — **H. Christ**: Pteridophyta. (Selaginella auctore G. Hieronymus.) — **V. F. Brotherus**: Bryales.)

Cyperaceae

by **C. B. Clarke** — Kew.

I have prepared a list of the Cyperaceae collected in Koh Chang, 24 species — of these 14 are maritime species, 5 are rice-field weeds; *Rynchospora aurea* Vahl is widely scattered; *Fimbristylis Hookeriana* Boeck. has been hitherto known only from 2 localities 300 miles apart. Of the maritime species, a few are strictly maritime; a few re-appear in the lower hills, while they are absent from the plains; the greater number while common on the sea-coast occasionally occur inland. As to *Fimbristylis Hookeriana* Boeck. it grows in large quantity in its two known habitats; and it may be expected to be met with hereafter between Khasia and Koh Chang.

The 24 Cyperaceae of Koh Chang all occur in British India, except *Fimbristylis cymosa* R. Br., a species common in Malaya and Polynesia. They are arranged diagnosed and described in Sir J. D. Hooker's Flora of British India. I have therefore not copied over again what is printed there, but have given a reference to it, and to the Journ. Linn. Soc. v. 34 [1898] which gives the localities of the species in British India.

The Flora of British India, being a local Flora, does not in general cite synonyms or localities foreign to India. I have given below as „Additional synonymy“ and „Additional Geography“ the synonymy and geography referring to plants collected in and round Siam; and also, in a slighter degree, some of the general synonymy and geography.

I have added no „species inquirendae“; there are several hundred species of Cyperaceae collected in Eastern India, China, Malaya; it would cause no surprise for any one of these to be met with in Siam. It is better, therefore, for the present, to confine the Koh Chang list to the *Primitiae* of the Flora collected there.

Kyllinga Rottb.

1. **K. monocephala** Rottb.

Hook. f. Fl. Brit. Ind. v. 6, p. 588; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 11.

Additional synonymy:

K. monocephala, Forst. Ins. Austral. Prod. p. 6; R. Br. Prod. Fl. Austral. p. 219; Presl Rel. Haenk. v. 1, p. 182 pl. Mexic. excl.; Decaisne in Nouv. Ann. Mus. v. 3 [1834], p. 360; Moritzi Verz. Zoll. Pfl. p. 95 partim; Stend in Zoll. Verz. Ind. Archip. heft 2, p. 63 partim; Benth. Fl. Hongk. p. 388 partim, et Fl. Austral. v. 7, p. 251 partim; Ridley in Forbes Eastern Archip. [1885], p. 521, et in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 9.

K. brevifolia, Moritzi Verz. Zoll. Pfl. p. 95, non Rottb.

K. pumila, Kunth Enum. v. 2, p. 132 partim.

K. monocephala Var. *subtriceps*, Kunth Enum. v. 2, p. 129.

Schoenus niveus, Linn.! Syst. Veget. (ed. XIII Murray) p. 81, fide tab. Jacquin citatae, et Linn. herb. propr.

Thryocephalon nemorale J. R. et G. Forster Gen. p. 130, t. 65.

Cyperus leucocephalus, Hassk. Pl. Jav. Rar. p. 87 non Retz.

C. monocephalus, F. Muell. Fragm. Phyt. Austral. v. 8, p. 271.

K. monocephala is especially a maritime and island species; it is carried to seacoasts as to Portugal, to Bahia and to Monte-video. But, all the American plants called by authors *Kyll. monocephala* are some other species — mostly they are *K. brevifolia* Rottb.

Klong Sarlakpet, in humid plains.

Additional Geography:

Trop. Africa — Ins. Prince, N. L. 2° 1′; Welwitsch n. 6988. Ins. S. Helena; Burchell.

Mascarenia — in omnibus insulis vulgaris.

China Australis — Formosa: Henry nn. 352, 1329. Hainan; Henry n. 30. Pakhoi; Playfair n. 202; &c. &c.

Malaya — Sumatra; Horsfield n. 965, Zollinger nn. 368, 465, Goering n. 148, Leschenault n. 621. Siam; Schomburgk n. 327. Cambodia; Lebœuf. Cochinchina; Gaudichaud n. 72, Germain n. 106; Turong, O. Kuntze. Borneo; Motley n. 93.

Ins. Philippine; Cuming n. 1558. Manila; Wichura n. 1860; &c.

Australia — Queensland; Dallachy.

Oceania — In omni Polynesia tropicali, vulgaris.

Ins. Sandwich; Barclay.

Pycreus Beauv.

2. **P. polystachyus** Beauv.

Hook. f. Fl. Brit. Ind. v. 6, p. 592; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 16.

Additional synonymy:

P. polystachyus, Nees in Nova Acta Nat. Cur. v. 19 [1843], Suppl. 1, p. 55.

Cyperus polystachyus, Benth. Fl. Hongk. p. 385, et Fl. Austral. v. 7, p. 261; Hassk. Pl. Jav. Rar. p. 74; Munro in Seem. Voy. Herald p. 422; Miq. Fl. Ind. Bat. v. 3, p. 258, Suppl. p. 260; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 4; Drake Fl. Ins. Pacif. p. 330.

C. caespitosus, Hook. et Arn. Beechey Voy. p. 99, non Poiret.

C. brunneus, Hook. et Arn. Beechey Voy. p. 99, non Swartz.

Pycreus polystachyus is one of the most wide-spread and abundant Cyperaceae in the globe; it is especially common near the sea.

The above localities refer to the type form only. The Var. *β laxiflora* Benth. is equally wide spread; and the doubtfully distinct *Pycreus ferrugineus* C. B. Clarke is still commoner in North America. It is impossible to give the synonymy or the geography completely; for no one knows where the species ends.

Throughout the island, in rice-fields.

Additional Geography:

Africa Borealis — Algeria; Lefranc n. 487, Kralik nn. 92, 147, Billot n. 3924. Ischia; Tenore.

Africa Tropica — Senegambia; Hendelot n. 444. Niger Flum.: Vogel nn. 11, 35. Africa Centralis; Gazelle Flum., Schweinfurth n. 1152. Libya; Ascherson nn. 534, 2303. Ins. S. Helena; Burchell nn. 8, 9, J. D. Hooker n. 42. Angola; Welwitsch nn. 7041, 6890, 6891, &c. Zanzibar; Hildebrandt n. 1069. Usambara, Holst n. 2029 &c. Caput Bonae spei; Drège nn. 4403, 4404, 4405 &c.

Mascarenia — Mauritius; Sieber n. 10 — &c. &c.

China — Hongkong; Hance n. 1230. Formosa; Henry nn. 1047, 1050 — &c. &c.

Japan — Wichura n. 723 — &c.

Malaya — Tonkin; Balansa nn. 200, 2849. Cochinchina; Germain nn. 15, 92. Java; Zollinger n. 456, Kurz n. 1854. Borneo; Motley n. 67, Beccari n. 3685. Manila; Chamisso n. 196, Wichura n. 1870.

Australia — R. Brown n. 5908 &c. &c.

Oceania — Amboyna; Barclay. New-Caledonia; Vieillard n. 1431. Isle of Pines; Milne n. 169. Ins. Sandwich, Hillebrand n. 564; &c.

America — Florida; Rugel nn. 109, 114. Nicaragua; Tate n. 503, Lévy n. 258. West Indies; ubique vulgaris (Martinique, Sieber nn. 13, 360).

3. **P. sulcinux** C. B. Clarke.

Hook. f. Fl. Brit. Ind. v. 6, p. 593; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 16.

This „species" is only a split-off from *Pycreus polystachyus*; it is I think a little better separated than the numerous split-off species in North America — admitted as species there.

Lem Dan, in dry sandy soil.

Additional Geography:

Africa Trop. — Nyasa-land; L. Scott. Zomba Mt., Whyte.
Malaya — Borneo Borealis; Burbidge. Ins. Philippine; Moseley.

Cyperus Linn.

4. **C. Haspan**, Linn. partim nec Linn. Herb.

Hook. f. Fl. Brit. Ind. v. 6, p. 600; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898]. p. 22.

Additional synonymy:

C. Haspan, Moritzi Verz. Zoll. Pfl. p. 96; Hook. et Arn. Beechey Voy. p. 221; Benth. Fl. Hongk. p. 386 et Fl. Austral. v. 7, p. 27; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 63; Miq. Fl. Ind. Bat. v. 3, p. 267 et Suppl. p. 260; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 6.
C. platyculmis, R. Br. Prod. Fl. Austral. p. 214.
C. laticulmis, Spreng. Syst. v. 1, p. 228.

This is a pest in rice-fields, in warm countries nearly throughout the World. — I do not know that is it more prevalent near the sea than elsewhere.

Throughout the island, in rice-fields.

Additional Geography:

Trop. Africa; vulgaris — Senegambia; Heudelot n. 833. Djur; Schweinfurth n. 2054. Angola; Welwitsch nn. 7097, 6908, 6932, 7086, 7035 b. Mombasa; Hildebrandt n. 2045; Nyasaland, Lugard n. 10.
Mascarenia; frequens.
China; vulgaris — Hongkong; Wright n. 557, Wilford n. 48, Schottmueller n. 499. Canton; Sampson n. 260. Pakhoi; Playfair n. 108.
Japan; frequens.
Malaya — Sumatra; herb. Miquel. Java; Horsfield nn. 268, 269, Ploem nn. 121, 258. Tonkin; Balansa n. 2850. Cochinchina; Lebœuf, Germain nn. 93, 94. Borneo; Barber n. 194, Mottley n. 98. Ins. Philippine; Wichura n. 1999.
Australia; sat communis — Carpentaria Sinus, R. Brown n 5911.
America Borealis — North Carolina, Georgia, Florida, Alabama, Louisiana, Texas.
America Centralis — Mexico, Guatemala, West Indies.
America Australis Trop.; vulgaris.
Argentina — Entre-rios; Niederlein nn. 212, 2130, 2155.

Mariscus Vahl.

5. **M. albescens** Gaud.

Hook. f. Fl. Brit. Ind. v. 6, p. 623; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 46.

Additional synonymy:

Cyperus stuppeus, Forst. Ins. Austral. Prod. 1786 p. 89 [i. e. *C. stipens*, Forster! ms]; Guillemin in Ann. Sc. Nat. ser. 2, v. 6 [1836], p. 317.

Cyp. pennatus, Decaisne in Nouv. Ann. Mus. v. 3 [1834] p. 359; Miq. Fl. Ind. Bat. v. 3, p. 281; Benth. Fl. Hongk. p. 387; Vidal. Fl. Filip. p. 283; Ridley in H. O. Forbes Eastern Archip. p. 355, et in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 8; Hillebr. Fl. Hawai p. 463; Drake Fl. Ins. Pacific. p. 330; non Boeck.

Cyp. canescens, Nees in Nova Acta Nat. Cur. v. 19, Suppl. 1 [1843], p. 61; Hook. et Arn. Beechey Voy. p. 222.

Cyp. holciflorus, Presl. Rel. Haenk. v. 1, p. 171.

Cyp. anomalus, Stend. Cyp. p. 37.

Cyp. ovatus, Llanos Fragm. p. 15.

Cyp. imbricatus, Llanos Fragm. p. 17, fide Naves et Vill.

Cyp. fucatus Boeck. in Flora v. 65 [1882], p. 13.

Cyp. nitidulus, Vidal Pl. Vasc. Filip. p. 283.

This species is a common maritime tropical plant.

Cyperus ventricosus, R. Br. Prod. Fl. Austral. p. 217
= *C. caricifolius*, Hook. et Arn. Beechey Voy. p. 99
= *C. stigmatosus* Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 62
= *C. Tongatabuensis*, Boeck. in Flora v. 58 [1875], p. 85.

I reckon only a Var. of *Mariscus albescens*, Gaud., and it lies within the area of *M. albescens*.

Throughout the island near the sea, in rocks as in swamps.

Additional Geography:

Africa orient. — Taita; Hildebrandt n. 2437.

Mascarenia — Nossibé; Boivin n. 2003. Seychelles; Horne nn. 219, 648.

China — Hongkong; Wright n. 563, Seemann n. 556. Formosa; Playfair n. 107, Henry nn. 763, 783, 1007, 1032.

Malaya — Java; Horsfield, H. O. Forbes. Borneo; Barber n. 383, Beccari n. 3681, &c. Ins. Pbilippine; Cuming nn. 436, 1636, &c. Cochinchina; Finlayson, Germain n. 24.

Australia — Queensland; Amalia Dietrich n. 634.

Polynesia; vulgaris — Aru Ins.; Warburg. Aneiteum; Mac Gillivray n. 921, Milne n. 287. Ins. Sandwich; Seemann n. 1707, Hillebrand n. 559.

6. **M. microcephalus** Presl.

Hook. f. Fl. Brit. Ind. v. 6, p. 624; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 46.

Additional synonymy:

Mariscus dilutus, Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 8.

Cyperus dilutus, Nees in Nova Acta Nat. Cur. v. 19, Suppl. 1 [1843], p. 65; Miq. Fl. Ind. Bat. v. 3, p. 285; Vidal Pl. Filip. p. 283.

Cyp. Haenkeanus, Kunth Enum. v. 2, p. 93.

Cyp. septatus, Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 62; Miq. Fl. Ind. Bat. v. 3, p. 284 et Suppl. p. 260.

Cyp. cuadriflorus, Llanos Fragm. Filip. p. 18.
Cyp. microcephalus, Naves in Blanco Fl. Filip. Append. p. 304, non R. Br.
Cyp. Grabowskianus, Boeck. in Engl. Jahrb. v. 5 [1884], p. 502.

This is essentially a maritime or archipelago plant; but is found (not abundantly) in the central parts of India.

Klong Munsé, in plains near the sea.

Additional Geography:
Mascarenia — Rara, Commerson.
China — Canton; Sampson n. 1612, Hance n. 1367.
Malaya — Sumatra; Martens. Java; Zollinger, Jagor n. 594, Ploem n. 432; &c. Borneo; Barber n. 330, Motley n. 443; &c.
Tonkin; Balansa n. 2764; Saigon, Lebœuf.
Ins. Philippine; Cuming nn. 538, 1656, Vidal n. 3983, Wichura n. 2000, Jagor n. 869; &c.

Eleocharis R. Br.

7. **E. capitata** R. Br.

Hook. f. Fl. Brit. Ind. v. 6, p. 527; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 50.

Additional synonymy:
Eleoch. capitata, Kunth Enum. v. 2. p. 150, syn. quibusdam excl.; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891] p. 14.
Eleoch. setacea, R. Br. Prod. Fl. Austral. p. 225 neque homonyma p. 224; Kunth Enum. v. 2, p. 156.
Scirpus capitatus, Linn. Herb. propr. partim; Benth.! Fl. Hongk. p. 394.
Sc. Caribaeus, Rottb. Descr. et Ic. p. 46, t. 15, fig. 3.
Heleocharis capitata, Benth. Fl. Austral. v. 7, p. 296.
Heleoch. setacea, Benth. Fl. Austral. v. 7, p. 296.

Lem Dan, in rice-fields.

Additional Geography:
Trop. Africa — Senegal; Heudelot n. 549, Perrottet nn. 198, 820, 830. Caput Palmas; Vogel n. 7. Congo Flumen; Christ. Smith. Somali Terra; Revoie n. 137.
Ins. Socotra; Balfour n. 730, Schweinfurth n. 693.
Ins. Bourbon; Bory.
Arabia — Sinai; Ehrenberg n. 372; Yemen; Botta, Bent.
China — Hongkong; Wright n. 593. Formosa; Playfair n. 134. Henry nn. 704, 1042.
Malaya — Java; Leschenault. Tonkin; Balansa n. 217.
Ins. Philippine; Blanco. Manila; Barthe.
Australia; R. Brown n. 5930, Cunningham n. 354; &c.
Polynesia; late sparsa.
America; vulgatissima; ab Alabama usque ad Argentinam.

8. **E. Chaetaria** Roem. et Sch.

Hook. f. Fl. Brit. Ind. v. 6, p. 629; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 51.

Additional synonymy:

Eleoch. Chaetaria, Moritzi Verz. Zoll. Pfl. p. 96; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 62; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 14.

E. depauperata, Kunth Enum v. 2. p. 140.

Scirpus Chaetarius, Spreng. Syst. v. 1, p. 203.

Heleocharis setacea, Palla in Engler Jahrb. 10 [1888], p. 299.

Throughout the island, usually in rice-fields.

Additional Geography:

Africa Tropica; Rara — Angola; Huilla, Welwitsch n. 6964. Djur; Schweinfurth n. 2583.

Malaya — Java; Zollinger nn. 339, 636; Buitenzorg, Kurz n. 1845. Tonkin; Balansa n. 182. Cambodia; Lebœuf n. 362.

Ins. Philippine; Loher.

America Calidior: vulgaris — a Mexico et Cuba usque ad Paraguay.

9. **E. equisetina** Presl.

Hook. f. Fl. Brit. Ind. v. 6, p. 629; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 48.

Additional synonymy:

E. equisetina, Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891] p. 14.

E. esculenta, Vieillard! in Ann. Sc. Nat. ser. 4, v. 16 [1832] p. 37; Paill. et Boiss. in Bull. Soc. Acclimat. ser. 4, v. 1 [1884] p. 905.

Heleocharis equisetina, Naves in Append. Blanco Philipp. 1880, p. 306.

H. plantaginea, Vidal Pl. Vasc. Filip. p. 284.

Lem Dan, in rice-fields.

Additional Geography:

Madagascar — Nossibé; Hildebrandt n. 2949 b.

Philippines — Luzon; Cuming n. 1255.

New-Caledonia; Vieillard n. 1496.

Fimbristylis Vahl.

10. **F. diphylla** Vahl.

Hook. f. Fl. Brit. Ind. v. 6, p. 636; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 57.

Additional Synonymy:

F. diphylla, Nees iu Nov. Acta Nat. Cur. v. 19, Suppl. 1 [1843], p. 81; Benth. Fl. Hongk. p. 392, et Fl. Austral. v. 7. p. 311 partim; Miquel in Ann. Mus. Lugd. Bat. v. 2 [1865—6], pp. 144, 211; Vidal Pl. Vasc. Filip. p. 284; Drake Fl. Ins. Pacifici p. 332; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 10.

F. laxa, Kunth Enum, v. 2, p. 232.

F. gracilis, R. Br. Prod. Fl. Austral. p. 227.

F. paviflora R. Br. Prod. Fl. Austral. p. 227.

F. stricta, R. Br. Prod. Fl. Austral. p. 228.

F. variabilis, R. Br. Prod. Fl. Austral. p. 228.

F. elongata, R. Br. Prod. Fl. Austral. p. 228.

F. Marianna, Gaud. in Freycinet Voy. p. 413 (Var. β excl.).

F. podocarpa, Benth. Fl. Hongk. p. 391.
F. communis, Miq. Fl. Ind. Bat. v. 3, p. 323.
F. ciliolata, Zoll. Verz. Ind. Archip. heft 2, p. 61.
F. ambigua, Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Miq. Fl. Ind. Bat. v. 3, p. 324.
F. Goeringiana, Steud. Cyp. p. 118.
F. circinnata, Steud. Cyp. p. 116; Miq. Fl. Ind. Bat. v. 3, p. 324.
F. calocarpa, Steud. Cyp. p. 117; Miq. Fl. Ind. Bat. v. 3, p. 325.

Taking *Fimbristylis diphylla* Vahl in the narrow sense (i. e. making it a narrower species than do Kunth and Boeckeler), it is perhaps the most widely-spread and the most abundant Cyperacea in the World — and has 150 names.

Lem Dan, in dry clayey soil near the sea.

Additional Geography:
Europa — Valais; Schleicher. Meran; Thomas. Treviso, Reichenbach n. 2306; &c.
Asia Occid. — Lazistan; Balansa n. 970 &c., usque ad Turkestan et Cabul.
Africa Trop; vulgatissima.
Africa Australis — Frequens, Drège n. 4371, 4373 &c.
Mascarenia; ubique vulgaris.
China; vulgaris.
Japonia; vulgaris.
Malaya — Tonkin; Balansa nn. 214, 2775. Anam; Turong, O. Kuntze. Cochinchina; Germain nn. 16, 96, 100, 102. Java; Zollinger n. 181, Horsfield n. 1072. &c. &c. Banca; Teysmann. Sumatra; Martens. Borneo; Motley nn. 66, 69, 87, &c. &c. Timor, Lumbok, &c.
Ins. Philippine; Cuming n. 558, Wichura nn. 1854, 2001.
Australia; vulgaris.
Polynesia; vulgaris.
Sandwich Ins.; vulgaris.
America = United States; frequens.
America Centralis cum West Indies; vulgatissima.
America Australis Tropica; vulgatissima.
Argentine et Monte Video; frequens.

11. **F. sericea** R. Br.

Hook. f. Fl. Brit. Ind. v. 6, p. 641; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 63.

Aditional synonymy:
F. sericea, Knuth Enum. v. 2, p. 244; Benth Fl. Austral v. 7, p. 319; Ridley in Journ. Singapore Asiat. Soc. n. 13 [1891], p 10.
F. decora, Nees in Hook. et Arn. Beechey Voy. p. 225, in Nova Acta Nat. Cur. v. 19, Suppl. 1 [1843], p. 83; Kunth Enum. v. 2, p. 240
Scirpus sericeus, Poir. Encycl. Suppl. v. 5, p. 99.

As yet received (by me) only from the sea-coasts.

Klong Prao, on the sandy sea-shore.

Additional Geography:
Malay Peninsula — Singapore; Ridley n. 4.
China — Amoy; Didrichsen n. 3044. Macao; Hance n. 10131. Hainan; A.

Henry n. 8195. Formosa; A. Henry nn. 1007, 1008. Pakhoi; Playfair n. 86. Canton; Yvan; &c.

Japan; Faurie nn. 412, 6482, 11882 — Hakone et Nagasaki, Maximowicz.

Malaya — Java; Junghuhn. Pulu Condor; Staunton. Cochinchina; Gaudichaud n. 74, Lebœuf n. 824, Germain n. 19.

Australia Borealis; R. Brown n. 5960. Portus Darwin; Schultz n. 602. Ins. Goulburn; Cunningham.

12. **F. Hookeriana** Boeck.

Hook. f. Fl. Brit. Ind. v. 6, p. 641. C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 62.

There are various collectors in India, but only 2 localities, 300 miles apart. In the Khasi locality, the plant is in large quantity, in the Chota Nagpore it is in considerable quantity.

In both localities, it grows in chinks in hard rocks that have got filled with sand. Several plants that grow in this habitat are also known from the ocean-margin.

On rocks in the jungle near Klong Munsé.

Additional Geography: Only Koh Chang.

13. **F. spathacea** Roth.

Hook. f. Fl. Brit. Ind. v. 6, p. 640; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 62.

Additional synonymy:

F. spathacea, Kunth Enum. v. 2, p. 246.

F. Wightiana, Knuth Enum. v. 2, p. 241; Benth. Fl. Hongk. p. 392.

F. glomerata, Kunth Enum. v. 2, p. 246; Benth. Fl. Austral. v. 7, p. 318 in nota [1]; Ridley in H. O. Forbes Eastern Archipelago [1885], pp. 43, 521.

F. rigida, Moritzi Verz. Zoll. Pfl. p. 97; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Miq. Fl. Ind. Bat. v. 3, p. 327.

F. ciliolata, Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Miq. Fl. Ind. Bat. v. 3, p. 317.

F. laevissima, Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Miq. Fl. Ind. Bat. v. 3, p. 324.

Isolepis glomerata, Schrader in Roem. et Sch. Syst. v. 2, Mant. p. 67.

This is an abundant species, but I have received it only from the Sea coasts.

Klong Sarlakpet, in humid plains.

Additional Geography:

Africa, Insul. Occident. — Socotra; Balfour nn. 33, 310. Schweinfurth n. 620. Mauritius, Sieber n. 21; &c. &c. Réunion; de l'Isle n. 129, Boivin n. 1003; &c. Seychelles; Horne nn. 210, 211, &c. &c.

China — Hongkong; Seemann n. 542; &c. Ins. Samtong; Wright n. 589. Formosa; Playfair n. 136, Henry nn. 1071, 1071 A, 1834, 1860.

Malaya — Sumatra; Heyne. Java; Zollinger n. 2446, Schottmueller n. 496; &c. Borneo; Motley nn. 42, 190; &c. &c.

Ins. Philippine; Wichura n. 1857 bis; &c.

America; a West Indies usque ad Brasiliam Australem (Sao Paulo) in oris maritimis communis.

14. **F. polytrichoides** Vahl.

Hook. f. Fl. Brit. Ind. v. 6, p. 632; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 54.

Additional synonymy:

F. polytrichoides, R. Br. Prod. Fl. Austral. p. 226; Miq. Fl. Ind. Bat. v. 3, p. 315 syn. excl.; Benth. Fl. Austral. v. 7, p. 304; Hance in Journ. Bot. v. 16 [London 1878], p. 112.

F. albescens, Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Miq. Fl. Ind. Bat. v. 3, p. 316.

Abildgaardia Javanica, Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 63, et Cyper p. 72; Miq. Fl. Ind. Bat. v. 3, p. 297, non Nees.

This is essentially a maritime plant, and I never collected it myself exept near the sea. But there are a few inland specimens, both in Africa and in India.

Throughout the island, in rice-fields and also in more dry places.

Additional Geography:

Africa Trop. — Zanzibar; Boivin. Usambara; Holst n. 2123.

China — Formosa; Henry n. 1100. Fokien et Amoy; Hance n. 10153.

Ins. Chusan; Didrichsen n. 3569.

Malaya — Java; Zollinger n. 3237.

Ins. Philippine; Chamisso n. 129, Loher.

Australia Trop. — Carpentaria Sinus; R. Brown n. 5939.

15. **F. ferruginea** Vahl.

Hook. f. Fl. Brit. Ind. v. 6, p. 638; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898]. p. 60.

Additional synonymy:

F. ferruginea, Decaisne in Nouv. Ann. Mus. v. 3 [1834], p. 362; Kunth Enum. v. 2, p. 236; Nees in Hook. et Arn. Beechey Voy. p. 312; Benth. Fl. Hongk. p. 391, Fl. Austral. v. 7, p. 312; Miq. in Ann. Mus. Lugd. Bat. v. 2 [1865—6], p. 144; Ridley in H. O. Forbes Eastern Archip. [1885], p. 521.

F. tristachya, R. Br. Prod. Fl. Austral. p. 266; Kunth Enum. v. 2, p. 242; Nees in Nova Acta Nat. Cur. v. 19, Suppl. 1 [1843], p. 76.

F. brevifolia, R. Br. Prod. Fl. Austral. p. 228.

F. cylindrostachya, Steud. Cyp. p. 119 partim.

Isolepis ferruginea, Link Hort. Berol. v. 2, p. 315.

Campylostachys abbreviata, Drège Zwei Pfl. Docum. p. 82; E. Meyer ms.

A very common species near the sea-coast; very much less common inland.

Throughout the island, in rice-fields and in swamps.

Additional Geography:

Mediterranea — Madeira; Lowe. Teneriffe; Delessert. Egypt; Bové, Schweinfurth n. 646, Acherson nn. 558, 2346.

Oriens — Arabia; Schweinfurth nn. 184, 199, Aucher-Eloy n. 5480. Palestine; Bové n. 387, Postian n. 2288.

Susan; Haussknecht.

Cabul; Griffith Kew n. 6325.

Africa; in oris omnibus, usque ad Caput Bonae Spei -- Djur; Schweinfurth n. 2121. Soudan; Oudney n. 4. Gallabat; Schweinfurth nn. 2035, 2037. Usambara; Holst n. 2122.
Mascarenia; frequens.
China — Hongkong; Hance nn. 1260, 7491, Harland n. 679. Pakhoy; Playfair n. 206. Formosa; Henry nn. 712, 733, 773, 1066.
Malaya — Java; Junghuhn, Martens. Borneo; Barber nn. 251, 362; &c.
Ins. Philippine; Chamisso n. 127, Loher.
Australia — Carpentaria Sinus; R. Brown n. 5941; &c.
America — Ins. Bahama; Eggers n. 4357.
West Indies; vulgaris.
America Astralis; a Panama usque ad Bahia.

16. **F. miliacea** Vahl.

Hook. f. Fl. Brit. Ind. v. 6, p. 644; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 65.

Additional synonymy:
F. miliacea, Kunth Enum., v. 2, p. 230; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Hassk. Pl. Jav. Rar. p. 67; Benth. Fl. Hongk. p. 393, et Fl. Austral. v. 7, p. 316; Miq. in Ann. Mus. Lugd. Bat. v. 2 [1865—6], pp. 145, 211; Boiss. Fl. Orient. v. 5, p. 390; Vidal Pl. Vasc. Filip. p. 284; Ridley in Forbes Eastern Archip. [1885], p. 521, in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 11.
Scirpus miliaceus, Lour. Fl. Cochinch. [ed. Willd.] p. 55.
S. Niloticus, Blanco Fl. Filip. p. 33.
Trichelostylis miliacea, Nees in Hook. et Arn. Beechey Voy. p. 226, et in Nova Acta Nat. Cur. v. 19, Suppl. 1 [1843], p. 84.

A rice-field weed.
Klong Munsé, in rice-fields.

Additional Geography:
Orient — Susan; Haussknecht.
Africa Trop. — Senegambia; Heudelot n. 212. Zanzibar; Boivin.
Mascarenia; vulgaris; Sieber nn. 25, 141; &c.
China; vulgaris — Canton; Sampson n. 272, Hance n. 1393. Hongkong; Wilford n. 368; &c. Pakhoi; Playfair n. 122. Ins. Formosa; Henry nn. 249, 786, 786 B, 1113; &c. Ins. Chusan; Yvan.
Japonia; vulgaris; Oldham nn. 841, 912; &c.
Malaya — Tonkin; Balansa nn. 206, 2755. Cambodia; Lebœuf. Anam; O. Kuntze. Cochinchina; Germain nn. 99, 109. Java; Zollinger nn. 8, 73, 193, 451; &c. Borneo; Motley nn. 92, 991; &c.
Ins. Philippine; Cuming n. 564, Chamisso n. 130; &c.
Australia Trop.; frequens — Queensland; Amalia Dietrich nn. 651, 719; &c.
Polynesia — Timor; Gaudichaud, Leschenault. Amboina; Labillardière. Bourou, Lahaie.
America Centralis; sparsa; Cuba, C. Wright n. 3772. Guatemala; Bernouilli n. 435.
Guiana Anglica; Jenman nn. 2169, 4413, 4456; &c.

17. **F. cymosa** R. Brown.

Prod. Fl. Austral. [1810], p. 228; Decaisne in Nouv. Ann. Mus. v. 3 [1834],

p. 361; Nees in Hook. et Ann. Beechey Voy. p. 98; Miq. Fl. Ind. Bat. v. 3, p. 328; Benth. Fl. Austral. v. 7, p. 318; Hillebr. Fl. Hawaii p. 473; Drake Fl. Ins. Pacifici p. 332.

F. Marianna, Gaud. in Freycinet Voy. p. 413 partim.

F. multifolia, Boeck. in Linnaea v. 38 [1874], p. 397; Benth. Fl. Austral. v. 7, p. 319.

Scirpus cymosus, Lam. Ill. v. 1, p. 141.

Altogether a maritime, especially an insular species.

Koh Kahdat, sandy sea-shore.

Area:

Japonia — Ins. Liu Kiu; C. Wright n. 358.
Malaya — Java; hb. Buitenzorg. Christmas Ins.: Lister.
Australia Trop.; frequens; R. Brown n. 5959; &c.
Polynesia; frequens — Samoa; Powell n. 55; &c.
Sandwich Isles: Beechey, Hillebrand nn. 525, 526.

Var. β **subcapitata** C. B. Clarke ms. i. e.

F. umbellato-capitata, H. Mann in Proc. Amer. Acad. v. 7 [1867] p. 209; non Steud.

F. cymosa Var. *umbellato-capitata*, Hillebr. Fl. Hawai p. 473.

F. pycnocephala, Hillebr. Fl. Hawai p. 473; Drake Fl. Ins. Pacifici p. 333.

F. Faulensis Guenth. in Ann. Naturhist. Hofmus. Wien p. 3, p. 252.

Area:

Ins. Philippine: Cuming n. 1433.
Polynesia; frequens — New-Caledonia; Vieillard nn. 3326, 3327.
Sandwich Isles — H. Mann n. 321; &c.

Fuirena Rottb.

18. **F. glomerata** Lam.

Hook. f. Fl. Brit. Ind. v. 6, p. 666; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 86.

Additional synonymy:

F. glomerata, R. Br. Prod. Fl. Austral. p. 220; Decaisne in Nouv. Ann. Mus. v. 3 [1834], p. 360; Kunth Enum. v. 2, p. 184; Benth. Fl. Hongk. p. 396, et Fl. Austral. v. 7, p. 338; Ridley in Forbes Eastern Archip. [1885], p. 521. in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 13.

F. arenosa, R. Br. Prod. Fl. Austral. p. 220.

F. Rottboelli, Nees in Hook. et Arn. Beechey Voy. p. 224; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61.

F. striata Llanos Frag. Filip. p. 21.

F. Hildebrandtii, Boeck. in Flora v. 65 [1882], p. 15.

Scirpus ciliaris, Linn. Mant. p. 182 et herb. propr.

Scirpus n. 73, Rottb. Descr. et Ic. p. 55, t. 17, fig. 1.

— Pluk. Alm. t. 417, fig. 6.

A rice-field weed in the Old World.

Klong Munsé, in humid plains.

Additional Geography:

Africa Trop.; late sparsa — Senegal; Heudelot n. 556. Niger; Barter n. 2224. Socotra; Balfour n. 389. Loanda; Welwitsch n. 7107. Usambara; Holst nn. 2040, 2737.

Madagascar; Hildebrandt n. 3303.

China; frequens — Hongkong; Wilford n. 274, C. Wright n. 570. Macao; da Silva. Pakhoi; Playfair n. 121. Formosa; Henry n. 1084.

Japonia; in hb. Kew.

Malaya — Cochinchina; Lebœuf. Java; Horsfield n. 1024, Junghuhn.
Ins. Philippine; Jagor n. 566, Gaudichaud n. 96.
Macassar; Zollinger n. 3285.

Australia Calidior; frequens; R. Brown n. 5987; &c.

Rynchospora Vahl.

19. **R. aurea** Vahl.

Hook. f. Fl. Brit. Ind. v. 6, p. 670; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 89.

Additional synonymy:

R. aurea, Beauv. Fl. d'Owar v. 2, p. 39, t. 81, fig. 2.

R. corymbosa, Britton in Trans. New York Acad. v. 41 [1892], p. 84.

Rhync. aurea R. Br. Prod. Fl. Austral. p. 220; Kunth Enum. v. 2, p. 293; Benth. Fl. Hongk. p. 39, et Fl. Austral. v. 7, p. 349; Miq. Fl. Ind. Batav. v. 3, p. 336, et Suppl. p. 262; Boeck in Linnaea v. 37 [1873], p. 626; Vidal Pl. Vasc. Filip. p. 285; Drake Fl. Ins. Pacifici p. 334.

R. articulata Kunth Enum. v. 2, p. 393; Moritzi Verz. Zoll. Pfl. p. 98; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61.

Cladium occidentale, Schrad. Fl. Germ. v. 1, p. 76 in Obs.: non Nees.

Chaetospora aurea, H. B. K. Nov. Gen. et Sp. v. 1, p. 231.

A common tropical weed, both in the Old and New World; not specially maritime, but widely scattered.

Klong Son, in a waterhole.

Additional Geography:

Africa Trop.; sat vulgaris — Senegambia; Heudelot nn. 343, 687. Soudan; Schweinfurth nn. 1360, 3495. Angola; Welwitsch nn. 6844, 6845. Zanzibar; Hildebrandt n. 1232 &c. &c.

Natal; herb. Schinz.

Mascarenia; Bojer, Bory, &c.

China — Hongkong; Harland. Hainan; Henry n. 8551. Formosa; Henry n. 1843.

Malaya; sat freqnens — Cochinchina; Germain nn. 111, 112. Tonkin; Balansa n. 2779. Sumatra; Beccari n. 851. Java; Zollinger n. 270, Kurz n. 1864; Borneo; Motley nn. 310, 1299; &c.
Ins. Philippine; Cuming n. 1763.

Australia; Sir J. Banks; &c.

Polynesia; vulgaris — New-Caledonia; Vieillard n. 1441. Tahiti; Forster n. 266.

America Centralis cum West Indies; frequens.

America Australis Tropica; vulgaris.

America Australis Temperata; usque ad Buenos Ayres.

Remirea Aublet.

20. **R. maritima** Aublet.

Hook. f. Fl. Brit. Ind. v. 6, p. 678; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 93.

Additional synonymy:

Remirea maritima Kunth Enum., v. 2, p. 139; Benth. Fl. Austral. v. 7. p. 347; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 15.; Vidal Pl. Vasc. Filip. p. 285.

Miegia maritima, Willd. Sp. Pl. v. 1, p. 311.

Mariscus pungens, Steud. Cyp. p. 60; Miq. Fl. Ind. Bat. v. 3, p. 288.

Mar. maritimus, Miq. Fl. Ind. Bat. Suppl. p. 600.

Cyperus Kegelianus, Steud. Cyp. p. 60.

I belive this to be altogether a maritime species.

Baron n. 2601 is ticketed „Central Madagascar"; if this means the centre of the country, I suspect it to be erroneous.

Throughout the Island, on sandy sea-shores.

Additional Geography:

Africa Trop — Sierra Leone; G. Don. Guinea; Thonning n. 377; &c. Nun Flumen; G. Mann n. 534. Gongo (Ostia); Welwitsch n. 6990.

Madagascar Centralis; Baron n. 2601.

China; Millett. Canton; Yvan.

Malaya — Java; Zollinger n. 2703. Bangka; Kurz n. 2735. Borneo; Motley n. 58, Beccari n. 2298. Cochinchina; Lebœuf n. 836.

Ins. Philippine; Chamisso n. 168, Cuming n. 867.

Australia; in orâ orientali; Sir J. Banks; &c. Ins. Northumberland; R. Brown n. 5992.

New-Guinea; Hollrung n. 506.

America Centralis — Tate n. 18, Fendler n. 339, Kegel n. 12682.

America Australis Tropica; sat frequens; in orâ orientali.

Hypolytrum L. C. Rich.

21. **H. latifolium** L. C. Rich.

Hook. f. Fl. Brit. Ind. v. 6, p. 678; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 93.

Additional synonymy:

H. latifolium, Kunth Enum., v. 2. p. 271; Benth. Fl. Hongk. p. 389, et Fl. Austral. v. 7, p. 339; Miq. Fl. Ind. Bat. v. 3, p. 333, et Illustr. Fl. Archip. Ind. p. 58; Hook. Bot. Mag. t. 6282; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 15; vix. Boeck.

H. schoenoides, Moritzi Verz. Zoll. Pfl. p. 97; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61.

H. diandrum, Dietr. Sp. Pl. v. 2, p. 365.

H. latifolium, Dietr. Sv. Pl. v. 2, p. 365.

This is primarily a maritime plant. It is frequent on the sea coast; then for 250 miles island it is not collected; then, when we reach the lower ranges of the outer mountains, it reappears.

In this case as in many others, there are half-a-dozen species admitted, which are so closely allied to *Hypol. latifolium* that they might be sunk in it (some have been so sunk by some authors); to do this would of course widen considerably the geographic range of the species.

Klong Munsé and Klong Majum. riverbanks in the jungle.

Additional Geography:

China — Canton; Hance n. 1368. Hongkong; Harland n. 1031, C. Wright n. 569; &c. Formosa; Oldham n. 562.

Malaya — Sumatra; Marsden, Beccari n. 945. Java; Zollinger nn. 313, 380, 686; &c. Sunda Strait; Macartney. Tonkin; Balansa nn. 2759, 2760. Cochinchina; Germain n. 4.

Australia Boreal.-Orient.; Fitzalan, Dallachy.

Polynesia — Amboina; Forster. Ins. Admiralty; Mosely. Ins. Viti; Graeffe n. 1232, Wilkes.

Scleria Berg.

22. **S. multifoliata** Boeck.

Hook. f. Fl. Brit. Ind. v. 6, p. 693; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 102.

Additional synonymy:

S. multifoliata, Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 18.
S. tessellata, Brongn. in Duperrey Voy. Coquille pars 2 [1829], p. 164.
S. scrobiculata, Zollinger ms. (partim).
Carex Ambonica, Rumph. Herb. Amb. v. 6, p. 20, t. 8, fig. 1.

This appears a maritime species — i. e. so far as known.

Klong Munsé, riverbanks in the jungle.

Additional Geography:

Malaya — Java; Zollinger n. 470 partim, King. Borneo Borealis; Burbidge. Manila; Gaudichaud n. 83. Timor Laut; Riedel.

23. **S. levis** Retz.

Hook. f. Fl. Brit. Ind. v. 6. p. 694; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 103.

Additional synonymy:

S. laevis, Moritzi Verz. Zoll. Pfl. p. 98; Steud. in Zoll. Verz. Ind. Archip. heft 2, p. 61; Benth. Fl. Hongk. p. 400; Hance in Ann. Sc. Nat. Ser. 4, v. 18 [1862]. p. 232; Miq. Fl. Ind. Bat. v. 3, p. 341; Ridley in Journ. Singapore Asiat. Soc. n. 23 [1891], p. 18.

This species is largely maritime; but, like *Hypolytrum latifolium* (& others), is reappears at the base of the Mountains, 250 miles from the sea.

Scleria levis Retz belongs to the group of *Scleria* which has (Hook. f. Fl. Brit. Ind. v. 6, p. 692) „Leaves (that is those next below the bracts) imperfectly opposite or ternate". In the Koh Chang plants the uppermost leaves below the bracts are not imperfectly ternate. This leaf-character I consider as of small importance — except for a first sorting of *Scleria*. As to these plants, I have the same form from Borneo (Haviland n. 1917).

Plains near Klong Munsé.

Additional Geography:

China — Hongkong; Hance n. 2985.

Malaya — Cochinchina; Germain. Java; Horsfield, Zollinger n. 469 partim, Ploem.

Carex Linn.

24. **C. Indica** Linn.

Hook. f. Fl. Brit. Ind. v. 6, p. 714; C. B. Clarke in Journ. Linn. Soc. v. 34 [1898], p. 114.

Additional synonymy:

I can give none. Because I have not worked up the Sect. „Indicae" of *Carex* except as to the British India material.

I may state, however, that very few of the plants I see about in Herbaria marked *C. Indica* are the *C. Indica* Linn. (mihi); and that consequently the references to *C. Indica* Linn. in books are mostly wrong (unless the name be widened to include many of the allied species).

A species, primarily maritime, reappears in the lower hills, 250 miles from the sea.

Klong Munsé, Klong Majum (200 ft.), in the jungle.

Additional Geography:

Malaya — Cochinchina; Cay Ninh, Pierre n. 1881. Java; Zollinger n. 313. Borneo; Beccari nn. 2741, 3873 (= Var. Milnei). Borneo Borealis; Creagh (= Var. Milnei).

Polynesia — Timor; Macan, F. Newton (= Var. Milnei). Fiji, Ovolau, Milne nn. 274, 23, 16, 216, 173 (= Var. Milnei).

New-Caledonia; Gutope, Lenormand n. 3336 (= Var. Milnei). Kamala, Vieillard n. 3339 (= Var. Milnei).

Gramineae

by **E. Hackel** — St. Pölten.

Coix L.

1. **C. Lacryma Iobi** L. Spec. ed. I. 972.

Plains near Lem Dan.

Area: Tropisches Asien, in Afrika u. Amerika cultiviert.

Dimeria Brown.

2. **D. ornithopoda** Trin. var. **tenera** Hack. in Mon. Androp. 81.

D. tenera Trin. Mém. Acad. St. Pétersb. Sér. 6, 2, 335.

Rice-field near Lem Dan.

Area: Vorder- und Hinter-Indien, Malay. Archipel, Japan, trop. Australien.

Imperata Cyr.

3. **I. arundinacea** Cyr. var. **Koenigii** Benth. Fl. Hongk. 419, cfr. Hack. Mon. Androp. 94.

I. Koenigii Beauv. Agrost. 165.

Common in plains throughout the island, Koh Kahdat on the sea-shores.

Area: Indien, S. Afrika, Malay. Inseln, China, Japan, Australien; andere Varietäten in Europa, Amerika etc.

Pogonatherum Beauv.

4. **P. saccharoideum** β. **monandrum** Hack. Monog. Androp. 193.

P. crinitum Trin. Fund. 166; *Pollinia monandra* Spreng. Syst. 1, 288. *Andropogon crinitus* Thunb. Fl. Jap. 40, t. 7. *A. monandrus* Roxb. Fl. Ind. I, 260.

Common on rocks in the jungle near Klong Munsé ascending to 700 feet.

Area: Indien, Malayische Halbinsel, Malay. Archipel, China, Japan, Austral.

Ischaemum L.

5. **I. muticum** L. Spec. pl. ed. I, p. 1049.

Klong Prao, Koh Kahdat on sandy sea-shores.

Area: Indien, Malay. Halbinsel, China, Australien.

Andropogon L.

6. **A. Sorghum** var. **vulgaris** Hack. Monogr. Androp. 515.

Sorghum vulgare Pers. Syn. 1, 101.

Klong Sarlakpet; in open places near the jungle; specimens 6—8 feet high.

Area: Cultiviert in allen wärmeren Ländern.

Thysanolaena Nees.

7. **T. acarifera** Arn. & Nees in Nov. Act. Nat. Cur. XIX, Suppl. 1, 187.

Panicum acariferum Trin. Spec. Gram. t. 87, *Melica latifolia* Roxb. Fl. Ind. I, 328.

Lem Dan, in the edge of the jungle; specimens about 10 feet high.

Area: Vorder- und Hinter-Indien, Malay. Halbinsel, Malay. Archipel, östl. bis New Guinea.

Paspalum L.

8. **P. scrobiculatum** L. Mant. 1, 29.

In sandy places near the village at Lem Dan.

Area: In allen warmen Ländern.

9. **P. longifolium** Roxb. Fl. Ind. I, 280.

P. Thunbergii Kunth ex Steud. Syn. I, 28.

Plains at Lem Dan.

Area: Indien, Malayischer Archipel, Japan.

10. **P. distichum** L. Am. Acad. V, 391.

Abundant along the east coast of Koh Chang near the sea, in sandy shores or in mangrove swamps; Klong Prao, Lem Ngob. It has long rhizomes, creeping on the ground.

Area: In allen warmen Ländern.

Isachne Brown.

11. **I. miliacea** Roth. Nov. Pl. 58.

I. Meneritana Poir. Encycl. Suppl. III, 185. *I. polygonoides* Doell. in Mart. Fl. Bras. II, 2, 273.

Plains at Lem Dan.

Area: Vorder- und Hinter-Indien, China, Malayische u. australische Inseln, Süd-Amerika.

var. **dispar.**

I. dispar Trin. Spec. Gram. t. 6.

In moist places near Lem Dan.

Area: Vorder-Indien.

12. **I. Schmidtii** Hack. n. sp.

Perennis. Culmi humiles, repentes, ad nodos radicantes, denique ascendentes, parte erecta vix ultra 6 cm. alti, filiformes, subcompressi glabri, ad apicem usque foliosi, basi ramosi. Foliorum vaginae appressae, internodia plerumque superantes, superne longe ciliatae; ligula obsoleta, ciliata; laminae lanceolatae v. ovato-lanceolatae, acutae, 2—3 cm. longae, ad 6 mm. latae, rigidulae, patentes, margine subincrassato albido scabro saepius plus minusve undulatae, subtus scabrae, supra laeves v. setulis paucis adspersae. Panicula parva (1—1,5 cm. lg.) pauper, lineari-oblonga, contracta, fere subspiciformis, densiuscula, ramis paucis stricte erectis rhachi subappressis laevibus basi breviter nudis, apice 1—3-spiculatis, spicularum pedicellis inaequalibus, subterminalibus brevissimis, omnibus crassiusculis, apice dilatatis. Spiculae ovatae, 3—3,5 mm. longae, viridulae v. apice subcoloratae. Glumae steriles subaequales (inferior paullo longior), ovatae obtusae, nervis 7 tenuibus haud prominulis percursae, toto dorso setulis rigidis hispidae. Glumae fertiles aequales, quam steriles fere duplo breviores, (gl. I. 3,5 mm, III. 1,8 mm.), late ovales, obtusae, pallide flavo-virentes, dorso glabrae laevesque vel superne punctis sparsis setulisve paucis exasperatae, marginibus involutis superne molliter ciliolatae. Flores ambo hermaphroditi, antheris 1 mm. longis.

Species singularis, propter glumas steriles magnas (fertilibus fere duplo longiores), habitu humili et repente nulli nisi *I. Lisboae* Hook. f. Fl. of Brit. Ind. VII, 22 affinis, quae autem differt (ex descriptione) paniculae ramis horizontaliter patentibus hispidis setulosis, glumis sterilibus hemisphaericis apice obtuse cuspidatis 5-nerviis, foliis ciliatis.

Klong Munsé, on riverbanks in the jungle.

Panicum L.

13. **P. sanguinale** L. var. **timorense.**

P. timorense Kunth Syn. I, 83.

Klong Prao; on sandy sea-shores.

Area: Vidi ex insulis Timor (hb. Paris.), Amboina (Doleschall in h. Vindob.), Luzon (Chamisso in hb. berol.), Banca (Teysm.), Java (hb. Nees), Ceylon (Thwait. 861), Bourbon (Boivin 939), Isle au Tonnelier (Bory d. Vincent.).

14. **P. heteranthum** Nees et Mey. in Nov. Act. Nat. Cur. XIX, suppl. 1, 174.

Paspalum heteranthum Hook. f. Fl. Brit. Ind. VII. 16, excl. syn.

Rayong, in sandy sea-shores.

Area: Halbinsel Malacca, China.

15. **P. Colonum** L. Syst. ed. X, 870.

Koh Kong, in dry sandy places.

Area: In allen wärmeren Ländern.

16. **P. indicum** L. Mant. 2, 184.

Lem Dan, in moist places.

Area: Tropisches Asien und Australien.

17. **P. interruptum** Willd. Sp. pl. 1, 341.

In pools and ditches at Lem Dan.

Area: Indien, Malayische Halbinsel, trop. Afrika.

18. **P. Ridleyi** Hack. in Trans. Linn. Soc. Ser. 2, Bot. III, 401 (nomen).

P. latifolium Hook. f. Fl. Brit. Ind. VII, 39 non L. (ex parte).

Differt a *P. latifolio* L. (*P. oryzoide* Sw.) culmi nodis dense barbatis (in latifolio glabris) laminis lanceolato-linearibus (nec late lanceolatis) basi rotundatis haud amplexicaulibus manifestius albo-marginatis, spiculis acutiusculis, gluma I^ma^ spiculae $^2/_3$ vel $^3/_4$ (in latifolio medium) aequantibus, glumis III et IV sensim acutatis nec abrupte acuminatis.

Diese Art wurde von mir auf Grund der von Ridley bei Pulau Besar (Malacca) gesammelten Exemplare unterschieden, mit denen das auf Koh Chang gefundene ganz identisch ist. Später sendete mir Ridley auch Exemplare von Pekan, welche ich ihm als eine „forma minor“ des *P. Ridleyi* bestimmte; ich sehe jedoch jetzt, dass sie besser zu *P. latifolium* u. zw. zu der in Indien verbreiteten Form dieser Art, die vielleicht als Varietät abzutrennen sein wird, gehören. Vielleicht lagen dem Verfasser der Flora of Brit. India eben solche Exemplare aus Malacca vor, wesshalb er die Art mit *P. latifolium* L. identificierte. Letzterer Name, der vielfach theils für *P. divaricatum* L., theils für *P. Walteri* Poir. in Gebrauch stand, ist wohl mit Recht von Hooker für *P. oryzoides* Sw. (*P. zizanioides* H. B. K.) vorgezogen worden, denn Linné betont schon in der ersten Ausgabe der Sp. plant. die „flores majusculi“, welche dem *P. Walteri* Poir. (*P. latifolium* Asa Gray etc.) nicht zukommen. Auf *P. divaricatum* passt seine Diagnose nicht im mindesten, und die Anwesenheit eines Exemplares desselben im Herb. Linné unter *P. latifolium* berechtigt nicht zur Übertragung des Namens, denn auch *P. oryzoides* Sw. befindet sich als *P. latifolium* in Linné's Herbar. und nur auf dieses passt seine Beschreibung vollständig.

Jungle near Klong Munsé.

19. **P. ovalifolium** Poir. Encycl. Suppl. IV, 279.

Ausser typischen Exemplaren wurde auch eine Form mit steiferen, beim Trocknen längs des Mittelnerves etwas zusammengefalteten Blättern gesammelt.

Abundant in the jungle near Klong Munsé.

Area: Vorder-Indien, Malacca, Malayischer Archipel, China, trop. Afrika.

20. **P. sarmentosum** Roxb. Fl. Ind. I, 308 ex Hook. Fl. Brit. Ind. VII, 54.

P. concinnum Nees, *P. incomptum* Trin. Spec. Gram. Ic. t. 232.

On riverbank near Lem Dan.

Area: Assam, Khasia Berge, Burma, Malayische Halbinsel, Mal. Inseln, Tongkin, China.

21. **P. trigonum** Retz. Obs. III, 9.

Klong Majum, alt. 600 feet; in a dry riverbed.

Area: Vorder-Indien, Malacca, Java.

22. **P. pilipes** Nees & Arn. in Miqu. Pl. Jungh. III, 376.

Klong Son, jungle.

Area: Vorder- und Hinter-Indien, Malayischer Archipel, Australien, Madagascar.

23. **P. Schmidtii** Hack. n. sp. e sect. VIII. Gibbosarum Hook. f. Fl. of Brit. Ind. VII, 56.

Culmus repens, deinde adscendens, gracilis, glaberrimus. Foliorum vaginae arctae, internodia plerumque superantes, superne pilis basi tuberculatis plus minusve hirsutae, margine ciliatae; ligula membranacea, brevissima; laminae lanceolatae, acuminatae, basi rotundatae, utrinque (sed supra parcius) pilis appressis basi tuberculatis hirtulae. Panicula oblonga, laxa, rhachi ramisque glaberrimis, his patulis capillaribus semel v. bis divisis, spicularum pedicellis (etiam subterminalibus) quam spicula 2—3-plo longioribus. Spiculae parvae (1,5 mm. longae) oblique trigonae a latere compressae, gibbosae, obtusae, livide brunneae: gluma I spiculae medium aequans, ovata, obtusa, 3-nervis, laevis; II spiculae $^2/_3$ aequans, obovata, obtusa, 3-nervis, verrucis paucis glabris conspersa; III spiculam aequans, ovalis, obtusa, 5-nervis, verrucis crebris elevatis breviter piliferis obsita, vacua; IV^a spiculam aequans, trigona, valde gibbosa, laevis, albida.

Affine *P. patenti* L. (*P. radicanti* Retz., *P. obliquo* Roth), quod differt laminis basi subangustatis, spiculis glabris. Gluma III verrucosa nostram speciem etiam a *P. pilipede* Nees distinguit, ceterum spiculis breviter pedicellatis diverso.

Plains near Klong Munsé.

Ichnanthus Beauv.

24. **I. pallens** Munro in Benth. Fl. Hongk. 414.

Panicum pallens Sw. Prodr. 23.

Klong Majum, alt. 600 feet, in riverbed.

Area: In allen tropischen Ländern.

Oplismenus Beauv.

25. **O. compositus** Beauv. Agrost. 54.

Panicum compositum L. Spec. Pl. 57.

Jungle near Klong Munsé.

Area: In den meisten Tropenländern (excl. Austral.).

Spinifex L.

26. **Sp. squarrosus** L. Mant. II, 300.

On sandy sea-shores. Klong Prao; Rayong.

Area: Vorder- und Hinter-Indien, Java, China.

Leptaspis Brown.

27. **L. urceolata** Brown in Benn. Pl. Jav. rar. 23, t. 6.

Pharus urceolatus Roxb. Fl. Ind. III, 611.

Klong Son, alt. 500 feet, in dense jungle.

Area: Penang, Johore, Ceylon, Sumatra, Java.

Oryza L.

28. **O. sativa** L. Spec. Pl. 333.

Cultivated in all inhabited places within the area explored.

Area: In Vorder-Indien und Pegu einheimisch, in allen Welttheilen cultiviert.

Coelachne Brown.

29. **C. pulchella** Brown Prodr. 187.

Klong Son, in river-bed.

Area: Tropisches Asien, Australien und Madagascar.

Var. **simpliciuscula** Hook. f. Fl. of Brit. Ind. VII, 271.

C. simpliciuscula Munro ex Benth. in Journ. Linn. Soc. XIX, 93.

Klong Prao, in river-bed.

Area: Nilgherries, Ceylon, Khasia Berge, Java, Tonkin, China, Madagascar.

Cynodon Pers.

30. **C. dactylon** Pers. Syn. I, 85.

In dry places near Lem Dan.

Area: In allen wärmeren Ländern.

Eleusine Gaertn.

31. **E. indica** Gaertn.

In sandy places near Lem Dan.

Area: Tropenländer der alten Welt, sonst auch eingeschleppt.

Arundo L.

32. **A. madagascariensis** Kunth, Revis. Gram. I, 273, t. 48.

Neyraudia madagasc. Hook. f. Fl. Brit. Ind. VII, 305.

Abundant in plains all over the island. Specimens up to 12 feet high.

Area: Tropisches Afrika, Madagascar, tropischer Himalaya, Khasia Berge, Assam, Penang, Burma, Malayische Inseln.

Eragrostis Beauv.

33. **E. unioloides** Nees ex Steud. Synops. I, 264.

Poa unioloides Retz., Obs. V, 19; *Eragrostis amabilis* Wight & Arn.

Abundant in moist low places near Klong Munsé.

Area: Im tropischen Asien verbreitet.

Lophatherum Brongn.

34. **L. gracile** Brongn. in Duperr. Voy. 50, t. 8.

Riverbank in the jungle near Klong Munsé.

Area: Vom tropischen Himalaya, den Khasia Bergen, Burma, Ceylon, die Malayische Halbinsel, China, Japan bis Neu Guinea.

Centotheca Desv.

35. **C. lappacea** Desv. in Nouv. Bull. Soc. Philom. II, 189.

Cenchrus lappaceus L. Spec. pl. ed. 2, 1448.

Common in the jungle throughout the island, especially in wet places.

Area: Vorder- und Hinter-Indien, Malayischer Archipel, China, Polynesien, tropisches Afrika.

Lepturus Brown.

36. **L. repens** Brown, Prodr. 207.

On sandy or rocky sea-shores; Klong Prao, Koh Lom.

Area: Ceylon, Malayisc e und pacifische Inseln, Australien.

Appendix: **Bambuseae.**

Es sind 2 Arten von Bambuseen in der Sammlung vorhanden; davon gehört die eine zur Gattung *Bambusa*, doch kann die Species nicht sicher bestimmt werden, da bloss Blüten und keine Blätter vorhanden sind; die andere ist auch inbezug auf die Gattung zweifelhaft geblieben, da ausser Blättern nur sehr unentwickelte Ährchen, an denen noch gar keine Blütentheile entwickelt sind, vorlagen.

Several species of Bamboo occur in Koh Chang often forming dense thickets.

Pteridophyta[1])

by **H. Christ** — Basel.

Ferns from Siam are rather scarce in the collections, and this Empire, between well known Burma and pretty well explored Tonkin, forms a blanc, which the Danish Expedition has diminished in a very satisfactory manner.

On account of the small size of Koh Chang and its short distance from the mainland, I think we are right in supposing that the present fern-collection will be only a scanty extract of the flora of the Continent. Notwithstanding, it characterizes very well this region as a transitory one between the Malayan Peninsula and the most Eastern shores of Asia, in other terms: between the Monsoon flora and the Chinese flora.

On the whole the ferns of Koh Chang belong decidedly to the former, but some species will clearly show the influence of the latter: *Alsophila podophylla,* known from Hongkong, S. W. China and Tonkin (Père Bon), *Brainea insignis*, from S. W. China (Henry), Tonkin (Billet) to Assam are of this number.

As to rarities or endemic forms in an island of so small a size we might not expect many surprises. Nevertheless, the fern-flora of Koh Chang is by no means a poor one. Among the usual Malayan species we meet with *Adiantum Bonii* Chr., a native plant of Tonkin (Père Bon) and closely allied to *A. Levingei* Baker, Summary 27, of Sikkim, to *A. Celebicum* Chr., Ann. Buitenzorg XV, 1, of Celebes and to *A. Hosei* Bak. Journ. bot., 1888, 324, of Borneo; a subspecies of *Gleichenia linearis* Burm.: *G. subpectinata* n. sp., a new *Trichomanes Siamense,* of the group of *T. rigidum* Sw., the curious var. *undulata* (Wall.) of *Gymnopteris costata* (Wall.) rather rare in India, and var. *Schmidtii* of the common *Acrostichum aureum* L. with very cuspidated leaves.

[1]) *Selaginella* determined by Professor G. Hieronymus, Berlin.

Hymenophyllaceae.

Trichomanes.

1. **T. Javanicum** Blume Enum. Pl. Jav. Fil. 224.

Plentiful on riverbanks in the jungle near Klong Munsé.

Area: A rather common terrestrial species throughout Malaya from Assam to Polynesia; also in Madagascar.

2. **T. rigidum** Sw.

Our plant is very typical, with very thin segments.

Riverbanks in the jungle by Klong Munsé and Klong Majum (700 ft.).

Area: A common terrestrial fern of tropical forests in Asia, Africa and America, also in Japan, N. Zealand and the Cape Colony.

3. **T. Siamense** Christ n. sp.

Differt a *T. rigido* fronde non deltoidea, sed lanceolato-ovata, pinnis pinnulisque abbreviatis, pinnulis remotis, irregulariter et breviter lobatis 2½ mill. latis, lobis vix 1 mill. longis obscure denticulatis, dentibus brevissimis subaristatis. Lamina crispata, textura coriacea, colore nigro. Urceolis paucis, liberis nec immersis, minimis, anguste cylindricis, margine angustissimo patente, receptaculo exserto.

Stipitibus fasciculatis rigidis flexuosis, 6 cent. longis, lamina vix 1 dec. longa, 4 cent. lata.

A subspecies of *T. rigidum*, but habit very different, like *Hymenophyllum australe* Spreng. (*H. Javanicum* Bl.).

Riverbanks in the jungle near Klong Munsé (200 ft.).

4. **T. pyxidiferum** L.

Besides typical specimens a very small form is met with.

Klong Sarlakpet, on damp rocks in the jungle near a waterfall (400 feet), Klong Majum, epiphytic (500 ft.).

Area: A common epiphytic fern among mosses in all tropical countries.

5. **T. Filicula** Bory. Van Den Bosch Tab. 26, 27, 28.

Jungle near Klong Son epiphytic on low trees, Klong Sarlakpet on rocks.

Area: Widely spread throughout the tropics of both hemispheres and further in S. Africa and Japan. Epiphytic among mosses.

6. **T. nanum** Van Den Bosch 2 Suppl. 122 sub *Crepidomanes*.

T. Kurzii Beddome Handb. 40, Fig. 2.

Jungle. Klong Munsé, on stones in a riverbed.

Area: This very minute species is indicated from S. W. India and the Andamans, Assam and Tonkin (Père Bon), but surely passed over in many other regions.

7. **T. muscoides** Sw.

Very typical, with flabellate cuneiform fronds and 3 to 5 sori.

Nipple (500 ft.) and Klong Son, epiphytic on low trees.

Area: Widely spread in all tropical regions. A small epiphyte on branches.

I am rather puzzled by the wanting of all *Hymenophylla* in the collection.

Polypodiaceae.

Chrysodium Fée.

8. **C. aureum** (L.) Fée.

This species is represented from Koh Chang by a characteristic variety:

Var. **Schmidtii** Christ n. var.

Well distinguished by the barren pinnae which are cuspidated i. e. tapering into a long linear very acute apex (long: 3 cent., large: hardly 2 mill.) of the shape called „Träufelspitze" by Stahl.

I never saw this apparatus (a protection against overflowing rainfall) in this species so developed as here. The fertile pinnae have only the short mucro very common in this plant.

Abundant throughout the island, most commonly in brackish water in the interior of mangrove-swamps.

Area: The species is nearly universal in brackish waters and estuaries of the tropics and farther to Florida.

Vittaria Sw.

9. **V. elongata** Sw.

On trees and rocks near the Sea, Lem Dan and more southward off Koh Sarlak.

Area: Epiphytic on trees from S. W. and N. W. India to S. China, not yet found in America.

Anthrophyum Kaulfs.

10. **A. reticulatum** Klfs.

Klong Sarlakpet, on rocks in the jungle near a waterfall.

Area: Epiphytic on trees throughout the monsoon-region from N. India and Ceylon to Polynesia and N. Australia.

Taenitis Smith.

11. **T. blechnoides** Sw.

Terrestrial in the jungle near Klong Munsé.

Area: A Monsoon-plant from Ceylon and N. India to Polynesia. Earth-fern.

Drymoglossum Presl.

12. **D. piloselloides** Presl. Tert. Pterid. 227, Tab. 10.

Abundant throughout the island, on trees, especially near the Sea.

Area: An epiphytic creeper on trees, from N. and S. W. India to the Sunda-Islands (Java, l. Raciborski).

Polypodium L.

13. **P. nigrescens** Blume Enum. fil. Jav. 127.

Klong Sarlakpet (500 ft.), on rocks in the jungle.

Area: A Monsoon-species from N. India and Ceylon to Eastern Polynesia.

14. **P. sinuosum** Wall. Catal. 2231.

Mouth of Klong Majum, Koh Saket, on low trees.

Area: One of the most interesting species, whose ample rhizome is inhabited by ants like Myrmecodium, creeping on trees, from Perak and the Malacca-States to Java and Western Polynesia, not common. It is not really allied to *P. longifolium* Mett. nor to the other simple Polypodia of the Lineare-group, but to the pinnatifid species with „myrmecophile" rhizomes and often with large peltate scales: *P. Sarcopus* De Vriese and Teysm. Hook. Synops. Ed. II, 514. *P. lomarioides* Kunze, *Lecanopteris carnosa* Blume, *L. pumila* Blume fil. Jav. Tab. 94 B. *P. sinuosum* also, occasionally, has lobed and even pinnatifid leaves.

15. **P. punctatum** (L. Spec. Plant. 1524 sub *Acrosticho*).

P. ireoides Lamarck Hook. Synops. Ed. II, 360.

Klong Munsé, Klong Sarlakpet, Koh Kong; on rocks in the jungle.

Area: Tropical forests of E. and W. Africa and India to N. Australia and Polynesia, frequent, on trees.

Niphobolus Kaulfs.

16. **N. acrostichoides** (Sw. Syn. fil. 29, 225 sub *Polypodio*).

On trees in the jungle near Klong Munsé, Koh Saket.

Area: Malayan shores from Ceylon and Malacca to N. Australia and the Philippines. Epiphytic.

17. **N. adnascens** (Sw. cit. 25, 228 sub *Polypodio*).

Abundant throughout the island, usually on low trees, more rarely on rocks.

Area: Very common throughout the Malayan region from N. India and Ceylon to W. Polynesia; also in Réunion and W. Africa. Epiphytic.

Platycerium Desv.

18. **P. biforme** Bl.

Throughout the island in the jungle on tall trees.[1])

Area: Malay Peninsula through the larger Sunda-Islds. to the Philippines.

Drynaria Bory.

19. **D. Linnaei** Bory Ann. Sc. Nat. 1, 5, 464, Tab. 12.

Abundant throughout the island, epiphytic.

Area: Epiphytic on large trees. Malayan region from Ceylon to N. Australia and E. Polynesia. Scattered and rather difficult to distinguish from the more common *D. quercifolia* (L).

Adiantum L.

20. **A. Bonii** Christ in Journ. de Botanique 16. Apr. 1894.

Nipple, on rocks in the jungle, ascending to 2000 ft.

Area: A species of rather weak characters, allied to some other species of E. Asia: gathered in Tonkin by Père Bon.

Onychium Kaulfs.

21. **O. auratum** Klfs.

Terrestrial in open jungle near Lem Dan.

Area: An earth-fern of open grounds from N. India, S. China and the Malayan region to the Philippines.

Pteris L.

22. **P. quadriaurita** Retz.

Our plant is the lusus *bicolor*, with a white area along the rachises.

Klong Sarlakpet, dry riverbed in the jungle.

Area: Tropical regions of the World, common, earth-fern of open grounds.

var. **biaurita** (L. as a species).

Plains at Lem Dan, in dry, clayey soil.

Area. With the precedent.

var. **Grevilleana** (Wall. Catal. 2680 as a species).

Differing from the type by a short deltoid and 5-partite barren frond and an elongated almost normal fertile one.

Terrestrial in open ground near Lem Dan.

Area: Scattered through the Monsoon-region.

23. **P. longifolia** L.

Lem Dan, terrestrial in the edge of the jungle.

Area: Very frequent in all tropical, subtropical and warmer regions of the world to the S. shores of the Mediterranean. Earth-fern.

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[1]) Specimens named by Johs. Schmidt.

24. **P. asperula** J. Smith Enum. fil. Philipp. n. 115 in J. W. Hook. Journ. bot. 1841.

Klong Son, terrestrial in damp jungle.

Area: Scattered and rather rare from Assam to the Philippines. Earth-fern.

25. **P. tripartita** Sw.

P. marginata Bory.

Koh Kahdat, terrestrial in the jungle.

Area: Frequent from S. India and S. China to Polynesia and N. Australia. Also in E. and W. trop. Africa. Earth-fern in forests.

Blechnum L.

26. **B. orientale** L.

Klong Munsé. along riverbanks in the edge of the jungle.

Area: Very common from India and S. China throughout the Malayan region to N. Australia and Polynesia. A large earth-fern of open grounds.

Brainea J. Sm.

27. **B. insignis** Hook. Synops. Ed. II, 390.

Nipple, about 2000 ft., in open jungle. A small (1—2^{m}), handsome fern-tree.

Area: A small fern-tree from Assam (Chittagong) to Tonkin (Bon, Billet), S. China: Hongkong, Yunnan (Henry). Our Siamlocality is a good connecting link between the older stations of this curious fern, whose relation to *Blechnum* is well determined.

Stenochlaena J. Smith.

28. **S. palustris** (L. sub *Polypodio*).

Lem Dan, Koh Lom, climbing on trees in open jungle and also in the sea-shore on rocks or sandy ground.

Area: A frequent gigantic creeper on trees in the forests from N. and S. India, S. China throughout the Malayan region to N. Australia and Polynesia.

Lomariopsis Fée.

28. **L. sorbifolia** (L. Spec. plant. 1526 sub *Acrosticho*).

Climbing on trees in the jungle, Klong Munsé, Koh Chang Noi.

Area: A very frequent large creeper of nearly all tropical countries.

Asplenium L.

30. **A. laserpitiifolium** Lamarck Encycl. II, 310.

Koh Kahdat, epiphytic in open jungle.

Area: A earth-fern of the whole Malayan region from Assam to N. Australia and Polynesia.

31. **A. pellucidum** Lamarck Encyclop. II, 306. *A. hirtum* Kaulf. Enum. fil. 169.

Lem Dan, on rocks near the Sea.

Area: A Malayan plant from Malacca to S. China, the Philippines and W. Polynesia, and also in Madagascar and its Satellites.

32. **A. vulcanicum** Blume Enum. fil. Jav. 176.

A specimen with very short sori, otherwise typical.

Terrestrial; jungle near Klong Munsé.

Area: Sunda-Islands, earth-fern and epiphytic.

33. **A. Grevillei** Wall., Hook. Sp. III, 80.

Jungle near Klong Munsé on tall trees. *Asplenium Nidus*-like epiphytic ferns are very common throughout Koh Chang and adjacent islands.

Area: Epiphytic on trees. Scattered within the area of *A. Nidus* L. and perhaps a mere variety of it with narrow and decurrent leaves.

Diplazium Sw.

34. **D. Bantamense** Blume Enum. 191.

Jungle near Klong Munsé, terrestrial.

Area: Malayan region from N. India and S. China to W. Polynesia.

35. **D. silvaticum** Prsl. Reliq. Haenk. I, 12.

Klong Munsé, terrestrial.

Area: Common in India and the whole Malayan region; also in trop. America and trop. Africa.

Aspidium Sw.

36. **A. (Sagenia) variolosum** Wall. Cat. 378. Beddome Handbook Tab. 111.

North-end of Koh Chang, on rocks near the Sea; Klong Majum (alt. 700 ft.) on rocks in the jungle.

Area: Scattered through the Malayan region from Assam eastward.

37. **A. (Lastrea) sagenioides** Metten. Asp. 113.

Klong Munsé and Lem Dan, on rocks.

Area: From Perak and Malacca to the Sunda-Islands.

38. **A. (Lastrea) setigerum** Blume Enum. 138 sub *Cheilanthe*. *A. tenericaule* Hook. Sp. IV, Tab. 169. *A. uliginosum* Kunze Mett.

Jungle near Lem Dan, terrestrial.

Area: Rather frequent throughout the Malayan region to W. Polynesia, China and Japan.

39. **A. (Nephrodium) pennigerum** Beddome Suppl. 74 non Blume nec Hook. v. *malayense* Bedd. cit.

One of the present specimens is a form with very short pinnae.

Klong Munsé and Klong Sarlakpet, on rocks in the jungle.

Area: Malayan shores (no exact information about the distribution).

40. **A. (Nephrodium) parasiticum** (L. sub *Polypodio*). *A. molle* Sw. Syn. fil. 49.

Jungle near Klong Munsé, terrestrial.

Area: Very common throughout all tropical regions to Algeria and the Canary Islands. Earth-fern of moist ground.

41. **A. (Nephrodium) extensum** Blume Enum. Jav. fil. 156.

Jungle near Lem Dan, terrestrial.

Area: Malayan region from N. India and Ceylon to the Philippines. A arge earth-fern.

Meniscium Schreb.

42. **M. triphyllum** Sw. Syn. fil. 19. 206.

Klong Son, on riverbanks in the jungle.

Area: Malaya from N. and S. India to China and the Philippines.

Gymnopteris Bernh.

43. **G. costata** (Wall. Cat. 26 sub *Acrosticho*) Beddome Handb. 438. var. **undulata** (Wall. Cat. 26 sub *Notholaena*).

Klong Sarlakpet, riverbed in the jungle.

Area: The type grows in N. India, Nepal, Chittogong to Burma, the variety is only quoted from Burma. Earth-fern.

Polybotrya H. B. Kth.

44. **P. (Egenolfia** Schott.) **appendiculata** Willd. Spec. Plant. 114.

Jungle near Klong Munsé, terrestrial.

Area: Malayan region from India to S. China and the Philippines. Earth-fern.

var. **Helferiana** Kunze. Hook. synops. Ed. II, 415.

Small, the fertile frond with beadlike very short pinnae; the setaceous bristle between each crenature of the barren pinnae almost wanting.

North-end of Koh Kong.

Nephrolepis Schott.

45. **N. exaltata** (L. Spec. Plant. 1548 sub *Polypodio*).

Koh Kahdat, in damp jungle, terrestrial.

Area: Tropics of both hemispheres.

46. **N. acutifolia** (Desv. Mem. Soc. Linn. 2, 312 sub. *Lindsaya*). *Lindsaya lanuginosa* Wall.

North-end of Koh Chang in the jungle, terrestrial.

Area: Epiphytic upon trees of the Malayan region from the Peninsula to N. Australia, also in trop. Africa.

Lindsaya Dryand.

47. **L. ensifolia** Sw.

Jungle near Klong Munsé (700 ft.), and north-end of Koh Chang, on rocks.

Area: The whole Monsoon-region from India and S. China to N. Australia and W. Polynesia, and in trop. W. and E. Africa including Madagascar.

48. **L. orbiculata** (Lamarck sub *Adianto*) Hook. Spec. fil. 1, 211. *L. flabellulata* Dry. Hook. synops. Ed. II, 107.

Some of the present specimens are seedlings with very inciso-crenate pinnae.

Klong Munsé in the jungle, growing in chinks in the rocks.

Area: From N. India, S. China and Ceylon through Malaya to N. Australia.

49. **L. heterophylla** Dryand. Beddome fil. South Ind. Tab. 25.

Nipple, 2000 ft.

Area: Malaya from Ceylon, S. India and S. China to the Sunda-Islands.

50. **L. cultrata** Sw. Synops. fil. 119.

Terrestrial, in the jungle near Klong Munsé.

Area: N. and S. India to the Philippines and N. Australia; Madagascar and Réunion.

Stenoloma Fée.

51. **S. tenuifolia** Sw. sub *Davallia*.

Jungle near Klong Son, on rocky riverbanks.

Area: A very common terrestrial fern in trop. Asia to China, Japan and Polynesia. Also in Madagascar and its satellites.

Davallia Smith.

52. **D. elegans** Sw.

Jungle near Klong Munsé, on low trees.

Area: Common in the Eastern Monsoon-region to Polynesia and N. Australia, but not in the Western Indian Peninsula; also in trop. W. Africa and Madagascar. Epiphytic, chiefly on palms.

53. **D. solida** Sw.

Jungle near Klong Sarlakpet, epiphytic.

Area: Frequent throughout Malaya from the Peninsula to Polynesia. Epiphytic.

54. **D. repens** (L. suppl. sub *Adianto*). *D. pedata* Smith act. Taur. 5. 414.

Nipple (1200 ft.), epiphyte on low trees in the jungle; Klong Munsé on rocks in the jungle.

Area: N. India throughout Malaya to Japan, N. Australia and the Mascarene-Islands. A creeper on branches.

Microlepia Prsl.

55. **M. pinnata** (Cav. praelect. 689 sub *Davallia*)

Jungle near Klong Munsé, on rocks in riverbed.

Area: Malaya from the Peninsula to Polynesia.

Cyatheaceae.

Cibotium Link.

56. **C. Barometz** Link fil. Sp. 166.

Specimens with only two (seldom more) sori at the base of each segment.

Klong Majum and Klong Munsé, on riverbanks in the jungle.

Area: Fern-tree from N. E. India and S. China to the Philippines and Sunda-Islands. According to a photograph kindly sent me, this fern grows in Koh Chang up to a splendid size.

Alsophila R. Br.

57. **A. podophylla** Hook. II Cent. ferns Tab. 66.

Klong Munsé, plentiful on riverbanks in the jungle.

Area: S. China and Tonkin (l. Bon). Stem very short or none.

Gleicheniaceae.

Gleichenia Sm.

58. **G. linearis** (Burm. Fil. Ind. 235, Tab. 67 sub. *Polypodio*). *G. dichotoma* (Thunbg. Japan, Tab. 37 sub *Polypodio*).

Nipple (2000 ft.) in open jungle, Klong Sarlakpet in dry spots near the Sea.

Area: Very common throughout the tropics of the globe and in Japan, S. America and the Pacific. Earth-fern often forming large masses.

59. **G. subpectinata** Christ n. sp.

Magna, rhizomate late repente, stipite valido, 1 metr. et ultra longo digiti minoris crassitie, laevi, polito, brunneo-rufo, dichotomo, duobus ramis valde elongatis flexuosis, pinnis petiolatis geminatis, petiolis 8 cent. longis, ad insertionem aut haud procul ab insertione petioli duabus pinnulis minoribus adventiciis instructis, versus basin

et apicem attenuatis late lanceolatis 8—10 cent. longis 1½ cent. latis, lobis usque ad rachim incisis lineari-lanceolatis obtusiusculis saepe retusis recte patentibus glabris, margine integris, planis supra atroviridibus infra valde coeruleo-glaucis, textura tenuiter herbacea, soris numerosis luteis aut fuscis, sporangiis 10 ad 20.

A subspecies of the former, resembling *G. pectinata* Prsl. as to the pairs of small attenuate pinnae, and the zigzag-branched very strong stipes.

G. linearis has larger coriaceous pinnae with a dilated base of the pinnae, whose lowest lobi are increased and often deeply cut.

Klong Majum (alt. 500 ft.) and Klong Munsé, on riverbanks in the jungle.

60. **G. laevigata** Willd. *G. flagellaris* Spr.

Nipple (2000 ft.) in open jungle.

Area: A Malayan fern from Madagascar and its satellites to Polynesia.

Schizaea Smith.

61. **S. digitata** Sw. Syn. fil. 150, 380.

Open jungle near Klong Son (1200 ft.).

Area: Scattered from India to W. Polynesia. Earth-fern of grassy spots.

62. **S. dichotoma** Sw.

Klong Prao in sandy spots near the mouth.

Area: S. India, Malaya to Australia, New-Zealand, Polynesia and the Mascarenes.

Lygodium Sw.

63. **L. microphyllum** R. Br. Prodr. fl. Nov. Holl. 162.

Common at Lem Dan, in open grassy country.

Area: A large climber, frequent from N. India and S. China to N. Australia. Also in W. Africa.

64. **L. flexuosum** Sw. Syn. fil. 153.

Lem Ngob, Lem Dan, common in open grassy country.

Area: A very large climber of the same area.

65. **L. circinatum** Sw. Syn. fil. 153.

On rocks in the jungle near Klong Munsé.

Area: A gigantic climber of about the same region (not African).

Marattiaceae.

Angiopteris Hoffm.

66. **A. evecta** Hoffm.

Hills near Klung.

Area: A very large earth-fern of the whole Malayan region from E. Polynesia and M. Australia to N. India, S. China, Japan, Ceylon and Madagascar.

Parkeriaceae.

Ceratopteris Brongniart.

67. **C. thalictroides** (L. Spec. Plant. 1527 sub *Acrosticho*).

Common in pools and rice-fields throughout the area explored.

Area: Water fern, universal in tropical regions in ponds, tanks etc.

Lycopodiaceae.

Lycopodium L.

68. **L. cernuum** L.

Lem Dan, Klong Son, in open grassy country.

Area: Universal throughout the warmer regions of the globe to the Azores, Japan, the temperate Pacific islands, and S. Africa. Earth-fern.

69. **L. carinatum** Desv. Encycl. bot. suppl. III, 559.

258 g is a very elongated form with rather obscure carina.

Koh Kong and Koh Kahdat on low trees in the jungle.

Area: The Monsoon-region from S. India to Polynesia. Epiphytic.

Selaginellaceae

by G. Hieronymus — Berlin.

Selaginella.

70. **S. argentea** (Wall.) var. **rubescens** Hieron. non var.

Differt a forma typica caulibus foliisque rubescentibus.

Klong Majum, alt. 700 ft., on rocks in the jungle.

Area: Indochina.

71. **S. siamensis** Hieron. n. sp.

E subsectione *Microphyllarum* sectionis *Heterophyllarum*; caulibus longe et late repentibus, subteretibus, parum compressis, radiciferos teretes rubescentes ramosos usque ad 2 dm. longos gerentibus, remote foliosis; foliis parum heteromorphis; lateralibus e basi cordata utrinque auriculata (auriculis rotundatis) ovatis, longe cuspidatis (cuspide integro usque ad 1 mm. longo), inaequilateralibus; semifacie apicem caulis versus spectante latiore, margine ciliis numerosis usque ad 0,08 mm. longis ornata; semifacie altera basin caulis ver-

sus spectante angustiore, basi solum et in auricula ciliis similibus ornata; foliis lateralibus maximis caulis c. 3 mm. longis (cuspide incluso, auriculis vix $^1/_2$ mm. longis exclusis); foliis intermediis basi infera (externa) late auriculatis (auricula truncata pilis paucis brevibus dentiformibus margine ornata), basi supera (interna) brevius auriculatis (auricula rotundata), margine supero ubique ciliolis vix usque ad 0,06 mm. longis ornatis, apice longe cuspidatis (cuspide usque ad 0,75 mm. longo); foliis intermediis maximis c. $2^1/_4$ mm. longis (cuspide incluso, auricula externa exclusa); ramis primariis vix ultra 6 cm. longis parce pinnatim ramosis; ramis secundariis utrinque 2—3 repetito dichotome ramosis, ambitu ovato-rotundatis; ramulis ultimis (foliis lateralibus inclusis) c. 2 mm. latis; foliis ramorum ramulorumque omnium caulinis similibus, sed valde approximatis imbricatisque et multo minoribus; foliis intermediis margine externa saepe eciliatis. Spicae desiderantur.

Obgleich an den Exemplaren keine Ähren vorhanden sind, so dürfte doch die Stellung dieser neuen Art in der Gruppe der *Microphyllae* gesichert sein. Im Habitus ist dieselbe der *S. Yemensis* (Sw.) Spring non Baker (syn. *S. somaliensis* Baker) ähnlich, sowie auch der *S. mongholica* Rupr., sie unterscheidet sich von denselben, durch die etwas plattgedrückten Hauptstengel, die langen oft roth gefärbten Wurzelträger, die nicht mit weissem sclerenchymatischem Rande, aber mit langer Spitze versehenen Blätter und noch andere Kennzeichen.

Nipple, alt. 2000 ft., on rocks in open jungle.

72. **S. plumea** Spring Monogr. II, p. 136.

Abundant in riverbanks in the jungle near Klong Munsé.

Area: Malay Peninsula.

73. **S. caulescens** (Wall.) Spring Monogr. II, p. 158 f. **minor.**

Klong Sarlakpet (alt. 700 ft.), Klong Son (alt. 1000 ft.), on rocks in the jungle.

Area: Himalaya, Indochina, Malesia.

Bryales

by **V. F. Brotherus** — Helsingfors.

Dicranaceae.

Leucoloma Brid.

1. **L. siamense** Broth. n. sp.

Dioicum; gracile, caespitosum, caespitibus densiusculis, late extensis, laete viridibus, aetate fuscescenti-viridibus, nitidis; caulis 1—2 cm. altus, adscendens, tenuis, niger, inferne fusco-radiculosus, densiuscule foliosus, superne dichotomus vel simplex; folia falcata, sicca vix mutata, canaliculato-concava, e basi anguste lanceolata sensum longe et tenuiter subulata, usque ad 5 mm. longa, basi c. 0,4 mm. lata, marginibus erectis, summo apice minute serrulatis, limbata, limbo hyalino, angusto, superne sensim tenuiore, usque ad apicem continuo, nervo angusto, cum apice evanido, dorso laevi, cellulis minutis, quadratis, chlorophyllosis, laevibus, basin versus sensim longioribus, basilaribus anguste linearibus, alaribus magnis, numerosis, fusco-aureis. Caetera ignota.

Species distinctissima, pulchra, quoad foliorum areolatione cum *L. Renauldii* Broth. comparanda, sed statura paulum robustiore, caespitibus nitidis foliisque falcatis faciliter dignoscenda.

Klong Munsé, common in the jungle on rocks exposed to the sun.

Garckea C. Müll.

2. **G. phascoides** (Hook.) C. Müll. in Bot. Ztg. 1845, p. 865.

Jungle near Lem Dan, on riverbank.

Area: From British India to Tonkin, Sumatra and Java.

Leucobryaceae.

Leucobryum Hamp.

3. **L. Bowringii** Mitt. Musc. Ind. or. p. 26.

Klong Munsé, Klong Son, common on rocks and also on trees, ascending to 700 ft.

Area: Hongkong, Khasia, Ceylon and Sumatra.

4. **L. sanctum** (Brid.) Hamp.

Klong Munsé, on rocks in the jungle.

Area: Nepal, Singapore, Sumatra, Java, Banca, Borneo and Celebes.

5. **L. brachyphyllum** Hamp. in Linnaea XIII, p. 42.

Klong Munsé, on rocks in the jungle, alt. 700 ft.

Area: Queensland and New South Wales.

Ochrobryum Mitt.

6. **O. Kurzianum** Hamp., Besch. in Journ. de Bot. 1897.

Jungle near Klong Munsé, on rocks, forming small orbicular, circumscribed tussocks.

Area: Burma and Pegu.

Octoblepharum Hedw.

7. **O. albidum** (L.) Hedw. Musc. Frond. III, p. 15.

Koh Sarlak, on rocks; Lem Dan on cultivated Artocarpus; Klong Sarlakpet, on trees in the jungle.

Area: Widely distributed in all tropical parts of the World.

Arthrocormus Doz. et Molk.

8. **A. Schimperi** Doz. et Molk. M. frond. inedit. Archip. ind. p. 76.

Jungle near Klong Munsé, on trees.

Area: Java, Borneo, Amboina and Philippines.

Leucophanes Brid.

9. **L. glaucescens** C. Müll.

Jungle near Lem Dan, on dry stones.

Area: Philippines.

Fissidentaceae.

Fissidens Hedw.

10. **F. silvaticus** Griff. Not. p. 429. — *F. javanicus* Doz. et Molk. Bryol. jav. t. 3.

Jungle near Klong Son.

Area: Himalaya, Khasia, Madras, Java.

11. **F. Mittenii** Par. Ind. bryol. p. 477. *F. crassinervis* Thw. et Mitt. in Journ. Linn. Soc. 1872, p. 323 nec Lac. Sp. nov. M. Archip. Ind. p. 3.

Jungle near Klong Munsé, on dry rocks.

Area: Ceylon.

12. **F. Zippelianus** Bryol. jav. I, p. 2.

Jungle near Lem Dan, on rocks.

Area: Hongkong, Java and Sumatra.

13. **F. (Eufissidens) siamensis** Broth. n. sp.

Tenellus, caespitosus, caespitibus densiusculis, late extensis, viridissimis, haud nitidis; caulis vix ultra 5 mm. altus, cum foliis c. 1 mm. latus, basi fusco-radiculosus, dense foliosus, simplex; folia sicca falcatula, humida stricta, erecto-patentia, infima minuta, superiora oblongo-ligulata, obtusiuscula, mucronata, integerrima, lamina vera ultra medium folii producta, limbata, limbo saepe superne dissoluto, lamina dorsali ad basin nervi enata ibidemque rotundata, elimbata, nervo pellucido, lutescente, breviter excedente, cellulis minutis, c. 0,007 mm., rotundatis, chlorophyllosis, papillosis, obscuris. Caetera ignota.

Species pulchra, cum *F. Holliano* Doz. et Molk. comparanda, sed minutie, foliis densioribus, brevioribus, obtusiusculis, mucronatis optime diversa.

Jungle near Klong Munsé, on rocks.

14. **F. (Eufissidens) papillulosus** Broth. n. sp.

Dioicus; pusillus, gregarius, pallide viridis, haud nitidus; caulis 2—3 mm. altus, basi fusco-radiculosus, laxiuscule foliosus, simplex; folia 5-juga, sicca homomalla, humida erecto-patentia, infima minuta, superiora lanceolata, acuta, usque ad 1,2 mm. longa et 0,3 mm. lata, superne minutissimi serrulata, lamina vera ad medium folii producta, limbata, limbo angusto, lamina dorsali ad basin nervi enata, nervo crassiusculo, lutescente, cum apice evanido vel brevissime excedente, cellulis angulato-rotundatis, c. 0,007 mm., minute papillosis, pellucidis; seta 2—3 mm. alta, tenuis, rubra, laevissima; theca suberecta vel inclinatula, minuta, ovalis. Caetera ignota.

Species *F. axillifloro* Thw. et Mitt. affinis, sed inflorescentia foliisque angustius limbatis, cellulis minutius papillosis ideoque pellucidis dignoscenda.

On limestone-rocks in open country at Lem Dan.

Syrrhopodontaceae.

Syrrhopodon Schwaegr.

15. **S. subconfertus** Broth. n. sp.

Dioicus; gracilis, caespitosus, caespitibus densis, lutescentibus, inferne albicantibus; caulis vix ultra 1 cm. altus, erectus, inferne parce radiculosus, dense foliosus, simplex vel plus minusve ramosus, ramis erectis, fastigiatis; folia erecto-patentia, e basi elongate elliptico-oblonga breviter linearia, acuta, 1,9—2,1 mm. longa, basi 0,19—0,3 mm. lata, marginibus ubique erectis, in parte vaginante integris, in parte laminali minute serrulatis, limbata, limbo hyalino vel lutescente, superne tenuiore, nervo breviter excedente, in parte laminali dorso dense aculeato, cellulis basilaribus laxis, hyalinis, ultra vaginam adscendentibus, laminalibus parvis, rotundato-quadratis, chlorophyllosis, papillosis. Caetera ignota.

Species *S. conferto* Lac. simillima, sed foliis nervo dorso dense aculeato optime diversa.

Jungle near Klong Munsé, on trees.

16. **S. spiculosus** Hook. et Grev. in Brewst. Edinb. Journ. of Sc. III, p. 226.

Jungle near Lem Dan, on trees.

Area: Singapore, Sumatra, Banca, Labuan and Borneo.

Calymperes Sw.

A. Cancellinae rectangulares. — **Aa.** Teniolae ultra vaginam productae. — **Aa α.** Folia acuta: *C. acuminatum.* — **Aa β.** Folia obtusa — **Aa β I.** Folia lamellata: *C. robustiusculum.* — **Aa β II.** Folia elamellata: *C. brachycaulon.* — **Ab.** Teniolae nullae. — **Ab α.** Folia obtusa: *C. Schmidtii.* — **Ab β.** Folia late rotundato-acuminata: *C. subtenerum.* — **B.** Cancellinae obovatae: *C. gracilescens.* — **C.** Cancellinae scalariformes: *C. subintegrum.*

17. **C. (Hyophilina) robustiusculum** Broth. n. sp.

Dioicum; robustiusculum, caespitosum, caespitibus densis, fuscescenti-viridibus; caulis 1—2 cm. altus, erectus, tomentosus, dense foliosus, simplex vel parce ramosus; folia sicca adpressa, apice incurva, humida erecto-patentia, stricta, canaliculato-concava, e basi brevi, superne paulum dilatata sensim lineari-ligulata, obtusa, plerumque apiculo obtusiusculo terminata, rarius in processum styloideum protracta, c. 3 mm. longa, in parte dilatata basis c. 0,70 mm. lata, marginibus erectis, in parte basilari serrulatis, in parte laminali lamellatis, lamellis minute et obtuse serrulatis, nervo crasso, infra summum apicem evanido, dorso scabro, cellulis subrotundis, 0,007—0,010 mm., pellucidis, papillosis, cancellinae rectangularis, vaginam subaequantis breviter rectangularibus, ad costam maximis, teniolae intra-marginalis, infra apicem evanidae lutescentibus, angustissimis, in parte superiore vaginae c. 4-seriatis, in parte laminali c. 2-seriatis. Caetera ignota.

Species e robustioribus, *C. fasciculato* Doz. et Molk. admodum similis, sed foliorum forma et structura longe diversa.

Lem Dan, on the swelled base of Cocoa-palms; Koh Sarlak, on rocks.

18. **C. (Hyophilina) acuminatum** Broth. n. sp.

Dioicum; robustiusculum, laxe caespitosum, caespitibus lutescenti-viridibus; caulis 1 cm. vel paulum ultra altus, erectus, parce radiculosus, dense foliosus, simplex vel parce ramosus; folia sicca adpressa, apice incurva, humida erecto-patentia, stricta, canaliculato-concava, e basi albescente, longiuscula, superne paulum dilatata sensim lanceolato-acuminata, acuta, c. 5 mm. longa, in parte dilatata basis 0,95—1,1 mm. lata, marginibus erectis, in parte basilari superne minute serrulatis, in parte superiore laminae inaequaliter serrulatis, nervo crasso, infra summum apicem evanido, dorso scabro, cellulis

subrotundis, 0,007—0,010 mm., subpellucidis, papillosis, cancellinae rectangularis, vaginam subaequantis breviter rectangularibus, ad nervum maximis, teniolae intramarginalis, infra apicem evanidae lutescentibus, angustissimis, 2—3 seriatis. Caetera ignota.

Species praecedenti similis, sed foliorum forma et structura longe diversa.

Jungle near Lem Dan, on stones.

19. **C. (Hyophilina) subintegrum** Broth. n. sp.

Dioicum; gracile, caespitosum, caespitibus densis, laete viridibus; caulis 1 cm. altus, erectus, basi fusco-radiculosus, densiuscule foliosus, superne furcatus; folia sicca suberecta, apice incurva, humida patentia, stricta, canaliculato-concava, e basi brevi, superne haud dilatata oblongo-ligulata, obtusa, rarius in processum styloideum, elongatum protracta, c. 3 mm. longa, 0,47—0,57 mm. lata, marginibus erectis, in parte superiore basilari minute serrulatis, in parte laminali subintegris, nervo crasso, infra summum apicem evanido, dorso sublaevi, cellulis rotundato-angulatis, c. 0,010 mm., chlorophyllosis, alte papillosis, cancellinae scalariformis, vaginam superantis breviter rectangularibus, ad costam majoribus, teniolae marginalis, in parte inferiore laminae evanidae c. 4-seriatis, in parte laminali 2-seriatis. Caetera ignota.

Species *C. stenogastro* Besch. habitu similis, sed foliis subintegris jam dignoscenda.

Lem Dan, on rocks and trees near the Sea.

20. **C. (Hyophilina) Schmidtii** Broth. n. sp.

Dioicum; gracile, caespitosum, caespitibus densis, fuscescenti-viridibus; caulis usque ad 2 cm. altus, erectus, basi fusco-radiculosus, laxiuscule foliosus, simplex vel furcatus; folia sicca suberecta, apice incurvo, humida erecto-patentia, canaliculato-concava, e basi brevi, superne haud dilatata oblongo-ligulata, obtusa, rarius in processum styloideum, elongatum protracta, c. 3 mm. longa et c. 0,47 mm. lata, marginibus erectis, ubique integerrimis, nervo crasso, infra summum apicem evanido, dorso plus minusve scabro, cellulis subrotundis, c. 0,010 mm., pellucidis, minute papillosis, cancellinae rectangularis, vaginam aequantis breviter rectangularibus, ad costam majoribus, teniola nulla, vaginalibus extra cancellinam minutis, subquadratis, c. 10-seriatis, marginalibus tenerrimis, hyalinis. Caetera ignota.

Species praecedenti habitu simillima, sed foliorum structura longe diversa.

Jungle near Klong Majum, on trees.

21. **C. (Hyophilina) subtenerum** Broth. n. sp.

Dioicum; pusillum, gregarie crescens, viridissimum; caulis brevissimus, vix ultra 2 mm. altus, basi fusco-radiculosus, dense foliosus, simplex; folia sicca horride incurva, humida patentia, e basi

brevissima, angustiore late spathulata, late rotundato-acuminata, saepe in processum brevem subito contracta, vix ultra 2 mm. longa, superne usque ad 0,76 mm. lata, marginibus erectis, integerrimis, nervo crasso, infra summum apicem evanido, dorso nitido, cellulis subquadratis. c. 0,010 mm., valde chlorophyllosis, superioribus minute papillosis, usque ad insertionem folii descendentibus ibidemque c. 7-seriatis, cancellinae rectangularis, vaginam subaequantis subquadratis, ad nervum majoribus, teniolis nullis. Caetera ignota.

Species *C. tenero* C. Müll., mihi e descriptione tantum cognita, sine dubio proxima, sed foliis cellulis superioribus papillosis dignoscenda.

Lem Ngob, mangrove, on Rhizophora conjugata.

22. **C. (Hyophilina) brachycaulon** Broth. n. sp.

Dioicum; robustiusculum, caespitosum, caespitibus humilibus, parvis, nigrescentibus; caulis vix ultra 5 mm. altus, adscendens, basi dense fusco-radiculosus, dense foliosus, plerumque in ramos 2—3 divisus; folia sicca adpressa, apice incurva, humida patentia, canaliculato-concava, e basi brevi, superne paulum dilatata sensim lineari-ligulata, obtusa, rarius in processum styloideum protracta, c. 3 mm. longa, in parte dilatata basis c. 0,57 mm., in parte laminali c. 0,38 mm. lata, marginibus erectis, in parte basilari serrulatis, in parte laminali integerrimis, nervo crasso, infra summum apicem evanido, dorso scaberulo, cellulis subrotundis, c. 0,010 mm., pellucidis, papillosis, cancellinae rectangularis, vaginam subaequantis internsi laxis, breviter rectangularibus, c. 5-seriatis, externis subito multo angustioribus, rectangularibus, c. 6-seriatis, teniolae intramarginalis, infra apicem evanidae lutescentibus, angustissimis, 2—3-seriatis, extra teniolam in parte vaginali 3-seriatis, rhomboideis, hyalinis. Caetera ignota.

Species caespitibus parvis, humilibus, nigrescentibus oculo nudo jam diagnoscenda.

Klong Munsé, on rocks in the jungle, alt. 700 ft.; Koh Kahdat, on trees.

23. **C. (Hyophilina) gracilescens** Broth. n. sp.

Dioicum; gracile, caespitosum, caespitibus laxiusculis, fuscescentibus; caulis ad 2 cm. usque altus, adscendens, infima basi fusco-radiculosus, laxiuscule foliosus, simplex; folia sicca laxe adpressa, apice incurva, humida patentia, stricta, canaliculato-concava, e basi brevi, superne dilatata sensim lineari-ligulata, obtusa, rarius in processum styloideum protracta, c. 3 mm. longa, in parte dilatata basis 0,57—0,7 mm. lata, marginibus erectis, in parte basilari superne serrulatis, in parte laminali integerrimis, nervo crasso, infra summum apicem evanido, dorso scaberulo, cellulis subrotundis, c. 0,075 mm., pellucidis, papillosis, cancellinae obovatae, vaginam subaequantis internis laxis, breviter rectangularibus, externis subito multo angustioribus, rectangularibus, c. 6-seriatis, teniolae intramarginalis, in parte inferiore laminae evanidae lutescentibus, angustissimis, inferne 4—5-seriatis, extra teniolam in parte vaginali 4-seriatis, rhomboideis,

hyalinis; seta c. 3 mm. alta, erecta, tenuis, fuscescens; calyptra carinis superne vix asperula, apice fusca.

Species ex affinitate *C. Hampei* Doz. et Molk., sed colore, foliis patentioribus, integerrimis, teniolis brevioribus jam dignoscenda.

24. **C. Hampei** Doz. et Molk. Bryol. jav. I, p. 48.

Lem Dan, on rocks near the Sea.

Area: Java.

25. **C. Motleyi** Mitt. in Bryol. jav. I, p. 48.

Koh Kahdat, on trees in the sea-shore,

Area: Ceylon, Labuan and Borneo.

Tortulaceae.

Hyophila Brid.

26. **H. cylindrica** (Hook.) Jaeg. Adumbr. I, p. 204.

Klong Sarlakpet; on wet rocks in the jungle, near a water fall, alt. 700 ft.

Area: British India.

Bryaceae.

Bryum L.

27. **B. doliolum** Duby in Moritzi Syst. Verz. p. 133.

Lem Dan, in dry clayey soil.

Area: Widely distributed from India to Malay- and Sunda Islands.

Mniaceae.

Rhizogonium Brid.

28. **Rh. spiniforme** (L.) Bruch in Flora 1846, p. 134.

Jungle near Klong Munsé, on rocks in a stream-bed.

Area: Widely distributed thorough the tropical and subtropical parts of the World.

Polytrichaceae.

Racelopus Doz. et Molk.

29. **R. pilifer** Doz. et Molk. Bryol. jav. I, p. 37.

Jungle near Lem Dan on riverbank.

Area: Tonkin, Malacca, Java, Borneo and New Guinea.

Neckeraceae.

Neckera Hedw.

30. **N. nigrescens** Broth. n. sp.

Dioica; robusta, nigrescens, nitidiuscula; caulis elongatus, repens, per totam longitudinem dense ramosus, ramis erectis, complanatis, 1—2 cm. altis, cum foliis c. 3 mm. latis, dense foliosis, simplicibus, obtusis; folia ramea horizontalia, transverse valde undulata, e basi pulchre auriculata, uno latere inflexa ovato-ligulata, obtusa, marginibus ubique minutissime denticulatis, nervo crassiusculo, longe infra apicem evanido, cellulis superioribus ellipticis, dein angustioribus, basilaribus linearibus, omnibus laevissimis. Caetera ignota.

Species pulcherrima, colore, ramificatione foliisque auriculatis, ovato-ligulatis faciliter dignoscenda.

Klong Majum, on rocks in the jungle.

Hookeriaceae.

Distichophyllum Doz. et Molk.

31. **D. Schmidtii** Broth. n. sp.

Dioicum; robustiusculum, caespitosum, caespitibus laxis, mollibus, pallide viridibus; caulis usque ad 2 cm. altus, complanatus, cum foliis c. 4 mm. latus, parce radiculosus, laxiuscule foliosus, dichotome ramosus; folia sicca vix mutata, faciliter emollita, lateralia patentia, e basi angusta spathulata, rotundata, apiculata, limbata, limbo integerrimo, e duabus seriebus cellularum composito, nervo tenui, longe ultra medium folii producto, cellulis superioribus rotundato-hexagonis, dein multo majoribus, ovali-hexagonis, basilaribus oblongo-hexagonis, media breviora; bracteae perichaetii minutae, ovatae, internae majores, magis cuspidatae; seta c. 6 mm. alta, e basi geniculata adscendens, ubique scaberrima, purpurea; theca subhorizontalis, minuta, obovata, fusca; peristomium duplex; exostomii dentes lanceolato-acuminati, inflexi, rufo-flavi, medio sulco longitudinali albo exarati, dense et alte lamellati; endostomium sordide albidum, papillosum; processus dentium longitudinem aequantes; operculum rostratum, rostro subulato, thecam longitudine adaequans. Calyptra ignota.

Species *D. acuminato* Bryol. jav. affinis, sed statura paulum minore, inflorescentia nec non foliis breviapiculatis dignoscenda.

On riverbank in the jungle near Lem Dan.

Stereodontaceae.

Taxithelium Spruc.

32. **T. Schmidtii** Broth. n. sp.

Dioicum; robustiusculum, caespitosum, caespitibus laxiusculis, sordide viridibus, nitidiusculis; caulis elongatus, repens, densiuscule pinnatim ramosus, ramis vix ultra 1 cm. longis, arcuatulis, complanatis, dense foliosis, simplicibus, obtusis; folia suberecta, valde con-

cava, oblonga, obtusiuscule acuta, marginibus erectis, ubique minute serrulatis, enervia, cellulis elongatis, angustis, unipapillosis, basilaribus infimis brevioribus, laevibus, alaribus ternis, majusculis, vesiculosis hyalinis. Caetera ignota.

Species *T. prostrato* (Doz. et Molk.) affinis, sed statura robustiore, ramificatione nec non foliis acutiusculis, cellulis alaribus multo majoribus prima fronte dignoscenda.

Klong Munsé, on wet rocks in the jungle near a waterfall.

33. **T. instratum** (Brid.). — *Trichosteleum* Jaeg. Adumbr. II, p. 478.

Jungle near Lem Dan, on rocks; Koh Kahdat, on trees.

Area: From Java to New Guinea.

34. **T. papillatum** (Harv.). — *Trichosteleum* Par. Ind. p. 1313.

Klong Munsé, on trees in the jungle.

Area: From Sumatra to New Guinea. Malacca.

35. **T. distichophyllum** (Hamp.). — *Trichosteleum* Jaeg. Adumbr. II, p. 482.

Klong Munsé, on trees in the jungle.

Area: Java, Celebes and Luzon.

36. **T. isocladum** (Bryol. jav.). — *Trichosteleum* Jaeg. Adumbr. II, p. 478.

Jungle near Klong Munsé, creeping on thin branches.

Area: Banca.

Isopterygium Mitt.

37. **I. albescens** (Schwaegr.) Jaeg. Adumbr. II, p. 499.

Jungle near Lem Dan and Klong Son, on riverbanks.

Area: British India and Sunda Islands.

Sematophyllaceae.

Sematophyllum Mitt.

38. **S. subrevolutum** Broth. n. sp.

Gracile, caespitosum, caespitibus laxiusculis, depressis, lutescenti-viridibus, nitidis; caulis elongatus, repens, per totam longitudinem fusco-radiculosus, pinnatim ramosus, ramis suberectis, vix ultra 5 mm. longis, dense foliosis, simplicibus; folia erecto-patentia, concava, lanceolata, anguste cuspidata, marginibus fera ad apicem folii late revolutis, summo apice erectis, integerrimis, enervia, cellulis elongatis angustissimis, basilaribus infimis laxis, aureis, alaribus magnis, oblongis, vesiculiformibus, supra alaribus paucis, minutis, omnibus laevissimis. Caetera ignota.

Species *S. revoluto* Broth. et Geh. simillima, sed caule laxius pinnato, foliis anguste cuspidatis, integerrimis dignoscenda.

Klong Majum, on rocks in the jungle, alt. 400 ft.

Rhaphidostegium Schimp.

39. **Rh. parvulum** Broth. n. sp.

Autoicum; subgracile, caespitosum, caespitibus mollibus, parvis, pallide lutescentibus, sericeis; caulis repens, per totam longitudinem fusco-radiculosus, vage ramosus, ramis dense subpinnatim ramulosis, ramulis brevibus, complanatulis, patentibus, densiuscule foliosis, obtusis; folia erecto-patentia, concava, anguste oblongo-lanceolata, longe et anguste acuminata, marginibus erectis vel parce revolutis, ubique vel superne minutissime serrulatis, enervia, cellulis elongatis, angustissimis, flexuosulis, basilaribus infimis aureis, laxioribus et brevioribus, alaribus 3—5, magnis, oblongis, vesiculiformibus, fuscis, omnibus laevissimis; bracteae perichaetii e basi oblongo-lanceolata longius acuminatae; seta 1 cm. alta, flexuosula, tenuis, lutescenti-rubra, laevissima; theca pendula, minuta, ovalis, sicca deoperculata sub ore constricta, fusca. Caetera ignota.

Species pulchella, caespitibus parvis, pallidis, mollibus, sericeis, ramulis complanatulis, foliis anguste oblongo-lanceolatis, longe acuminatis dignoscenda.

Lem Dan, on rocks and trees near the Sea.

40. **Rh. subconniveus** Broth. n. sp.

Autoicum; robustiusculum, caespitosum, caespitibus densis, lutescenti-vel fuscescenti-viridibus, nitidis; caulis elongatus, repens, dense pinnatim ramosus, ramis brevibus, erectis vel adscendentibus, teretibus, dense foliosis, simplicibus, obtusis; folia sicca suberecta, humida erecto-patentia, concava, oblonga, anguste acuminata, marginibus late revolutis, apice incurvis, subconniventibus, integerrimis, enervia, cellulis elongatis, angustis, basilaribus infimis abbreviatis, aureis, alaribus c. 5, oblongis, vesiculiformibus, fusco-aureis, omnibus laevissimis; bracteae perichaetii erectae, intimae ovato-lanceolatae, acuminatae, acumine serrulato; seta 1,5 cm. alta, sicca flexuosula, tenuis, fuscescenti-rubra, laevissima: theca horizontalis vel subpendula, minuta, ovalis, fusca. Caetera ignota.

Species ex affinitate *Rh. tristiculi* (Mitt.) Jaeg., sed foliis marginibus late revolutis, apice incurvis, subconniventibus jam dignoscenda.

Klong Munsé, on rocks in the jungle.

Trichosteleum Mitt.

41. **T. leptocarpoides** Broth. n. sp.

Autoicum; robustum, caespitosum, caespitibus depressis, densiusculis, pallide lutescentibus, nitidis; caulis elongatus repens,

ramosus, ramivagis vel subpinnatim dispositis, brevibus, complanatulis, laxe foliosis, strictis, obtusis; folia sicca laxe imbricata, humida patula, valde concava, oblonga, in acumen elongatum, loriforme contracta, marginibus erectis, integris, enervia, cellulis elongatis, angustissimis, papillosis, basilaribus infimis abbreviatis, aureis, alaribus c. 5, magnis, vesiculaeformibus, fusco-aureis; seta 2 cm. alta, crassiuscula, flexuosula, rubra, laevis; theca maxime pendula, ad setam fere adpressa, oblongo-clavata, fuscidula, grosse pustulosa, collo laevi. Caetera ignota.

Species insignis *T. leptocarpo* (Schwaegr.) affinis, sed foliis integris, theca breviore, grosse pustuloso, collo laevi, facillime dignoscenda.

Koh Kahdat, on mouldering trees.

42. **T. Boschii** (Doz. et Molk.) Jaeg. Adumbr. II, p. 487.

Jungle near Klong Munsé, on mouldering trees.

Area: Sunda Islands.

43. **T. trachycystis** Broth. n. sp.

Autoicum; robustiusculum, caespitosum, caespitibus densis, pallide viridibus, haud nitidis; caulis repens, subpinnatim ramosus, ramis uncinatis, densifoliis, simplicibus; folia falcata, concava, late oblongo- vel ovato-lanceolata, anguste acuminata, marginibus erectis, superne serrulatis, enervia, cellulis elongatis, angustissimis, papillis elevatis seriatim punctulatis, basilaribus infimis abbreviatis, aureis, alaribus c. 5, oblongis, vesiculiformibus, hyalinis vel fusco-aureis; bracteae perichaetii internae e basi oblongo-lanceolata longe acuminatae, acumine serrulato, cellulis laevissimis; seta 1 cm. alta, flexuosula, tenuis, fuscescenti-rubra, superne scaberula; theca nutans, minuta, ovalis, sicca deoperculata sub ore constricta, fusca. Caetera ignota.

Species *T. hamato* (Doz. et Molk.) Jaeg. affinis, sed statura robustiore, foliis latioribus, cellulis scaberrimis optime diversa.

Lem Dan, on rocks and trees near the Sea.

Leskeaceae.

Pelekium Mitt.

44. **P. velatum** Mitt. in Journ. of the Linn. Soc. 1868, p. 176.

Koh Kahdat, on mouldering trees in the interior of the island.

Area: From Java to Samoa.

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Part IV.

(**W. West** and **G. S. West**: Fresh Water Chlorophyceae. — **Th. Reinbold**: Marine Algae (Chlorophyceae, Phaeophyceae, Dictyotales, Rhodophyceae)[1]. — **M. Gomont**: Myxophyceae hormogoneae. — **Johs. Schmidt**: Peridiniales.)

Fresh Water Chlorophyceæ

by **W. West** F. L. S. and Prof. **G. S. West** B. A. — Bradford.

(With plate 2—4).

The following contribution to the flora of the island of Koh Chang has resulted from the examination of a number of collections of freshwater *Chlorophyceæ* made during the stay of the Danish Expedition in Siam in 1899—1900. The collections were preserved in weak alcohol or formaline and were twenty four in number.

Very few filamentous *Chlorophyceæ* were obtained, the chief of which were four species of *Œdogonium* and four of *Spirogyra,* one species of each of these genera being quite new. Two of the collections from stagnant water in the jungle were rich in various free-swimming *Palmellaceæ.* Some four or five of the collections contained a number of Desmids, many of which have proved to be very interesting.

The only papers dealing with freshwater Algæ from this region of the world are: — Joshua on „Burmese Desmids" (1886);

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[1]) Excl. *Corallinaceae* by M. Foslie, published in part II. of the Flora of Koh Chang.

Schmidle on „Einige Algen aus Sumatra“ (1895); W. West & G. S. West on „Desmids from Singapore“ (1897); and a note by Archer in Quart. Journ. Micr. Sci. (1865) on two Desmids from Hong Kong. To these may be added a paper by Lütkemüller on „Desmidiaceen aus den Ningpo-Mountains in Centralchina“ (1900).

The following is a summary of the Chlorophyceæ observed:

	Genera	Species
Coleochætaceæ	1	1
Œdogoniaceæ	1	4
Confervaceæ	1	1
Ophiocytieæ	1	2
Zygnemaceæ	1	4
Desmidiaceæ	11	84
Palmellaceæ	14	25
Total	30	121

Of the above, 9 species and a number of varieties are here described for the first time.

In addition to the above several sterile species of Spirogyra, Zygnema, Mougeotia, Bulbochæte, and Œdogonium were observed, and also a few fragments of a species of Chaetophora.

Class. **Chlorophyceæ.**

Ord. *Confervoideæ Heterogamæ.*

Fam. Coleochætaceæ.

Aphanochæte Berth.

1. **A. repens** Berth. 1878; De Toni Syll. Algarum, 1, p. 179.

Diam. cell. 7,7—17 μ; altit. cell. 8,5—10 μ.

Attached to aquatic plants in stagnant water.

Area: Europe, North America, Sandwich Is., New Zealand.

Fam. Œdogoniaceæ.

Œdogonium Link.

2. **Œ. cryptoporum** Wittr. in Öfvers. af K. Vet.-Akad. Förh. 1870, no. 3, p. 119; in Nova Acta Reg. Soc. Scient. Upsala, ser. 3, IX, 1874, p. 7.

Var. **vulgare** Wittr. in Nov. Acta Reg. Soc. Scient. Upsala, l. c.

Crass. cell. veget. 5—7,5 μ; altit. 3—5-plo major;
„ oogon. 19—20 μ; „ 18—23 μ;
„ oospor. 17,5—18,5 μ; „ 13—14 μ.

In stagnant water in riverbed.
Area: Europe, N. America and New Zealand.

3. **Œ. maximum** West & G. S. West, n. sp. (Tab. nostr. IV, fig. 39—41.)

Œ. dioicum, macrandrium; oogoniis singulis, subquadratis vel oblongo-rectangularibus, levissime tumidis; oosporis oogonia exacte complentibus, subquadratis vel oblongo-rectangularibus, in sectione optica verticali circularibus; membrana oosporæ crassa, glabra, quasi crassescione membranæ oogonii formata; plantis masculis eadem crassitudine ac femineis; antheridiis pluricellularibus (?).

Crass. cell. veget. 89—93 μ; altit. $1^1/_2$—2 (usque ad 3)-plo major;
„ oogon. (et oospor.) 105—107 μ; altit. 115—136 μ;
„ cell. antherid. 77—86 μ; altit. 7—15 μ.

A large quantity of this *Œdogonium* was seen from stagnant water and the plants were in abundant fruit. The oospores are rather remarkable being somewhat rectangular in outline, and having a wall which is apparently formed by an increase in thickness of the wall of the oogonium. Thus, when the spore is ripe there is no differentiation between the oospore and the oogonium, and the ripe oospores are set free by the breaking up of the filaments. Only one example of the antheridia was observed and this was only a fragment. From its general appearance it is highly probable that the antheridia are many-celled, but this point could not be definitely determined.

It may be compared with *Œ. fabulosum* Hirn from which it is easily distinguished by its larger size and its differently shaped oospores, which completely fill the oogonia.

4. **Œ. dioicum** Carter in Ann. Mag. Nat. Hist. I, no. 4, 1858, p. 30, t. III, f. 1, 2, 5—8, 13—16; Hirn in Acta Soc. Scient. Fennicæ, Tom. XXVII, no. 1, 190, p. 175, t. XXVIII, f. 163. (Tab. nostr. IV, fig. 42.)

Crass. cell. veget. 31—35 μ; altit. 3—5-plo major;
„ oogon. 97 μ; „ 100 μ;
„ oospor. 70 μ; „ 70 μ.

We place this plant under *Œ. dioicum* Carter owing to the relative size of the filaments and the peculiar oogonia, which the oospores do not fill. It agrees with Carter's species in everything except the length of the cells, which are proportionately a little longer.

In stagnant water in the jungle, among the preceding species.
Area: India.

5. **Œ. pluviale** Nordst. in Rabenh. Alg. Europ. no. 2257; Wittr. in Acta Reg. Soc. Scient. Upsala, ser. 3, IX, p. 19; Hirn in Acta Soc. Scient. Fennicæ, tom. XXVII, no. 1, p. 280, t. XLVIII, f. 311.

Forma.

Crass. cell. veget. 19—25 μ; altit. $^3/_4$—2-plo major;
„ oogon. 40—46 μ; „ 44—48 μ;
„ oospor. 38—44 μ; „ 42—44 μ.

The form observed was from rocks in a riverbed and agrees with a form mentioned by Hirn (l. c. p. 281) as occuring in „Italia: in saxis humidis in Monte Fiesole prope oppidum Florenz". This form was previously described as '*Œ. Montagnei* F. Magz. var. *saxicolum* Wittr'.

Area: Europe and N. America.

Ord. *Confervoideæ Isogamæ.*

Fam. Confervaceæ.

Microspora Thur., em. Lagerh.

6. **M. abbreviata** Lagerh. in Bericht. Deutsch. Bot. Gesellsch. 1887, V, p. 417. *Conferva abbreviata* Rabenh. Krypt. Flor. v. Sachs. 1863, p. 246; Flor. Europ. Algar. III, p. 323.

Crass. fil. 10—11 μ.

In stagnant water amongst *Spirogyra decimina* var.
Area: Europe, N. America, Australia, aud W. Africa.

Fam. Chaetophoraceæ.

Trentepohlia Mart. [1])

7. **T. aurea** Mart.

On rocks in the jungle near Klong Munsé, very common.
Area: Europe, America, Asia.

Fam. Ophiocytieæ.

Ophiocytium Näg.

8. **O. bicuspidatum** Lemmermann in Hedwigia 1899, Bd. XXXVIII, p. 31, t. III, f. 13—15. *O. majus* Näg. var. *bicuspidatum* Borge.

In muddy ricefield.
Area: Europe, and E. Africa (var.).

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[1]) Auctore E. de Wildeman.

9. **O. parvulum** A. Braun Alg. Unicell. 1855, p. 55. *Brochidium parvulum* Perty 1852.

With the preceding species in muddy ricefield.

Area: Europe, N. America, Ceylon, Sumatra, Australia, and W. Africa.

Ord. *Conjugatæ.*

Fam. Zygnemaceæ.

Spirogyra Link.

10. **S. neglecta** Kütz. Spec. Algar. 1849, p. 441; Rabenh. Flor. Europ. Algar. III, p. 248; Petit Spirog. de Paris, p. 26, t. IX, f. 1—5. *Zygnema neglecta* Hass. 1845.

Crass. cell. veget. 65 μ; long. zygosp. 84—92 μ; lat. zygosp. 61—66 μ.

In stagnant water in riverbed.

Area: Europe and N. America, West Indies, Central and W. Africa (var. *ternata*). Ceylon.

11. **S. decimina** (Müll.) Kütz. Phyc. Germ. p. 223; Rabenh. Flor. Europ. Algar. III, p. 242; Petit Spirog. de Paris, 1880, p. 25, t. VIII, f. 1—3.

Forma major, cellulis vegetativis diametro $2^1/_2$—5 (usque 6)-plo longioribus; cellulis fructiferis non inflatis; chromatophoris 3 cum marginibus asperis, anfractibus $2^1/_2$—$4^1/_2$.

Crass. cell. veget. 46—50 μ; long. zygosp. 81—92 μ; lat. zygosp. 46—49 μ.

In stagnant water.

Area: Europe, N. America, Madagascar and Ceylon.

12. **S. Schmidtii** West & G. S. West, n. sp. (Tab. nostr. IV, fig. 43—45).

S. cellulis vegetativis diametro 7—10-plo longioribus, extremitatibus non replicatis; chromatophoris 2—3, angustis, laxis, cum marginibus leviter crenulatis et pyrenoidibus magnis, anfractibus $2^1/_2$—4; conjugatione scalariformi, cellulis fructiferis inflatis; zygosporis elongato-ellipsoideis, diametro 2—$2^1/_2$-plo longioribus, polis rotundatis vel conico-rotundatis; membrana zygosporæ maturæ crassa, lutea — brunnea, mesosporio scrobiculato.

Crass. cell. veget. 31—35 μ; crass. cell. fruct. 53—59 μ; long. zygosp. 88—118 μ; lat. zygosp. 44—46 μ.

It is perhaps nearest to *S. fluviatilis* Hilse but is distinguished by its less diameter, its longer cells, its fewer and different chromatophores, and by the form of its zygospores.

In stagnant water in riverbed among *S. neglecta* and *S. gracilis.*

13. **S. gracilis** Kütz. Spec. Algar. 1849, p. 438; Rabenh. Flor. Europ. Algar. III, p. 237; Petit Spirog. de Paris, 1880, p. 15, t. III, f. 7—8.

Forma cellulis paullo longioribus.

Crass. cell. veget. 17,5—19 μ; crass. cell. fruct. 27 μ; long. zygosp. 54—63 μ; lat. zygosp. 24—25 μ.

In stagnant water in riverbed.

Area: Europe and N, America. Abyssinia (var. *abyssinica* Lagerh.).

Fam. Desmidiaceæ.

Gonatozygon De Bary.

14. **G. Ralfsii** De Bary Conj. 1858, p. 76, t. IV, f. 23.

Long. 163—220 μ; lat. 11,5—13,5 μ.

In stagnant water amongst *Spirogyra decimina* var.

Area: N. and S. America, W. Indies, Europe, Siberia, China, India, Ceylon. Sumatra, E. and W. Africa, Australia.

15. **G. Kinahani** Rabenh. Flor. Europ. Algar. III, 1868, p. 156. *Leptocystinema Kinahani* Arch. 1858.

Var. **tropicum** West & G. S. West, n. var. (Tab. nostr. II, fig. 2).

Var. cellulis multo crassioribus.

Long. 336 μ; lat. 20—23 μ.

In stagnant water, amongst the preceding species.

Area of type: Europe.

Cylindrocystis Menegh.

16. **C. Brébissonii** Menegh. 1838; De Bary Conj. 1858, p. 35, 46, 74, t. VII, f. E 1—22. *Penium Brébissonii* Ralfs 1848.

Long. 53—78 μ; lat. 15—16,5 μ.

In stagnant water in riverbed.

Area: Ubiquitous.

17. **C. subpyramidata** West & G. S. West, n. sp. (Tab. nostr. II, fig. 8—11).

C. parva, pæne duplo longior quam lata; cellulis ellipticis, leviter et subgradatim constrictis ad medium; semicellulis ovato-pyramidatis, polis rotundo-subtruncatis; membrana glabra achroa; a vertice visis circularibus; pyrenoidibus singulis, magnis. Zygosporæ nigrescentes, oblongo-rectangulares angulis rotundatis, a latere visæ ellipticæ; in medio laterum membrana valde et subirregulariter incrassata.

Long. 27—28 μ; lat. 15—16 μ; lat. constrict. 14,5 μ; long. zygosp 32,5—34 μ; lat. zygosp. 23—25 μ; crass. zygosp. 20 μ.

This species occured in small gelatinous masses amongst *Spirogyra gracilis* and *S. neglecta* in stagnant water in a riverbed.

It is nearest to *Cylindrocystis pyramidata* West & G. S. West recently found in Ceylon, but it is distinguished by its smaller size, its less tapering semicells, and its more open constriction.

Penium Bréb.

18. **P. Digitus** Bréb. in Ralfs Brit. Desm. p. 150, t. XXV, f. 3. *Closterium Digitus* Ehrenb. *Penium lamellosum* Kütz. *P. navigium* W. B. Turner.

Long. 188 μ; lat. 54 μ.

Among Utricularia in riverbed.
Area: Ubiquitous.

19. **P. australe** Racib. in Rospraw. Akad. Umiej. Krakow. Wydz. matem.-przy. ser. 2, vol. XXII, p. 367, t. VI, f. 27; West & G. S. West in Journ. Linn. Soc. bot. XXXIII, 1897, p. 157, t. VIII, f. 16.

Long. 80—75 μ; lat. 43—44 μ; lat. constrict. 41—42 μ.

In stagnant water in the jungle and in muddy ricefields.
Area: Singapore and Australia.

20. **P. cucurbitinum** Biss. in Journ. Roy. Micr. Soc. 1884, p. 197, t. V, f. 7.

Forma **minor** West in Journ. Roy. Micr. Soc. 1894, p. 4.

Long. 55,5 μ; lat. 52 μ.

In stagnant water with other Desmids.
Area: Europe. New Zealand (var.).

21. **P. curtum** Bréb. in Kütz. Spec. Algar. 1849, p. 167. *Closterium curtum* Bréb. 1840. *Cosmarium curtum* Ralfs 1848.

Forma **major** Wille in Öfvers. af K. Vet.-Akad. Förh. 1879, no. 5, p. 56, t. XIV, f. 73.

Long. 58 μ; lat. 28 μ.

On rocks in riverbed, abundant amongst *Cosmarium læve.*
Area: Europe, N. America, W. Indies, India, Madagascar, and W. Africa.

22. **P. Navicula** Bréb. in Mém. Soc. Scient. Nat. Cherbourg, 1856, IV, p. 146, t. 11, f. 37.

Long. 32,5 μ; lat. 9,6 μ.

In stagnant water in the jungle.
Area: Europe, N. America. W. Indies, India, Burmah, Ceylon, Singapore E. Indies, Sandwich Is., New Zealand and Australia.

23. **P. minutissimum** Nordst. in Acta Univ. Lund. 1873, tom. IX, p. 46, t. I, f. 21.

Long. 17 μ; lat. 10,6 μ.

In stagnant water in riverbed.

Area: Europe, Madagascar, Burmah.

24. **P. inconspicuum** West in Journ. Roy. Micr. Soc. 1894, p. 4, t. I, f. 6, 7.

Long. 17 μ; lat. 6 μ.

Amongst other Desmids in stagnant water.

Area: Europe and N. America. Ceylon.

Closterium Nitzsch.

25. **C. prælongum** Bréb. in Mém. Soc. Scient. Nat. Cherbourg, 1856, IV, p. 152, t. 11, f. 41.

Long. 459—625 μ; lat. 16,5—18 μ.

In stagnant water in the jungle.

Area: Europe and N. America. New Zealand (forma).

26. **C. acerosum** Ehrenb. in Abhandl. Akad. Wissenschaft. Berlin 1831, p. 68; Ralfs Brit. Desm. 1848, p. 154, t. XXVII, fig. 2.

Forma apicibus truncatis; membrana luteo-brunnea, subtilissime striolata. Long. 436—583 μ; lat. 45 μ; lat. apic. 8—9 μ. (Tab. nostr. II, fig. 5.) Diam. zygosp. 87 μ.

The apices were much more truncate than in var. *truncatum* Gutw. (in Spraw. Kom. fizyjogr. Akad. Umiej. Krakow. 1891, p. 33, t. 1, f. 7); in fact, Gutwinski's variety appears to be very little different from the typical form.

Area: Ubiquitous.

27. **C. Lunula** Nitzsch 1817; Ralfs Brit. Desm. 1848, p. 163, t. XXVII, f. 1. *Vibrio Lunula* Müller 1784.

Var. **sublanceolatum** Klebs in Schrift. phys.-oekon. Gesellsch. Königsberg V, 22, 1879, p. 6, t. 1, f. 1 *e* et *f*.

Forma minor, cellulis paullo angustioribus; membrana lutea, glabra. Long. 282 μ; lat. 32,5 μ; lat. apic. 8,5 μ.

This form approaches very closely to the plant mentioned and figured by Gutwinski as *Cl. acerosum* Ehrenb. forma (Roypraw. Wydz. matem.-przyr. Akad. Umiej. Krakow. 1896, tom. XXXIII, p. 36, t. V, f. 6).

Area of type: Europe, N. and S. America, E. Africa, India, Central Asia, Japan, New Zealand and Australia.

28. **C. Ehrenbergii** Menegh. Synops. Desm. in Linnæa 1840, p. 232; Ralfs Brit. Desm. 1848, p. 166, t. XXVIII, f. 2.

Lat. 90 μ; apicibus 442 μ inter se distantibus.

In stagnant water amongst *Spirogyra decimina* var.

Area: Europe, N. and S. America, W. Indies, India, Central China, Japan, New Zealand, Australia, and Samoa (var.).

29. **C. Dianæ** Ehrenb.; Ralfs l. c. p. 168, t. XXVIII, f. 5.

Lat. 21 μ; apicibus 263 μ inter se distantibus.

With the preceding species.

Area: Ubiquitous.

30. **C. parvulum** Näg. Gatt. einzell. Alg. 1849, p. 106, t. VI C, f. 2.

Lat. 10,5 μ; apicibus 130—144 μ inter se distantibus; diam. zygosp. 33 μ.

In stagnant water among other Desmids (with zygospores).

Area: Ubiquitous.

31. **C. calosporum** Wittr. in Nova Acta Soc. Scient. Upsala, ser. 3, VII, 1569, p. 23, t. I, f. 11.

Forma: lat. 7—7,5 μ apicibus 87—89 μ inter se distantibus.

This plant, which occurred in great abundance in stagnant water in the jungle, differs from typical *Cl. calosporum* in being a little narrower, the ventral margin having precisely the correct curvature.

Area: Europe, Ceylon.

32. **C. Venus** Kütz. Phyc. German. 1845, p. 130; Ralfs Brit. Desm. 1848, p. 220, t. XXXV, f. 12.

Lat. 7 μ; apicibus 51 μ inter se distantibus.

In stagnant water.

Area: Europe, N. America, Burmah, Ceylon, Central China, Japan.

33. **C. Jenneri** Ralfs Brit. Desm. 1848, p. 167, t. XXVIII, f. 6.

Forma minor, membrana plerumque luteo-brunnea.

Lat. 8,5—9 μ; apicibus 55—60 μ inter se distantibus.

Numerous examples of this small form were observed and almost all of them possessed a yellowish-brown cell-wall. The proportion and relative curvature were exactly those of *Cl. Jenneri* Ralfs.

Area: Europe, N. America, E. Africa.

34. **C. Cynthia** De Not. Desm. Ital. p. 65, t. VII, f. 71; Cooke Brit. Desm. p. 26—27.

Lat. 10,5 μ; apicibus 82 μ inter se distantibus.

In muddy ricefields.

Area: Europe, N. America, E. Africa, Ceylon, Sumatra, New Zealand and Australia.

35. **C. regulare** Bréb. in Mém. Soc. Sciences, Cherbourg, 1856, IV, p. 304, t. II, f. 35.

Forma apicibus crassioribus; striis validis, visis 11.
Long. 240 μ; lat. 26,5 μ; lat. apic. 8,5 μ.

With the preceding species.
Area: Europe, W. Africa, India, Australia.

36. **C. Ralfsii** Bréb. in Ralfs Brit. Desm. 1848, p. 174, t. XXX, f. 2.

Var. **hybridum** Rabenh. Krypt. Fl. Sachs. p. 174; Flor. Europ. Algar. III, p. 135.

Long. 464 μ; lat. 29,5 μ; lat. apic. 6 μ.

Area: Europe, Ceylon and Singapore.

37. **C. Kützingii** Bréb. in Mém. Soc. Sciences, Cherbourg, 1856, IV, p. 156, t. II, f. 40.

Long. 467—540 μ; lat 17 μ.

In stagnant water among *Spirogyra decimina* var.
Area: Europe, N. America, Madagascar, India, Ceylon, Japan, New Zealand and Australia.

38. **C. Cornu** Ehrenb. 1830; Ralfs Brit. Desm. 1848, p. 176, t. XXX, f. 6 *f* et *g*.

Var. **siamense** West & G. S. West, n. var. (Tab. nostr. II, fig. 6—7).

Var. cellulis minus curvatis; zygospora subquadrata, angulis submamillatis.
Long. 140—165 μ; lat. 5,5—7,5 μ; diam. zygosp. 23—25 μ.

This variety differs from typical *Cl. Cornu* Ehrenb. in being somewhat less curved, and in the form of the zygospore, the angles of which are not so produced and do not project within the empty semicells. The zygospore is surrounded by a mucous investment and the semicells are attached to the outer edge of this mucus.

In muddy ricefields.
Area: Europe, N. and S. America. Australia.

39. **C. tumidum** Johnson in Bull. Torr. Botan. Club, vol. 22, no. 7, July 1895, p. 291, t. 293, f. 4. *C. Cornu* var. β Ralfs Brit. Desm. 1848, p. 176, t. XXX, f. 6 *a—e*. *C. Cornu* et forma *major* Wille in Öfvers. af K. Vet.-Akad. Förh. 1879, no. 5, p. 59, t. XIV, f. 80, 81.

a. Forma cellulis crassioribus. (Tab. nostr. II, fig. 4).
Long. 125 μ; lat. 18,5 μ; lat. apic. 4 μ.

The form observed was proportionately a little thicker than *Cl. tumidum* Johns., and the ventral margin was slightly less tumid. The relative increase in thickness was due to the somewhat greater curvature of the dorsal margin. The cell-wall was quite smooth and colourless and the apices were truncate exactly as in Johnson's figures.

In general appearance and curvature this form resembles *Cl. littorale* Gay var. *crassum* West & G. S. West, but it is readily distinguished by its much smaller size and its truncate apices.

b. Forma polis paullo crassioribus. (Tab. nostr. II, fig. 3).
Long. 100 μ; lat. 14,5 μ; lat. apic. 5,5 μ.

On rocks in riverbed.
Area: Europe, N. America, Samoa.

40. **C. gracile** Bréb. 1839, in Mém. Soc. Sciences, Cherbourg, 1856, IV, p. 155, t. II, f. 45. *C. limneticum* Lemmermann in Plöner Forschungsberichten, Teil 7, 1899, p. 28, t. II, f. 39—41.

Long. 269 μ; lat. 6,5 μ.

In muddy ricefields.
Area: Europe, N. and S. America, E. Africa, Sumatra, New Zealand and Australia.

41. **C. acutum** Bréb. in Ralfs Brit. Desm. p. 177, t. XXX, f. 5 *a* et *b*.

Long. 138—144 μ; lat. 5,3—7 μ.

In muddy ricefields.
Area: Europe, N. America, E. Africa, India, Burmah, Sumatra, Central China. New Zealand and Australia.

Pleurotænium Näg.

42. **P. Trabecula** Näg. Gatt. einzell. Alg. 1849, p. 104, t. VI, f. A. *Closterium Trabecula* Ehrenb. 1830.

Long. 462—564 μ; lat. ad bas. semicell. 28—30,5 μ; lat. ad apic. semicell. 20—20,5 μ.

In stagnant water in riverbed.
Area: Europe, N. and S. America, Siberia, India, E. Indies, Sandwich Is., China, Japan, Abyssinia.

43. **P. maximum** Lund. in Acta R. Soc. Scient. Upsala, ser. 3, VIII, 1871, p. 89. *Docidium maximum* Reinsch in Abhandl. Naturhist. Gesellsch. zu Nürnberg, III, 1866, p. 1884, t. XII, f. 4. *Pleurotænium Archerii* Delp. in Memor. Accad. Sci. Torino, ser. 2, XXX, 1877, p. 118, t. XIX, fig. 12—16.

Long. 522—560 μ; lat. ad bas. semicell. 38—41,5 μ; lat. ad med. semicell. 31—33 μ; lat. ad apic. semicell. 22—24 μ.

In stagnant water among other Desmids.
Area: Europe, N. America, Abyssinia, W. Africa, Ceylon, Central China.

44. **P. gloriosum** West & G. S. West. *Docidium gloriosum* Turn. in Kungl. Sv. Vet. Akad. Handl. Bd. 25, no. 5, 1893, p. 30, t. III, f. 5.

Forma paullo minor, inflatione parva singula ad basin semicellularum.

Long. 674—858 μ; lat. ad bas. semicell. 33 μ; lat. ad med. semicell. 28 μ; lat. ad apic. semicell. 35 μ. (Tab. nostr. II, fig. 1).

The tubercles, which are situated just below the apex, were about 24 in number. They are much less conspicuous than the tubercles of many other *Pleurotænia* of this nature, and consist of somewhat slight plications of the cell-wall at the apex. In fact, the tubercles of all *Pleurotænia* of this nature are primarily due to a series of short (but prominent) foldings or plications round the apex. In a few species these plications are surmounted by actual bead-like outgrowths, but this is not often the case.

In stagnant water among *Spirogyra decimina* var.

Area: India.

45. **P. trochiscum** West & G. S. West in Trans. Linn. Soc. bot. ser. 2, V, 1896, p. 235, t. XIII, f. 4, 5; cfr. Journ. Linn. Soc. bot. XXXIII, 1898, p. 285—286.

Long. 335—468 μ; lat. ad bas. semicell. 38—42 μ; lat. ad apic. semicell. 26—29 μ.

The Siamese specimens differed from the American ones in being a little thicker towards the base of the semicells. In the character, arrangement and number of the markings they were absolutely identical.

In stagnant water in the jungle, and in muddy ricefields, abundant.

Area: N. America, Ceylon.

46. **P. hypocymatium** West & G. S. West l. c. 1896, p. 234, t. XIII, f. 1.

Forma paullo major, undulis paucioribus eis ad basin majoribus.

Long. 451 μ; lat. ad bas. semicell. 19 μ; lat. ad apic. semicell. 12,5 μ.

The Siamese specimens were a little longer than the American ones and the undulations did not extend so near the ends of the semicells. As the basal undulation was also a little larger than the others the *Pleurotænium* bore a certain amount of resemblance to *P. basiundatum* West & G. S. West.

In stagnant water.

Area: N. America, Ceylon (var *angustum*).

Euastrum Ehrenb.

47. **E. ansatum** Ehrenb.; Ralfs Brit. Desm. 1848, p. 85, t. XIV, f. 2.

In muddy ricefield.

Area: Ubiquitous.

48. **E. sinuosum** Lenorm. in Ralfs l. c. p. 85, t. XIII, f. 5 *a*, *b*, *d*. *E. circulare* Hass.

Long. 61 μ; lat. 39 μ; lat. isthm. 10 μ.

In stagnant water.

A small form was observed somewhat approaching var. **reductum**

West & G. S. West (in Journ. Bot. March 1897, p. 83; in Journ. Linn. Soc. bot. XXXIII, 1897, p. 160, t. VIII, f. 17).

Long. 54 μ; lat. 34,5 μ; lat. isthm. 11,5 μ.

Among *Utricularia* in riverbed.

Area: Europe, N. America, E. and W. Africa, India, Ceylon, Burmah, Singapore, Sandwich Is., New Zealand and Australia.

49. **E. insulare** Roy in Scott. Natur. April 1877. *E. binale* var. *insulare* Wittr. in Bih. til K. Sv. Vet.-Akad. Handl. Bd. 1, no. 1, 1872, p. 49, t. IV, f. 7.

In stagnant water in the jungle and in muddy ricefields, abundant.

Area: Europe, N. America, E. Africa, India and Ceylon.

50. **E. binale** Ehrenb. 1840; Ralfs Brit. Desm. 1848, p. 90, t. XIV, f. 8. *Heterocarpella binalis* Turp. 1820.

Long. 14 μ; lat. 11 a; lat. isthm. 5 μ.

In muddy ricefields.

Area: Ubiquitous.

51. **E. denticulatum** Gay in Bull. Soc. Bot. France, XXXI, 1884, p. 335. *E. binale* var. *denticulatum* Kirchn. in Cohn Krypt. Flor. Schlesien, 1878, p. 159.

Long. 22 μ; lat. 15,5 μ; lat. isthm. 5 μ.

In stagnant water in the jungle.

Forma minor.

Long. 13 μ; lat. 11,5 μ; lat. isthm. 3,5 μ; crass. 7,6 μ.

In muddy ricefields.

Area: Europe, N. and S. America. E., W., and Central Africa, Madagascar, India, Ceylon, Singapore, China, New Zealand and Australia.

Micrasterias Ag.

52. **M. foliacea** Bail. in Ralfs Brit. Desm. 1838, p. 210, t. XXXV, f. 3; Johnson in Bot. Gaz. XIX, p. 56, t. VI, f. 1—4.

Long. 58—60 μ; lat. 79—81 μ.

In stagnant water in the jungle, abundant.

Area: N and S. America, India, Ceylon, Burmah, Java, Queensland.

53. **M. Mahabuleshwarensis** Hobson in Quart. Journ. Micr. Sci. V, 1863, p. 168 c. icone; Lund. in Nova Acta R. Soc. Scient. Upsala, ser. 3, VIII, 1871, p. 15, t. I, f. 6.

In stagnant water in the jungle, abundant.

Area: Europe, N. America. British Guiana. E. Africa and Madagascar (var. tetracera West & G. S. West). India, Burmah, Java, New Zealand (var.) and Australia.

Var. **surculifera** Lagerh. in Bih. till K. Sv. Vet.-Akad. Handl. Bd. 13, no. 9, 1888, p. 5, t. I, f. 1.

Long. 98 μ; lat. 100 μ; lat. isthm. 18 μ; crass. 49.

In muddy ricefield.

Area: India and Ceylon.

54. **M. Möbii** West & G. S. West in Journ. Linn. Soc. bot. XXXIII, 1897, p. 162. *Euastrum verrucosum* Ehrenb. var. *Möbii* Borge in Bih. till K. Sv. Vet.-Akad. Handl. XXII, no. 9, 1896, p. 13, t. II, f. 18, 19. *E. verrucosum* forma Möbius in Abhandl. d. Sencknb. naturf. Ges. Frankfurt a. M. 1894, Bd. 18, p. 340, t. II, f. 21.

M. mediocris, circiter $1^1/_5$-plo longior quam lata, profunde constricta, sinu leviter aperto ad extremum lineari et subampliato (nonnunquam sinu angusto-lineari extremo ampliato et aperto extrorsum); semicellulæ trilobæ, incisuris latis et rotundatis; lobo polari multo majori, incudiformi, late expanso cum collo latissimo, apice convexo sed in medio late et leviter retuso, extremitatibus lateralibus emarginato-truncatis; lobis lateralibus breviter subtrapeziformibus, leviter bilobulatis, lobulo superiori minori cum apice undulato-truncatis, lobulo inferiori majori cum margine levissime et subirregulariter undulato; in centro semicellularum tumore magno dense scrobiculato, tumore minimo intra lobum lateralem unumquemque; membrana cellularum irregulariter et minute granulata; a vertice visæ oblongo-ellipticæ tumore magno utrobique, polis rotundatis, lobo polari oblongo-subrectangulari, lateribus convexis, polo unoquoque in processus crassos breves divaricatos duos producto, lobulo superiori lobi lateralis uniuscujusque in processus breves divaricatos duos furcato; a latere visæ truncato-ovatæ, lateribus in parte superiori concavis.

Long. 111—117 μ; lat. 90—36 μ; lat. lob. polar. 76—80 μ; lat. isthm. 28—31 μ; crass. 59—60 μ. (Tab. nostr. III, fig. 21.)

We have previously shown this plant to be a *Micrasterias* and not a species of *Euastrum* (cfr. Journ. Lin. Soc. 1897, p. 162), but we give here for the first time a complete description of the typical plant. It stands nearest to *Micrasterias Americana* Ralfs.

In stagnant water in the jungle, abundant amongst *Micrasterias Mahabuleshwarensis* and various *Palmellaceæ*.

Area: Australia (Northern Queensland) Also var. *Ridleyi* from Singapore.

Var. **tetrachastriformis** West & G. S. West, n. var. (Tab. nostr. III, fig. 22).

Var. lobis lateralibus reductis, lobulo inferiori attenuato et subemarginato, lobulo superiori parvo et acute conico; extremitatibus lobi polaris plus attenuatis.

Long. 108—120 μ; lat. 88—111 μ; lat. lob. polar. 82—96 μ; lat. isthm. 24—31 μ.

This variety, which occurred in a muddy ricefield, is easily distin-

guished from the typical form by the reduced lobules of the lateral lobes and the greater attenuation of each extremity of the polar lobe. It receives its name from its resemblance to those species of *Micrasterias* which were at one time placed under *Tetrachastrum*.

55. **M. rotata** Ralfs in Ann. Mag. Nat. Hist. V, 1844, p. 299, t. VI, f. 1; Brit. Desm. 1848, p. 71, t. VIII, f. 1.

In stagnant water in the jungle.

Area: Europe, N. and S. America. India, Singapore. Japan.

Cosmarium Corda.

56. **C. pseudopyramidatum** Lund. in Nova Acta R. Soc. Scient. Upsala, ser. 3, VIII, 1871, p. 41, t. II, f. 18.

Long. 54 μ; lat. 36 μ; lat. isthm. 11 μ.

Area: General in temperate and tropical climates.

57. **C. læve** Rabenh. Flor. Europ. Algar. III, 1868, p. 161; Nordstedt in Öfvers. af K. Vet.-Akad. Förh. 1876, no. 6, p. 29, t. XII, f. 4; G. S. West in Journ. Linn. Soc. bot. 1899. (Tab. nostr. II, fig. 14.)

Long. 22—25 μ; lat. 16—19,5 μ; lat. isthm. 5,8—6,7 μ; crass. 9—10 μ. Zygosporæ angulari-globosæ, glabræ, angulis leviter incrassatis. Diam. zygosp. 22—25 μ. (Tab. nostr. II, fig. 15—16).

This occured in enormous quantity on rocks in a riverbed and the zygospores were abundant. We have previously described what we then thought to be this plant in zygospore (cfr. West & G. S. West in Journ. Roy. Micr. Soc. 1896, p. 154—5, t. IV, f. 35; West in Notarisia 1892, p. 1502), but we can now definitely say that is was not. The *Cosmarium* we described from Portugal as *C. læve* with zygospores („zygosporæ globosæ' spinis brevibus numerosis truncatis bifidisve ornatæ") is certainly not *C. læve* Rabenh., but some other closely allied species with smooth cells and a spiny zygospore. We are sure of this because we have now obtained *C. læve* Rabenh. in zygospore in such great quantity.

Area: Europe, N. and S. America, E. and W. Africa, Madagascar, India, Ceylon, E. Indies, New Zealand and Australia.

58. **C. pseudonitidulum** Nordst. in Acta Univ. Lund. IX, 1873, p. 16, t. I, f. 4.

Long. 37 μ; lat. 25 μ; lat. isthm. 7,5 μ; crass. 16 μ.
All the forms seen were very delicately punctate.

In stagnant water in riverbed amongst *Spirogyra gracilis*. Also among *Utricularia* in riverbed.

Area: Europe, Central China.

59. **C. obsoletum** Reinsch in Abhandl. Senckenb. naturf. Gesellsch. VI, 1867, p. 142, t. XXII D I, f. 1—4; in Abhandl. Naturhist. Gesellsch. zu Nürnberg III, 167, p. 184, t. XII, f. 4. *C. palustre* Turner in Kongl.

Sv. Vet.-Akad. Handl. Bd. 24, no. 5, 1893, p. 60, t. VIII, f. 65, t. IX, f. 2.
C. palustre var. *ovale* Turn. l. c.

a. Typical forms of the usual size of this species in the tropics.
Long 60—64 μ; lat. 69—75 μ; lat. isthm. 30—31 μ.

These specimens were exactly like those from Ceylon and Singapore, and all possessed the large conical pore which passes through the thickening at the basal angles of the semicells. Turner, who misinterpreted the nature of this pore, figured it as a spine at the angle, and thus created a new name „*C. palustre*" for typical specimens of the large form of *C. obsoletum* so abundant in tropical Asia.

b. Smaller forms without the conical pore at the basal angles.
Long. 34 μ; lat. 44 μ; lat. isthm. 15,5—18 μ; crass. 23 μ.

The above two forms show a marked difference in size and correspond to the two forms mentioned by Lütkemüller from Central China (Cfr. Ann. des k. k. Naturhist. Hofmus. Wien, 1900, Bd. XV, Heft 2, p. 119).

Abundant in stagnant water in the jungle.

Area: Europe, N. and S. America, India, Ceylon, Burmah, Central China, E. Indies, New Zealand and Australia.

60. **C. subauriculatum** West & G. S. West in Trans. Linn. Soc. bot. ser. 2, V, 1895, p. 55, t. VI, f. 31.

Long. 46 μ; lat. sine spinul. 48 μ, cum spinul. 52 μ; lat. isthm. 21 μ; crass. 29 μ. (Tab. nostr. II, fig. 19.)

In stagnant water among other Desmids.

Area: Madagascar, Central China.

Var. **truncatum** West & G. S. West, n. var. (Tab. nostr. II, fig. 20.)

Var. angulis truncatis, spinis binis reductis ornatis; a vertice visis ut in forma typica.

Long. 41 μ; lat. 46 μ; lat. isthm. 18 μ; crass. 24 μ.

Compare with the front view of *C. erosum* Delp.

In stagnant water in the jungle.

61. **C. Schmidtii** West & G. S. West, n. sp. (Tab. nostr. III, fig. 27—28.)

C. parvum, paullo longius quam latum, modice constrictum, sinu breviter lineari extrorsum aperto; semicellulæ elliptico-semicirculares (cellulæ subcirculares), isthmo lato; a vertice visæ ellipticæ; a latere visæ subcirculares; membrana delicatissime et dense punctulata, pyrenoidibus singulis.

Long. 22—23 μ; lat. 18—20 μ; lat. isthm. 8,5—9,5 μ; crass. 11,5—12,5 μ.

After much consideration we have come to the conclusion that this must be described as a distinct species. The shape of the semicells and the wide isthmus are characteristic. Perhaps the nearest species are *C. melanosporum* Arch. and *C. nitidulum* De Not., but from both these species it is easily distinguished.

In large numbers amongst *C. læve* Rabenh. on rocks in a riverbed, and also in stagnant water amongst various species of *Spirogyra*.

62. **C. subtriordinatum** West & G. S. West in Journ. Bot. April 1897, p. 122, t. 368, f. 11.

Forma. (Tab. nostr. II, fig. 18.)

Long. 22—24 μ; lat. 21 μ; lat. isthm. 6—6,5 μ; crass. 12,5—13,5 μ.

These forms only differ from the African examples in the somewhat simplified central granules. They are distinguished from *C. subpunctulatum* Nordst. by their smaller size, much fewer and more acute granules, and by the different arrangement of the central granules.

In stagnant water in the jungle.

Area: W. Africa.

63. **C. pseudotaxichondrum** Nordst. in Öfvers. af K. Vet.-Akad. Förh. 1877, no. 3, p. 20, t. II, f. 5.

Var. **siamense** West & G. S. West, n. var. (Tab. nostr. III, fig. 26).

Var. sinu apertiori, semicellulis minus angularibus, marginibus lateralibus leviter undulatis, cum serie granulorum magnorum 3 trans medium semicellulæ uniuscujusque.

Long. 26 μ; lat. 29 μ; lat. isthm. 6,5 μ; crass. 17 μ.

This variety is nearest to *C. pseudotaxichondrum* var. *africanum* West & G. S. West (in Journ. Bot. May 1897, p. 173, t. 367, f. 14).

In stagnant water in the jungle.

Area: This species (with its varieties) is widely distributed in tropical and subtropical regions.

64. **C. quadrifarium** Lund in Nova Acta Soc. Scient. Upsala, ser. 3, VIII, p. 32, t. III, fig. 12.

Forma **hexasticha** Nordst. in Kongl. Sv. Vet.-Akad. Handl. Bd. 22, no. 8, p. 49; *C. hexastichum* Lund. l. c. p. 33, t. III, f. 13.

Long. 53 μ; lat. 41 μ; lat. isthm. 17 μ; crass. 29 μ.

In stagnant water in riverbed.

Area of type: Europe, N. America, Ceylon.

65. **C. subdecoratum** West & G. S. West in Journ. Linn. Soc. bot. XXXIII, 1897, p. 164, t. VIII, f. 13.

Long. 76 μ; lat. 54—59 μ; lat. isthm. 19—22 μ.

In stagnant water in the jungle.

Area: Ceylon and Singapore.

66. **C. pseudorthopunctatum** West & G. S. West, n. sp. (Tab. nostr. II, fig. 12—13.)

C. parvum, circiter tam longum quam latum, profunde constrictum sinu aperto et acutangulo; semicellulæ subellipticæ, ventre valde convexæ, dorso valde convexæ in medio subrectæ, angulis

leviter subangularibus; membrana granulata, granulis in seriebus verticalibus 9—10 (in serie unaquaque circiter 5); a vertice visæ ellipticæ; a latere visæ circulares; pyrenoidibus singulis.

Long. 24 μ; lat. 20—23,5 μ; lat. isthm. 5,7—6,8 μ; crass. 12 μ.

It is nearest to *C. orthopunctatum* Schmidle (in Oesterr. botan. Zeitschrift 1895, p. 389, t. XV, f. 15) but is much smaller, has more flattened apices, and both the rows of granules and the number of granules in each row are much fewer in number. The vertical view is also more narrowly elliptical and is never rhomboidal.

On rocks in riverbed among *C. læve* Rabenh.

67. **C. Blyttii** Wille in Vid.-Selsk. Forhandl. Christiania, 1880, no. 11, p. 25, t. I, f. 7.

Long. 17 μ; lat. 16 μ; lat. isthm. 4,7 μ.

In stagnant water in the jungle.

Area: Europe, N. America. West, Central and East Africa. Madagascar, Ceylon, Central China, New Zealand and Australia.

Forma minor: Long. 13,5 μ; lat. 13 μ; lat. isthm. 2,8 μ; crass. 8,5 μ.

In muddy ricefields.

68. **C. Reinschii** Archer in Quart. Journ. Micr. Sci., n. s. VI, p. 109. *C. sp.* Reinsch Contrib. Alg. et Fung. Lipsiæ 1875, t. XVIII, f. 4.

Membrana cellulæ subtilissime punctata.

Long. 37 μ, lat. 30 μ; lat. isthm. 8 μ; crass. 16 μ.

In stagnant water amongst *Spirogyra decimina* var.

Area: Europe, N. America, Australia.

69. **C. æquatum** West & G. S. West, n. sp. (Tab. nostr. II, fig. 17.)

C. parvum, paullo latius quam longum, profunde constrictum, sinu sublineari et paullo aperto; semicellulæ transverse oblongæ, marginibus lateralibus rotundatis, apicibus latissimis leviter concavis; a vertice visæ oblongæ, polis rotundatis; a latere visæ circulares; membrana glabra.

Long. 31 μ; lat. 36 μ; lat. isthm. 13,2 μ; crass. 15,3 μ.

Among *Utricularia* in riverbed.

70. **C. exiguum** Archer in Proc. Dubl. Nat. Hist. Soc. IV, 1864, p. 49, t. I, f. 32, 33; Nordst. in Kongl. Sv. Vet.-Akad. Handl. Bd. 22, no. 8, p. 58, t. VI, f. 12.

Long. 15,3 μ; lat 8 μ; lat. isthm. 1,6 μ.

In stagnant water amongst *Spirogyra*.

Area: Europe, N. America, W. Africa, Madagascar, Ceylon, New Zealand.

71. **C. Norimbergense** Reinsch in Abhandl. Naturhist. Gesellsch. zu Nürnberg, Bd. 3, 1866, p. 113, t. IX, f. 2. *C. Hammeri* Reinsch var.

octogibbosum Reinsch l. c. p. 112, t. X, f. 1. *C. octogibbosum* (Reinsch) Turner 1893. *C. octogibbosum* var. *indica* Turn.

Forma **depressa** West & G. S. West in Journ. Bot. April 1897, p. 119.

Long. 14,5—15,5 μ; lat. 13,5—14 μ; lat. isthm. 5 μ.

Area: Europe, W. and E. Africa (vars.), India and Ceylon (forms), Burmah, E. Indies (var.), Central China, New Zealand.

72. **C. Meneghinii** Bréb. in Ralfs Brit. Desm. 1848, p. 96, t. XV, f. 6.

Long. 22 μ; lat. 16 μ; lat. isthm. 4,5 μ.

Forma: cells narrower and semicells more rounded.
Long. 18—19 μ; lat. 12,5—135 μ; lat. isthm. 3,5—3,8 μ; crass. 8 μ.

In stagnant water in the jungle with the preceding species.
Area: Ubiquitous.

73. **C. angulosum** Bréb. in Mém. Soc. Sci. Nat. Cherbourg, IV, 1856, p. 127, t. I, f. 17. *C. Meneghinii* Bréb. var. *angulosum* Rabenh. 1868.

Var. **concinnum** West & G. S. West. *C. concinnum* Reinsch.

Long. 12 μ; lat. 10 μ; lat. isthm. 2,6 μ.

In stagnant water amongst *Spirogyra*.
Area: Europe, N. America, Madagascar. W. Africa.

74. **C. pusillum** Arch. in Pritch. Infus. 1861, p. 731. *Euastrum pusillum* Bréb. 1856.

Long. 12 μ; lat. 11 μ; lat. isthm. 4,5 μ.

Area: Europe, S. America, India, Ceylon, N. Zealand.

75. **C. contractum** Kirchn. Alg. Schlesien, Breslau 1878, p. 147; Wolle Desm. U. S. 1884, p. 63, t. 50, f. 24.

Forma minor: long. 26 μ; lat. 20 μ; lat. isthm. 3,8 μ; crass. 13 μ.

Except for its rather more open sinus this form is identical with that known as *C. ellipsoideum* Elfv. forma *minor* Racib. in Pamietnik Akad. Umiej. w Krakowie, Wydz. matem.-prz. X, 1885, p. 84, t. X, f. 9. (= *C. proteiforme* Turner in Kongl. Sv. Vet.-Akad. Handl. Bd. XXV, no. 5, 1893, p. 64, t. IX. f. 26).

C. ellipsoideum Elfv. does not differ sufficiently from *C. contractum* Kirchn. to warrant its separation as a distinct species.

In stagnant water in the jungle.
Area: Generally distributed.

76. **C. emarginatum** West & G. S. West in Trans. Linn. Soc. bot. ser. 2, V, 1895, p. 58, t. VIII, f. 14.

Long. 9—10 μ; lat. 8,3—9,5 μ; lat. isthm. 4,4 μ; crass. 4,6 μ.

With the preceding species.
Area: Madagascar. E. Africa (var.).

77. **C. exile** West & G. S. West. *Dysphinctium exile* Turner in Kongl. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 1893, p. 40, t. I, f. 21 *.

Forma curta; cellulis diametro subduplo longioribus.
Long. 13—15 μ; lat. 7,5—8,5: lat. isthm. 5,9—6,3 μ.

In stagnant water amongst various Algæ.
Area: India.

78. **C. pseudarctoum** Nordst. in Wittr. & Nordst. Alg. Exsicc. no. 257 cum fig. xylogr. 1879.

Forma **australis** West & G. S. West. *C. subarctoum* (Lagerh.) Racib. forma *australis* Racib. in Rospraw. Wydz. matem.-przy. Akad. Umiej. Krakow. tom. XXII, 1892, p. 363, t. VI, f. 22.

Long. 13,5—17 μ; lat. 8,5—10 μ; lat. isthm. 7—8,5 μ.

On rocks in riverbed amongst *C. læve* Rabenh. and *C. Schmidtii* n. sp. Raciborski's Australian plant is decidedly a form of *C. pseudarctoum* Nordst.
Area: Europe, Australia.

79. **C. pseudoconnatum** Nordst. in Vidensk. Medd. f. d. naturh. Foren. Kjøbenhavn, 1869, no. 14, p. 214, t. III, f. 17.

Long. 59 μ; lat. 42,5 μ; lat. isthm. 38 μ.

In muddy ricefields.
Area: Europe, N. and S. America, India, Ceylon, Madagascar.

80. **C. subturgidum** (Turner) Schmidle in Hedwigia, Bd. XXXIV, 1895, p. 300. *Dysphinctium subturgidum* Turn. in Kongl. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 1893, p. 40, t. VII, f. 4.

Forma minor Schmidle l. c. t. IV, f. 2.
Long. 96 μ; lat. 52 μ; lat. isthm. 49 μ.

In stagnant water amongst *Spirogyra decimina* var.
Area: E. Africa, India, Sumatra, Java, Samoa, Australia.

Staurastrum Meyen.

81. **S. apiculatum** Bréb. in Mém. Soc. Sci. Nat. Cherbourg, IV, 1856, p. 142, t. I, f. 23; West & G. S. West in Trans. Linn. Soc. bot. ser. 2, V, 1896, p. 254, t. XVI, f. 6.

Long. sine spin. 21 μ; lat. sine spin. 21 μ; long. spin. 1,5 μ; lat. isthm. 6,5 μ.

Area: Europe, N. America, India, Japan.

82. **S. bifidum** Ralfs in Ann. Mag. Nat. Hist. V, 1845, p. 151, t. X, f. 3; Lund. in Nova Acta Soc. Scient. Upsala, ser. 3, VIII, 1871, p. 62, t. IV, f. 2.

Forma spinis valde convergentibus.

Long. 33 μ: lat. sine spin. 29 μ; long. spin. 7—8 μ; lat. isthm. 12 μ.

On rocks in riverbed.

Area: Europe, Siberia, India, Ceylon, Java, Japan.

83. **S. echinatum** Bréb. in Ralfs Brit. Desm. 1848, p. 215, t. XXXV, f. 24.

Long. sine spin. 33 μ, cum spin. 42 μ; lat. sine spin. 29 μ, cum spin. 40 μ; lat. isthm. 9 μ. (Tab. nostr. III, fig. 31).

This *Staurastrum* of which we observed several examples, has been referred to *S. echinatum* Brèb. after much consideration. It is certainly not a form of *S. teliferum* Ralfs., neither is it a form of *S. gladiosum* Turn., the only other species with which it could be confounded. Brébisson's figure in Ralf's ‚British Desmids' (l. c.) is a very poor one, and yet our plant agrees with it in size, in outward form, in the depth of its constriction, and in relative length and number of the spines.

From *S. teliferum* Ralfs it differs in its somewhat rhomboideo-elliptical semicells which cause a much more open sinus; the spines are more numerous, a little longer and more delicate; the angles of the vertical view are not so rounded, the sides are hardly so concave, and the spines are more scattered.

From *S. gladiosum* Turn. it is distinguished by its somewhat smaller size, by its relatively longer cells, its more angular semicells and slightly more open sinus; the spines are about the same in number, but they are slightly longer and more delicate, and are more or less evenly distributed over the whole of the semicells; the angles of the vertical view are not so rounded and the spines extend all over the central part (i. e. all over the actual dorsal region of the semicells of the *Staurastrum*).

The *S. echinatum* figured by Wolle (Desm. U. S. 1884, t. 45, f. 31—32) does not represent the species, the spines being too short. That figured by Turner (in Kongl. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 1893, t. VI, f. 48) may be a form of *S. echinatum* Bréb. but it does not agree sufficiently well with Brébisson's figure in Ralfs ‚British Desmids' to represent a typical specimen. The plant recorded by Schmidle (in Engler's Botan. Jahrbuch. Bd. XXVI, 1898, p. 55) as „*St. echinatum* forma?" and figured by him (t. IV, f. 11) as „*S. echinatum* Bréb." is much too short-spined for Brébisson's species and is much nearer a small form of *S. pilosum* (Näg.) Arch.

In stagnant water in the jungle.

Area: Europe, India.

84. **S. submonticulosum** Roy et Biss., in Journ. Bot. 1886, p. 238, t. 268, f. 7.

Forma angulis propius ad basin semicellularum; isthmo paullo angustiori.

Long. 28 μ; lat. 31 μ; lat. isthm. 8 μ.

In stagnant water among other Desmids.

Area: Japan.

85. **S. orbiculare** Menegh. Synops. Desm. in Linnæa 1840, p. 225; Ralfs Brit. Desm. 1848, p. 125, t. XXI, f. 5.

Var. **depressum** Roy et Biss. l. c. p. 237, t. 268, f. 14.

Long. 21—25 μ; lat. 21—25 μ; lat. isthm. 7,5 μ—8,6 μ.

With the preceding species.

Area (of type and varieties): Ubiquitous.

86. **S. Bieneanum** Rabenh. Alg. No. 1410; West & G. S. West in Journ. Roy. Micr. Soc. 1896, p. 158, t. III, f. 27. *S. orbiculare* var. *Bieneanum* Rabenh. Flor. Europ. Algar. III, p. 200.

Var. **orientale** West. & G. S. West, n. var. (Tab. nostr. III, fig. 29.)

Var. minor, dorso semicellularum convexo (non retuso in medio); membrana glabra.

Long. 25 μ; lat. 22,5 μ; lat. isthm. 6 μ.

Only one specimen of the Siamese plant was seen and provisionally we place it as a variety of *S. Bieneanum* Rabenh. It is very probable that *S. Bieneanum* var. *orientale* will ultimately prove to be a distinct species.

Area (of type): Europe, N. America, E. Africa, Madagascar, Siberia, Japan, Samoa, New Zealand and Australia.

87. **S. Zahlbruckneri** Lütkem. in Ann. des k. k. Naturhist. Hofmus. Wien 1900, Bd. XV, Heft 2, p. 125, t. VI, f. 41—43.

Var. **mamillatum** West & G. S. West, n. var. (Tab. nostr. III, fig. 35—37.)

Var. cellulis in ambitu subcircularibus; semicellulis subdepressis semicircularibus, apicibus latissime rotundatis; angulis bilobulatis, lobulis valde mamillatis, iis semicellulæ alterius interdigitatis cum iis alterius; a vertice visis lateribus subrectis.

Long. 92—95 μ; lat. 80—82 μ; lat. isthm. 27—28,5 μ.

Numerous examples of this fine *Staurastrum* were seen. The typical form was recently described by Lütkemüller from the Ningpo Mountains in Central China. The Siamese variety is relatively shorter and possesses more rounded semicells; the angles are more deeply lobed and distinctly mamillate, the mamillate lobes of one angle fitting into those of the other, thus causing a striking peculiarity of the sinus, the aperture of which is rarely visible.

The cell-wall is very much thickened at the mamillate angles and shows a marked lamination. Sometimes a few lateral wart-like excrescences are present on the opposed faces of two interdigitating lobes of the angles. The cell-wall is strongly punctate as in the typical form.

In stagnant water in the jungle.

Area (of type): Central China.

88. **S. alternans** Bréb. in Ralfs Brit. Desm. p. 132, t. XXI, f. 7.

Long. 26 μ; lat. 25 μ; lat. isthm. 8,5 μ.

In muddy ricefields.

Area: Europe, N. America, E. Africa, India, Java, New Zealand and Australia.

89. **S. hexacerum** Wittr. in Bih. till K. Sv. Vet.-Akad. Handl. 1872, Bd. 1. no. 1, p. 51. *Desmidium? hexaceros* Ehrenb. 1833. *S. tricorne* Menegh. 1840; Ralfs Brit. Desm. 1848, p. 134, t. XXII, f. 11 *a* et *c*, t. XXXIV, f. 8 *a*.

Var. **tropicum** West & G. S. West, n. var. (Tab. nostr. III, fig. 30).

Var. semicellulis elliptico-fusiformibus, ventre convexiori quam dorso; granulis minutissimis in seriebus trans angulos.

Long. 16 μ; lat. 20 μ; lat. isthm. 5,4 μ,

This is probably identical with the form figured from Sumatra by Schmidle as *S. pygmæum* Bréb. var. *obtusum* Wille.

In muddy ricefields.

Area (of type): Europe, N. and S. America, W. and E. Africa, Madagascar, Japan, New Zealand.

90. **S. micron** West & G. S. West in Journ. Roy. Micr. Soc. 1896, p. 159, t. IV, f. 50, 51.

Forma spinis reductis et numerosioribus. (Tab. nostr. III, fig. 38.)

Long. cum proc. 16—17,5 μ; lat. cum proc. 19—21 μ; lat. isthm. 5—5,5 μ.

In stagnant water in the jungle.

Area: Europe, W. Africa (var.).

91. **S. pseudotetracerum** West. et G. S. West in Trans. Linn. Soc. bot. ser. 2, V, 1895, p. 79, t. VIII, f. 39. *S. contortum* Delp. var. *pseudotetracerum* Nordst. in Kongl. Sv. Vet.-Akad. Handl. Bd. 22, no. 8, p. 50, t. V, f. 14.

Var. **robustum** West & G. S. West, n. var. (Tab. nostr. III, fig. 32—34.)

Var. cellulis (sine processibus) paullo longioribus, processibus brevioribus: a vertice visis 4-radiatis.

Long. sine proc. 16—20 μ, cum proc. 19—25 μ; lat. sine proc. circ. 9,5—13 μ, cum proc. 17—26 μ; lat. isthm. 5,5—6 μ.

With the preceding species.

Area (of type): N. America, Madagascar, Ceylon, New Zealand.

92. **S. margaritaceum** Menegh. Synops. Desm. in Linnæa 1840, p. 227; Ralfs Brit. Desm. 1848, p. 134, t. XXI, f. 9.

Forma 5-gona.

In stagnant water amongst *Spirogyra decimina* var.

Var. **robustum** West & G. S. West in Journ. Roy. Micr. Soc. 1897, p. 496, t. VII, f. 14.

Long. 25,5 μ; lat. cum proc. 27,5 μ; lat. isthm. 7,5 μ.

In stagnant water in the jungle.

Area (of type): Ubiquitous.

93. **S. inconspicuum** Nordst. in Acta Univ. Lund. IX, 1873, p. 26, t. I, f. 11.

Long. 14 μ; lat. 13 μ; lat. isthm. 5,2 μ.

With the preceding species.

Area: Europe, N. America, Siberia, Burmah.

94. **S. leptacanthum** Nordst. in Vidensk. Medd. Naturh. Foren. Kjøbenhavn, 1869, p. 229, t. IV, f. 46.

Long. s. proc. 38 μ, c. proc. 76 μ; lat. s. proc. 19 μ, c. proc. 50 μ.

In muddy ricefields.

Area: N. and S. America. Senegal. Ceylon. Siberia.

Arthrodesmus Ehrenb.

95. **A. alatus** West & G. S. West, n. sp. (Tab. nostr. III, fig. 23—25).

A. parvus, circiter tam longus quam latus, profundissime constrictus, sinu angusto-lineari extremo subampliato; semicellulæ late rectangularo-trapeziformes, angulis inferioribus subrotundatis, lateribus leviter concavis et sursum divergentibus, angulis superioribus leviter productis, subrotundatis cum spina brevissima minutissima, apicibus late retusis, nonnunquam spinis brevissimis minutissimis paucis 2—4 circa angulos superiores; a vertice visæ ellipticæ, polis apiculatis; membrana delicatissime punctata.

Long. 25—31 μ; lat. bas. semicell. 20—25 μ; lat. apic. semicell. 23—27 μ; lat. isthm. 4,4—7,5 μ; crass. 12,5 μ.

Numerous examples of this species were obtained from amongst *Utricularia* in a riverbed. They varied a little in their general form and proportions, but the chief variation was in the small spines round the upper angles of the semicells. The majority of specimens possessed only the apiculations at the upper angles, but others possessed a variable number (from one to four) of small spines arranged approximately in a ring round the angles.

In outward form it cannot be mistaken for any other species of the genus.

Hyalotheca Ehrenb.

96. **H. undulata** Nordst. in Wittr. et Nordst. Alg. Exsicc. 1879, no. 248.

Long. 13—17 μ; lat. 5,7—6,7 μ.

In stagnant water in riverbed.

Area: Europe, N. America, India.

97. **H. dissiliens** Bréb. in Ralfs Brit. Desm. 1848, p. 51, t. I, f. 1.

Lat. 16—18 μ; diam. zygosp. 19—22 μ.

In stagnant water in riverbed among various species of *Spirogyra*, with zygospores.

Area: Ubiquitous.

Ord. *Protococcaceæ.*

Fam. Palmellaceæ.

Cœlastrum Näg.

98. **C. sphæricum** Näg. Gatt. einzell. Alg. 1849, p. 98, t. V, f. C 1.

In stagnant water in the jungle.

Area: Europe, N. and S. America, W. Indies, Madagascar, India, Sumatra, Siberia, New Zealand.

99. **C. pulchrum** Schmidle in Bericht. d. d. Botan. Gesellsch. Bd. X, 1892, p. 206, t. XI, f. 1.

Var. **intermedium** Bohlin in Bih. till K. Sv. Vet.-Akad. Handl. Bd. 23, no. 7, 1897, p. 35, t. II, f. 16, 17.

In stagnant water in the riverbed.

Area (of type): Europe, S. America, Ceylon, Queensland.

Pediastrum Meyen.

100. **P. duplex** Meyen. *P. pertusum* Kütz. *P. Napoleonis* Ralfs Brit. Desm. p. 184, t. XXXI, f. 7.

With the preceding species abundant.

Area: General in temperate and tropical regions.

Var. **clathratum** A. Br. Alg. Unicell. p. 93.

With the typical form.

101. **P. Tetras** (Ehrenb.) Ralfs in Ann. Mag. Nat. Hist. XIV, 1844, p. 469, t. XII, f. 4. *Micrasterias Tetras* Ehrenb. 1838.

With the preceding species and very abundant. Coenobia of 4, 1+7 and 5+11 cells.

Area: Ubiquitous.

Scenedesmus Meyen.

102. **S. bijugatus** (Turp.) Kütz. Syn. Diat. 1333, p. 607. *Achnanthes bijuga* Turp.

Abundant in stagnant water in the jungle and in muddy ricefields.

Area: Ubiquitous.

103. **S. denticulatus** Lagerh. in Öfvers. af K. Vet.-Akad. Förh. 1882, no. 2, p. 61, t. II, f. 13—16.

Var. **linearis** Hansg. in Archiv Naturwiss. Landesdurchf. Böhm. Bd. 6, 1888, p. 268.

In muddy ricefields.

Area: Europe, N. America, W. Africa, Madagascar, Ceylon.

104. **S. acutiformis** Schröder in Forschungsberichten der Plöner Biol. Stat. Heft 5, 1897, p. 17, t. II, f. 4.

Var. **spinuliferum** West & G. S. West n. var. (Tab. nostr. IV, fig. 46—49.)

Var. cænobiis e cellulis 2—8 (plerumque 4) constitutis; polis cellularum spinis curvatis minutis 2—3 instructis.

Long. cell. sine spin. 14—24 μ; lat. cell. 3,2—8,5 μ; long. spin. 1—5,7 μ.

This variety occurred in large quantity amongst other *Palmellaceæ* in stagnant water. The cœnobia were of all sizes and contained from two to eight cells. All the cells possessed the lateral ridges characteristic of this species. The small spines were very variable in number and position, but were always of appreciable length and generally considerably curved.

It bears a considerable resemblance to *S. denticulatus* var. *linearis* Hansg., but is readily distinguished by the two prominent ridges on each cell of the cœnobium. The spines at the poles of each cell are also longer and more curved than in *S. denticulatus* Lagerh.

105. **S. quadricauda** (Turp.) Bréb. in Mém. Soc. sc. nat. Falaise, bot. 1835, p. 66: Ralfs Brit. Desm. 1848, p. 180, t. XXXI, f. 12.

In stagnant water in riverbed.

Area: Ubiquitous.

Rhaphidium Kütz.

106. **R. polymorphum** Fresen. in Abhandl. der Senckenb. naturf. Gesellsch. II, p. 199, t. VIII.

Var. **aciculare** (A. Br.) Rabenh. Flor. Europ. Algar. III, p. 45.

In stagnant water in the jungle.

Var. **falcatum** (Corda) Rabenh. l. c.

With the preceding variety.

Area: This species and its varieties are ubiquitous.

107. **R. convolutum** (Corda) Rabenh. l. c. p. 46.

Lat. cell. 3,8 μ.

With the preceding species.

Area: Europe.

Selenastrum Reinsch.

108. **S. gracile** Reinsch. in Abhandl. Naturhist. Gesellsch. zu Nürnberg, III, 1866, p. 65, t. IV, f. 3 *a—b*.

In stagnant water, scarce.
Area: Europe, S. America, Abyssinia, India.

Tetraëdron Kütz.

109. **T. regulare** Kütz. Phyc. Germ. p. 129. *Polyedrium tetraëdricum* Näg. Gatt. einzell. Alg. 1849, p. 84, t. IV B, f. 3.

Diam. 22—23 μ.

Area; Europe, N. and S. America, W. Indies, E. Africa, Abyssinia, Kordofan.

110. **T. bifurcatum** Lagerh. in Nuova Notarisia 1893, p. 160. *Polyedrium tetraëdricum* Näg. var. *bifurcatum* Wille.

Diam. sine spin. 38—46 μ, cum. spin. 50—59 μ. (Tab. nostr. IV, fig. 50.)

Area: N. and S. America, W. Indies, Abyssinia, Kordofan.

111. **T. octaëdricum** (Reinsch) Hansg. in Hedwigia 1888, p. 131. *Polyedrium octaëdricum* Reinsch.

Diam. 25—27 μ.

Var. **spinosum.** *P. octaëdricum* var. *spinosum* Reinsch.

Diam. sine spin. 21—26 μ, cum spin. 32—38 μ.

Area: Europe.

112. **T. cruciatum** West & G. S. West. *Micrasterias cruciata* Wallich in Ann. Mag. Nat. Hist. ser. 3, vol. V, 1860, p. 281, t. XIII, f. 12; *Staurophanum cruciatum* Turn. in Kongl. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 1893, p. 159, t. XX, f. 20, 21.

Diam. 52—54 μ. (Tab. nostr. IV, fig. 51.)

The eight angles were bifurcate (not trifurcate) and a few of the spines were again furcate.

Amongst various Desmids, *Scenedesmus*, etc., in stagnant water in the jungle.
Area: India, Ceylon.

Reinschiella De Toni.

113. **R. siamensis** West & G. S. West, n. sp. (Tab. nostr. IV, fig. 52.)

Cellulæ magnæ, solitariæ et libere natantes, late lunato-lanceolatæ, margine exteriori multum convexo, margine interiori subrecto et levissime retuso, apicibus productis in spinas longas gracillimas et recurvatas.

Long. sine spin. 77 μ; lat. 28 μ; long. spin. circ. 17—52 μ.

Apparently a distinct species nearest to *R. crassispina* De Toni.

With various Desmids amongst *Spirogyra decimina* var. in stagnant water.

114. **R. obesa** West & G. S. West, n. sp. (Tab. nostr. IV, fig. 53—54.)

Cellulæ mediocres, solitariæ vel binæ (interdum 3), libere natantes, oblique ellipsoideæ, paullo curvatæ, margine exteriori convexo vel recto et levissime retuso, margine interiori valde convexo, apicibus spina robusta curvata brevi acutissima præditis.

Long. sine spin. 29—30,5 μ, cum spin. 42—46 μ; lat. 14 μ; long. spin. 6,5—7,5 μ.

One cell possessed a short, thick, extra spine near to one pole.

This plant differs from the other species of *Reinschiella* in the fact that the ventral (or internal) margin is much more convex than the dorsal (or external) margin. The spines thus appear to be curved in the opposite direction to the apparent curvature of the cells.

Among various *Palmellaceæ* in stagnant water in the jungle.

Dictyosphærium Näg.

115. **D. pulchellum** Wood in Smithson. Contrib. to Knowl. 1873, p. 84, t. X, f. 4. *D. globosum* Richt. in Hedwigia 1884, p. 65.

Diam. cell. 3,8—4,5 μ.

In stagnant water.

Area: Europe, N. and S. America. Abyssinia, Australia.

Botryococcus Kütz.

116. **B. Braunii** Kütz. Spec. Algar. p. 892; Rabenh. Flor. Europ. Algar. III, p. 43.

In stagnant water.

Area: Europe, N. and S. America, Abyssinia, India, Sumatra.

Ineffigiata West & G. S. West.

117. **I. neglecta** West & G. S. West in Journ. Roy. Micr. Soc. 1897, p. 503.

In stagnant water in the jungle.

Area: Europe, N. America, Ceylon.

Dimorphococcus A. Br.

118. **D. lunatus** A. Braun Alg. Unicell. p. 44; Rabenh. Flor. Europ. Algar. III, p. 36, cum fig. xylogr.; West in Journ. Roy. Micr. Soc. 1892, p. 735, t. IX, f. 39. *Scenedesmus radiatus* Reinsch.

With the preceding plant.

Area: Europe, S. America.

Oocystis Näg.

119. **O. elliptica** West in Journ. Roy. Micr. Soc. 1892, p. 736, t. X, f. 56.

Frequent in stagnant water in the jungle and in muddy ricefields.

Area: Europe, N. America, Madagascar, Ceylon.

Glœocystis Näg.

120. **G. vesiculosa** Näg. Gatt. einzell. Alg. 1849, p. 66, t. IV F.

In stagnant water amongst other *Palmellaceæ*.
Area: Europe, N. and S. America, Ceylon, Australia.

121. **G. gigas** (Kütz.) Lagerh. in Öfvers. af K. Vet.-Akad. Förh. 1883, no. 2, p. 63. *Protococcus gigas* Kütz. *Chlorococcum gigas* Grun. *Glœocystis ampla* Rabenh.

In stagnant water in the jungle and in muddy ricefields.
Area: Ubiquitous.

Kirchneriella Schmidle.

122. **K. obesa** Schmidle in Flora oder Allg. Bot. Zeitung 1894, Heft 1, p. 44. *Selenastrum obesum* West in Journ. Roy. Micr. Soc. 1892, p. 734, t. X, f. 50—52.

Crass. cell. 4,8—5,2 μ.

In stagnant water in the jungle.
Area: Europe.

Appendix.

Fam. Characeae. [1])

Chara.

123. **C. gymnopithys** Al. Br.
vel **C. flaccida** Al. Br.

The specimens were too young for a certain determination.

Muddy ricefield near Lem Dan.

Class. Florideae.

Fam. Helminthocladiaceae.

Batrachospermum Roth.

124. **B. moniliforme** Roth.
var. **confusum** (Hass.).

On rocks in small waterfalls in the jungle near Klong Son.
Area: Europe.

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[1]) Auctore O. Nordstedt.

Description of Plates.

a, *a'* = cellula vel semicellula a fronte visa.
b = „ „ „ a vertice visa.
c = „ „ „ a latere visa.
d = semicellula a basi visa.

Plate II.

Figure

1. *Pleurotænium gloriosum* West & G. S. West forma. × 520.
2. *Gonatozygon Kinahani* Rabenh. var. *tropicum* West & G. S. West, n. var.
3—4. *Closterium tumidum* Johnson. Two forms. × 520.
5. *Closterium acerosum* Ehrenb. forma. With zygospore. × 120.
6—7. *Closterium Cornu* Ehrenb. var. *siamense* West & G.S.West, n. var. × 520.
8—11. *Cylindrocystis subpyramidata* West & G. S. West, n. sp. × 520.
12—13. *Cosmarium pseudorthopunctatum* West & G. S. West, n. sp. × 520.
14—16. *Cosmarium læve* Rabenh. 15 and 16, zygospores. × 520.
17. *Cosmarium æquatum* West & G. S. West, n. sp. × 520.
18. *Cosmarinm subtriordinatum* West & G. S. West forma. × 520.
19. *Cosmarium subauriculatum* West & G. S. West. × 520.
20. „ „ var. *truncatum* West & G. S. West, n. var. × 520.

Plate III.

21. *Micrasterias Möbii* West & G. S. West. × 520.
22. „ „ var. *tetrachastriformis* West & G. S. West, n. var, × 520.
23—25, *Arthrodesmus alatus* West & G. S. West, n. sp. × 520.
26. *Cosmarium pseudotaxichondrum* Nordst. var. *siamense* West & G. S. West, n. var. × 520.
27—28. *Cosmarium Schmidtii* West & G. S. West, n. sp. × 520.
29. *Staurastrum Bieneanum* Rabenh. var. *orientale* West & G. S. West, n. var. × 520.
30. *Staurastrum hexacerum* Wittr. var. *tropicum* West & G. S. West, n. var. × 520.
31. *Staurastrum echinatum* Bréb. × 520.
32—34. *Staurastrum pseudotetracerum* West & G. S. West var. *robustum* West & G. S. West, n. var. × 520.
35—37. *Staurastrum Zahlbruckneri* Lütkem. var. *mamillatum* West & G. S. West, n. var. × 520.
38. *Staurastrum micron* West & G. S. West, forma. × 520.

Plate IV.

39—41. *Œdogonium maximum* West & G. S. West, n. sp. × 220.
42. *Œdogonium dioicum* Carter. × 220.
43—45. *Spirogyra Schmidtii* West & G. S. West, n sp. 43 and 44, × 220; 45, × 520.
46—49. *Scenedesmus acutiformis* Schröder var. *spinuliferum* West & G S. West, n. var. × 520.
50. *Tetraëdron bifurcum* Lagerh.
51. *Tetraëdron cruciatum* West & G. S. West. × 520.
52. *Reinschiella siamensis* West & G. S. West, n. sp. × 520.
53—54. *Reinschiella obesa* West & G. S. West, n. sp. × 520.

Marine Algae[1])

(Chlorophyceae, Phaeophyceae, Dictyotales, Rhodophyceae [2])

by **Th. Reinbold** — Itzehoe.

Chlorophyceae.

Ulvaceae.

Enteromorpha Link.

1. **E. plumosa** Kg. Phyc. gen. p. 300, non Ahln; De Toni Syll. I. p. 132. — *E. Hopkirkii* (M' Calla) Harv. — *E. paradoxa* Kg. Spec. p. 479.

Our specimen represents a very delicate form which agrees with *E. paradoxa β. angustissima* Kg. Tab. phyc. VI. t. 35. Epiphytic on *Laurencia obtusa.*

Koh Chang-Strait in shallow water, in some places between tide-marks.

Area: Baltic; Atlantic; Mediterranean; Australia (probably more widely distributed).

Protoderma Kg.

2. **P. sp.**

Very thin indefinite membranaceous layers on shells. The plant tolerably agrees with *P. marinum* Rke. Algenfl. W. Ostsee p. 81. which is abundant in the Baltic and the German Sea, covering stones and shells. (cfr. *P. viride* Kg. Tab. phyc. VI. t. 11). In Engl. u. Prantl Pflanzf. p. 78 *Protoderma* is denoted as genus dubium.

Lem Ngob, on dead shells in the mangrove.

Caulerpaceae.

Caulerpa Lamx.

3. **C. filiformis** (Harv.) J. Ag. Alg. Syst. I. p. 5; Web. v. Bosse Caulerpa p. 262; De Toni Syll. I. p. 442. — *Herpochaete filiformis* Harv. List Friendl. Isl. Alg. Nr. 95.

Fragments only.

Koh Kahdat in 1—2 fathoms water (coral-sand).

Area: Friendly Islds.

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[1]) With an asterisk I have marked the species already known from Siam.

[2]) As to the marine *Myxophyceae* see the following paper by Gomont. As to the *Corallinaceae* see part II. of these contributions.

4. **C. fastigiata** Mont. Cent. I. Nr. 16; Web. v. Bosse l. c. p. 262; De Toni Syll. I. p. 442.

f. **minor** Web. v. Bosse l. c. p. 263.

The little plants exactly agree with the original specimen (in the Botan. Museum of Hamburg) on which Mad. Weber v. Bosse has founded the forma *minor*.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Brazil.

5. **C. verticillata** J. Ag. Alg. Liebm. p. 6; Alg. Syst. I. p. 6; Web. v. Bosse l. c. p. 267; De Toni Syll. I. p. 443.

N. of Koh Kahdat on coral-reefs in shallow water.

Area: W. Indies; Ceylon; Friendly and Tonga Islds.

6. **C. scalpelliformis** (R. Br.) Ag. Spec. p. 437; sens. ampl. Web. v. Bosse l. c. 268. — *C. denticulata* Decn. — *Fucus scalpelliformis* R. Br. in Turn. Hist. t. 174.

Fragment only which perhaps is to be referred to var. *intermedia* Web. v. Bosse l. c. p. 287.

Between Koh Mesan and Cape Liant, in 9 fathoms water.

Area: Red Sea; Australia; Tasmania; Ceylon; Mauritius.

7. **C. plumaris** (Forsk.) Ag. Spec. p. 436; Web. v. Bosse l. c. p. 294; De Toni Syll. I. p. 453. — *Fucus plumaris* Forsk. Flor. aegypt. p. 190.

f. **longipes** Web. v. Bosse l. c. p. 295. — *C. plumaris* v. *longipes* J. Ag. Alg. Syst. I. p. 15. — *Fucus taxifolius* Turn. Hist. t. 54. non Vahl.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: In all tropical Seas.

8. **C. Freycinetti** Ag. Spec. p. 446; sens ampl. Web. v. Bosse l. c. p. 310.

var. **typica** Web. v. Bosse l. c. p. 312.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Guadeloupe; Red Sea; warm Pacific.

var. **pectinata** Web. v. Bosse l. c. p. 316 [1]).

A fragment only.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Guadeloupe.

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[1]) The determination of this fragment I owe to the kindness of Mad. Weber v. Bosse.

9. **C. Urvilliana** Mont. Voy. Pôle Sud. p. 21, sens. ampl. Web. v. Bosse l. c. p. 318.

var. **typica** f. **tristicha** Web. v. Bosse l. c. p. 319.

C. Urvilliana is by forms narrowly connected with *C. Freycinetti;* I think our only fragmentary specimen is to be referred to *C. Urvilliana,* because there are three rows of teeth on one part of the frond.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area (f. *tristica*): Lucipara Islds ; Trop. Australia; Carolines Islds.

10. **C. racemosa** (Forsk.) J. Ag. Alg. Syst. I. p. 35; sens. ampl. Web. v. Bosse l. c. p. 357. — *Fucus racemosus* Forsk. Flor. aegypt. p. 191.

var. **uvifera** Web. v. Bosse l. c. p. 362.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: W. Indies; Red Sea; Warm Pacific.

11. **C. peltata** Lamx. Journ. de Bot. t. 3. fig. 2; sens. ampl. Web. v. Bosse l. c. p. 373.

The diameter of the disk varies in our plant from 3 to 8 mm.

Koh Chick, on rocks in shallow water.

Area: W. Indies; Red Sea; Warm Pacific.

12. **C. sedoides** (R. Br.) Ag. Spec. p. 438; Web. v. Bosse l. c. p. 387; De Toni Syll. I. p. 480. — *Fucus sedoides* R. Br. in Turn. Hist. t. 172.

The specimen is perhaps allied to f. *crassicaulis.*

Koh Kahdat, in shallow water (coral-sand).

Area: Australia; N. Zealand; Samoa-, Tonga-, Friendl. Islds.

13. **C. lentillifera** J. Ag. Alg. Rueppel. p. 173; sens. ampl. Web. v. Bosse l. c. p. 380.

var. **longistipitata** Web. v. Bosse in herb.[1]).

„Cette variété se distingue du *C. lentillifera typica* par, quelquefois, le petit nombre de ses rangées de vésicules, par le grand diamètre de celles-çi et le pédicelle dont la hauteur égale, ou surpasse la moitié du diamètre de la vésicule.

Quelques échantillons de cette variété ressemblent beaucoup, à première vue, au *C. racemosa* var. *clavifera*, mais ils se distinguent par le rétrécissement du pédicelle à son sommet de tous les échantillons de cette variété". Web. v. Bosse in litt.

Koh Chick, on rocks in shallow water.

Area (var. *longistipitata*): New Guinea; Sarasa (îles Postillon); Tuab (île de Key).

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[1]) Mad. Weber v. Bosse was so kind to determine this Alga and to give me the following notices.

Codiaceae.

Halimeda Lamx.

14. **H. macroloba** Decne. Corall. p. 91; De Toni Syll. I. p. 520.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Red Sea; Indian and Pacific Oceans.

Udotea Lamx.

15. **U. flabellata** Lamx. Polyp. flex. p. 311 t. 12; De Toni Syll. I. p. 510.

The Pacific specimens seem to be a little more elongated and more deeply split than the plants from the W. Indies; any other difference is not to be seen.

Off Koh Kam, in 10 fathoms water.

Area: W. Indies; Ceylon; Tropic. Australia.

16. **U. glaucescens** Harv. List Friendl. Isl. Alg. Nr. 82; De Toni Syll. I. p. 505.

A fragment only.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Friendl. Islds.

Avrainvillea Dcne.

17. **A. papuana** (Zan.) Murr. et Bood. Avrainv. in Journ. of Bot. 1889; De Toni Syll. I. p. 514. — *Chloroplegma papuanum* Zan. Phyc. papuan. Nr. 10 in N. Giorn. Bot. Ital. X. 1878.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: N. Caledonia; N. Guinea; Ceylon; Philippines.

18. **A. comosa** (Bail. et Harv.) Murr. et Bood. l. c.; De Toni Syll. I. p. 515. — *Chlorodesmis comosa* Bail. et Harv. in Harv. Ner. boreal. Americ. III. p. 29. (?)

Undeveloped fragment only, therefore doubtful as to species.

Off Koh Kam, in 10 fathoms water.

Area: Warm Pacific (not uncommon).

Valoniaceae.

Dictyosphaeria Decne.

19. **D. favulosa** (Mert.?) Dcne Classif. alg. p. 32; De Toni Syll. I. p. 371. — *Ulva favulosa* Mert. msc.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Warm Atlantic, Indian and Pacific Oceans.

Valonia Ginn.

20. **V. utricularis** Ag. Spec. p. 431; De Toni Syll. I. p. 376. — *V. utricularis* f. *aegagropila* Hauck Meeresalg. p. 469. — *V. aegagropila* Ag.

With Hauck l. c. I consider *V. aegagropila* only a form of *V. utricularis*.

Koh Kahdat, on coral-reefs in shallow water.

Area: Mediterranean; Atlantic; Indian and Pacific Oceans.

21. **V. Forbesii** Harv. Alg. Ceyl. exsicc. N. 75; De Toni Syll. I. p. 374.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Indian Ocean; warm Pacific.

Struvea Sond.

22. **St. delicatula** Kg. Tab. phyc. XVI. p. 1 t. 2; Murr. et Bood. Struvea. p. 281, Nr. 6; De Toni Syll. I. p. 366. — *Cladophora anastomosans* Harv. Mar. Bot. W. Austr. Nr. 39. Alg. aust. exsicc. Nr. 582.

Little plant and fragments only, which are however characteristic enough.

Koh Lom, on coral-reefs in shallow water.

Area: Guadeloupe; Ceylon; Australia, N. Caledonia.

Siphonocladus Schmitz.

23. **S. Zollingeri** (Kg) Born. in Hariot in Jour. Bot. 1887, p. 56; De Toni Syll. I. p. 358. — *Cladophora (Aegagropila) Zollingeri* Kg. Spec. p. 415, Tab. phyc. IV. t. 64.

Off Koh Kahdat, in 5 fathoms water (coral-sand).

Area: Java.

Boodlea Murr. et De Toni in Journ. Linn. Soc. Bot. XXV.

24. **B. (coacta var?) Siamensis** Reinb. u. sp.

B. intricata, subspongiosa; filamentis primariis paullulum laxe ramosis, ramis dense divaricatimque quoquoversum ramulosis; ramulis hinc illinc ope tentaculorum inter se cohaerentibus; articulis longitudine valde inaequalibus, primariis ad 200 μ, ramulorum c. 30—40 μ crassis, articulis terminalibus apice obtusis; articulis primariis saepe elongatis usque 20plo diametro longioribus.

This is a true *Boodlea* and, as I think, a good species nearly related to *B. coacta,* but which by other algologists may perhaps be considered only a variety of the latter.

Our plant differs from *B. coacta* — of which I have a specimen from *Japan* (leg. Okamura) beside me for comparison — by somewhat less compact and less sponge-like habit, as the primary filaments, provided in part with much elongated joints, are not so densely beset with main branches. The density however of the branches of the second order and

of branchlets is almost the same in both plants, but the latter are in our plant much more spreading. As to the tentacula they are quite evident in *B. Siamensis,* but they seem to occur less numerously than in *B. coacta.* The joints in the different parts of the frond of *B. coacta* are tolerably equal in length, while in our plant they generally vary not inconsiderably in length in one and the same part of the frond. Besides the joints of the primary filaments of *B. Siamensis* are thicker than in B. coacta.

By examination of material preserved in alcohol I can confirm the opinion uttered with some caution by Murray, who examined only dried specimens, (of *B. coacta*), that the chromatophores agree wholly with those which Schmitz has described for the genus *Siphonocladus.* (see Engl. u. Prantl. Pflanzf. I. p. 147, fig. 98).

Koh Kahdat, in 1—2 fathoms water (coral-sand.),

Dasycladaceae.

Acetabularia Lamx.

25.* **A. major** v. Mart. O. Asiat. Tange p. 25. t. 4; v. Solms-Laubach Acetabul. in Transact. Linn. Soc. 1895, Nr. 6. — De Toni Syll. I. p. 419.

The splendid well developed plants agree well with this species, except in that the stalks are somewhat longer (up to 10 cm.) than those described and figured by v. Martens which difference is, I think, of no importance.

The disk measures 2 cm. in diameter and the rays vary in number from 70 to 80.

Abundant in the Koh Chang-Strait on rocks, stones, piles etc. between tide-marks.

Area: Siam (Simaharadscha); Timor; N. Guinea.

Phaeophyceae.

Fucaceae.

Sargassum Ag.

26. **S. polycystum** Ag. Syst. p. 304; De Toni Syll. III. p. 103. — *S. brevifolium* Grev.

Koh Kahdat, in 1—2 fathoms water, attached to stones.

Area: Common in the Indian and Pacific Oceans.

Cystoseira Ag.

27. **C. latifrons** Kg. Tab. phyc. X. p. 22, t. 60; De Toni Syll. III. p. 176.

Perhaps the same species as *C. prolifera* J. Ag.

Koh Kahdat, in 1—2 fathoms water, attached to stones.

Area: China; Timor; Tropic. Australia.

Turbinaria Lamx.

28. **T. conoides** Kg. Tab. phyc. X. p. 24, t. 66; Barton, Turbin, in Transact. Linn. Soc. 1891 p. 217, t. 54: De Toni Syll. III. p. 126. — *T. vulgaris* v. *conoides* J. Ag. Spec. I. p. 267.

Koh Kahdat, in 1—2 fathoms water attached to stones; Koh Chang-Strait at Lem Ngob, cast ashore.

Area: Red Sea; Indian and Pacific Oceans.

Sphacelariaceae.

Sphacelaria Lgby.

28a. **Sph. furcigera** Kg. Tab. phyc. V. p. 27, t. 90.

On *Turbinaria*.

Koh Kahdat, in 1—2 fathoms water.

Area: Red Sea; Indian and Pacific Oceans.

Ectocarpaceae.

Ectocarpus Lgby.

29. **E. indicus** Sond. in Zoll. Verz. p. 3; De Toni Syll. III. p. 546. — *E. amicorum* Harv. Alg. Friendl. Isl. Nr. 8.

Plurilocular sporang.

Off Koh Mesan, attached to a floating cocoa-nut.

Area: Warm Pacific (Java; N. Guinea; Friendly Isl.).

30. **E. simpliciusculus** Ag. in Bot. Zeit. 1827, p. 639. var. *Vitiensis* Asken. Gazelle. p. 20. t. 5; De Toni Syll. III. p. 496. (?)

Too fragmentary, therefore doubtful as to species.

Koh Chang Noi, on coral-reef in shallow water.

Area: Fidji Islds.; E. Australia, Sandwich Islds.

Encoeliaceae.

Colpomenia Derb. et Sol.

31*. **C. sinuosa** (Roth) Derb. et Sol. Mém. p. 11, t. 32; De Toni Syll. III. p. 489. — *Encoelium sinuosum* Ag. — *Asperococcus sinuosus* Bory. — *Ulva sinuosa* Roth. Catal. III. p. 327, t. 12.

Koh Chang-Strait at Lem Ngob, Koh Kahdat, cast ashore.

Area: Mediterranean; Atlantic; Red Sea; Indian and Pacific Oceans. (Siam, Simaharadscha).

Hydroclathrus Bory.

32*. **H. cancellatus** Bory Dict. VIII. p. 119; De Toni Syll. III. p. 490. — *Asperococcus cancellatus* Endl. — *Encoelium clathratum* Ag. — *Asperococcus clathratus* J. Ag.

The specimens from the Koh Chang-Strait represent a very fine and delicate form.

Koh Chang-Strait; Koh Kahdat, abundant on rocks and stones between tide-marks.

Area: Atlantic; Red Sea; Indian and Pacific Oceans; Siam (Simaharadscha).

Asperococcus Lamx.

33. **A. fastigiatus** Zanard. Phyc. indic. Pug. p. 134, t. 3. De Toni Syll. III. p. 496.

f. **major** Reinb. n. f.

fronde duplo crassiore et altiore sed minus ramosa quam in forma typica.

I think the present plant cannot be separated from *A. fastigiatus*, but it represents a remarkably robust form. The fronds are (in exsiccatis) about 5 mm. broad but less branched than the type in Zanardini's figure.

For the rest our plant offers the same characteristic features as the main species; the tips of the segments, simple or forked, are rounded and the diameter of the frond is nearly the same in all parts of the plant.

The specimens are provided (at the end of December) with pluriloc. sporangia which are collected in definite sori dispersed over the frond.

Koh Chang-Strait near Lem Ngob, in shallow water.

Area: Sarawak.

Dictyotales.

Dictyotaceae.

Dictyota Lamx.

34. **D. dichotoma** (Huds.) Lamx. in Desv. Journ. II. p. 42; De Toni Syll. III. p. 263. — *Ulva dichotoma* Huds. Flor. angl. p. 476.

Koh Chang-Strait at Lem Ngob, cast ashore.

Area: Common in all temperate and warm Oceans.

35. **D. Barteyresiana** Lamx. Dict. Nr. 17; De Toni Syll. III. p. 262. — *D. cuspidata* Kg. Tab. phyc. IX. t. 80.

The specimens represent in part a somewhat broad form of this very varying species.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: W. Indies; Tropic. Australia; Ceylon (probably more widely distributed in warmer Seas).

36. **D. divaricata** J. Ag. Alg. Syst. V. p. 101; De Toni Syll. III. p. 276. — *D. Barteyresiana* var. *β divaricata* J. Ag. Spec. I. p. 94. — *D. acutiloba* Kg. Tab. phyc. IX. t. 29 non J. Ag.

The specimens are sterile but correspond in all other characters with this species. (They also agree in some manner with *Dictyota indica* Sond. Kg. Tab. phyc. IX. t. 17, a species insufficiently fixed which is cited from Siam by v. Martens).

Koh Chang-Strait at Lem Ngob, cast ashore.

Area: Atlantic; Red Sea.

37. **D. sp.**

Only a single sterile and incomplete specimen; perhaps *D. robusta* J. Ag. Anal. alg. C. I. p. 76. (Australia).

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Haliseris Targ-Tozz.

38. **H. polypodioides** (Desf.) Ag. Spec. I. p. 142; De Toni Syll. III. p. 254. — *Dictyopteris polypodioides* Lamx. — *Fucus polypodioides* Desf. Flor. atl. II. p. 421.

Between Koh Mesan and Cape Liant, in 9 fathoms water.

Area: Mediterranean; Warm Atlantic; Cape; Red Sea; Pacific. (Australia, Japan).

Padina Adans.

39. **P. Commersonii** Bory Voy. Coq. Nr. 41, t. 21; J. Ag. Alg. Syst. V. p. 119; De Toni Syll. III. p. 244.

Among the present great number of specimens some are provided with oospores and belong surely, I think, to this species, but it is probable, that among the sterile plants there may be specimens of the widely distributed *Padina pavonia*.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: W. Indies; Red Sea; Tropic. Australia; Ceylon; N. Guinea; Japan.

Zonaria (Gymnosorus) J. Ag.

40. **Z. sp.**

Decumbent little crustaceous patches attached to stones and one little unattached sterile specimen. All show the structure of *Zonaria (Gymnosorus)*. Judging by their mode of growth the specimens probably represent young states of *Zonaria Diesingiana* J. Ag. or *Zonaria* (*Gymnosorus*) *variegata* (Lamx.), which both occur in the Pacific. (Or should our plant perhaps be identical with *Zonaria obscura* Dick., a doubtful species shortly described in Dickie, Alg. Mangaia Isl. in Journ. Linn. Soc. 1875, p. 31?).

Rhodophyceae.

Bangiales.

Bangiaceae.

Erythrotrichia Aresch.

41. **E. ceramicola** (Lgby.) Aresch. Phyc. Scand. p. 210; De Toni Syll. IV. p. 24. — *Bangia ceramicola* Chauv. — *Goniotrichum ceramicola* Kg. — *Conferva ceramicola* Lgby. Hydroph. Dan. p. 144, t. 48.

On *Padina* and *Laurencia*.

Koh Chang-Strait at Lem Ngob, on rocks between tide-marks.

Area: Mediterranean; Atlantic; Cape Horn; Timor; Tonga Isls.

Florideae.

Gelidiaceae.

Gelidium Lamx.

42. **G. crinale** (Turn.) Lamx.; De Toni Syll. IV. p. 156; *G. corneum* var. *crinalis* Auct. J. Ag. Spec. II. p. 470. — *Fucus crinalis* Turn. Hist. t. 198.

The specimen agrees in its habit with *Acrocarpus intricatus* Kg. Tab. phyc. XVIII. t. 35.

Koh Chang Noi and Koh Lom, creeping on coral-reefs in shallow water.

Area: Mediterranean; Atlantic; Red Sea; Pacific.

Rhodophyllidaceae.

Catenella Grev.

43. **C. Nipae** Zan. Phyc. indic. Pug. Nr. 35, t. 6; De Toni Syll. IV. p. 321.

Koh Chang-Strait at Lem Ngob, creeping on the roots of mangrove-trees between tide-marks.

Area: Sarawak.

Rhabdonia Harv.

44. **R. Schmidtii** Reinb. n. sp. (Fig. 1—5).

R. gelatinoso-membranacea, caespitosa, decumbens e teretiusculo compressa, $^1/_2$—2 mm. lata, dichotome et parce inordinateque lateraliter ramosa, frondes (et segmenta cujusque frondis) et inter se et cum aliis corporibus ope processuum hinc illinc arcte concrescentes; segmentis saepe ± elongatis marginibus paullulum inaequalibus (sparsim leviter constrictis et dilatatis) apicibus obtusis vel subacutis, prolificationibus et processibus difformibus, plerumque ± minutis, e marginibus vel rarius e disco emergentibus, praecipue versus apices et ad apices obsitis. Tetrasp. generis

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 5.

Fig. 3.

Fig. 1—5. *Rhabdonia Schmidtii.*

1. Fronds; nat. size. — 2—5 show the various forms of the excrescences growing out from the margins and the tips of the frond. 7: 1. (Dr. A. Voigt del. Figg. 2—5.)

(zonatim divisis) per frondem sparsis. Cystocarpiis ? ? — Chartae adhaeret.

The plant represents a true *Rhabdonia* by the structure of the frond, characteristic for this genus, together with the zonate tetraspores. Of all the known species of *Rhabdonia* the new species seems to be most nearly related to *R. decumbens* Grun. (Asken. Gazelle p. 46, t. 2). Even on reading the somewhat short diagnosis I had at first the conjecture, that the two plants, although living in very distant places of the world, were identical, but after having examined the figures of *R. decumbens,* I was convinced of the impossibility of uniting the two plants under one specific name.

Our specimens are so intricated and in part so closely attached one to the other and also to small grains from the ground (pieces of shells etc.), that it is very difficult and often even impossible to separate the fronds without injury or to make a preparation of an uninjured complete specimen. In the figures I have attempted to show the habit of the plant, but it would require a great number of figures to give a complete idea of the great variety in branching and of the diverse arrangements of the prolifications and excrescences. These latter growing out from the margin or the tips of the segments (or of the prolifications) and more seldom from the flat surface, are also of a very varying form, sometimes they are like warts or little cushions, then they resemble little teeth or roundish, simple or forked cilia, or more elongated and variously divided ones, which fringe the margins or terminate the tips of the segments. (Figg. 2—5 represent some different forms of the excrescences). The frond is not strictly articulated (as in *R. clavigera, R. verticillata*) but it is in part and in an irregular manner slightly constricted and dilatated alternately, so as to make sometimes the margins of the frond unequal. The consistence of the frond is somewhat gelatinous so that the plant adheres firmly to the paper. I have not seen cystocarps.

Koh Chang-Strait, in shallow water near Lem Ngob.

Sphaerococcaceae.

Gracilaria Grev.

45. **G. confervoides** (L.) Grev. Alg. Brit. p. 123; De Toni Syll. IV. p. 431. — *Fucus confervoides* L. Spec. plant. II. p. 1629.

Off Koh Kam in 10 fathoms water.

Area: Widely distributed throughout all warm Seas.

46. **G. dura** (Ag.) J. Ag. Alg. medit. p. 151; De Toni Syll. IV. p. 442. — *Sphaerococcus durus* Ag. Spec. p. 310.

Area: In almost all warm Seas.

f. **prolificans** Reinb. n. f.

fronde admodum crassa, ramis et ramulis basi eximie constrictis, prolificationibus evidenter petiolatis ex apicibus truncatis ramorum (fere flabellatim) egredientibus.

The specimens show the structure and the other characteristic points of *Gracilaria dura,* a species much varying in its habit; but I think our plant represents a very distinct form, which should be fixed. In general, prolifications occur rarely in the genus *Gracilaria.*

The specimens, provided with cystocarps, are somewhat stout and robust, about 10 cm. high and about 1—1½ mm. thick (in diameter).

Koh Chang-Strait, in shallow water near Lem Ngob.

Hypnea Lamx.

47. **H. musciformis** (Wulf.) Lamx. Ess. p. 43; De Toni Syll. IV. p. 472. — *Fucus musciformis* Wulf. in Jacq. Coll. III. p. 154, t. 14. Fig. 3.

A small but fruiting (tetrasp.) specimen.

Koh Chang-Strait at Lem Ngob, in sandy ground between tide-marks.

Area: In all warm Seas.

Champia Desv.

48. **Ch. parvula** (Ag.) J. Ag. Epic. p. 303; De Toni IV. p. 558. — *Lomentaria parvula* Gaill. — *Chylocladia parvula* Hook. — *Chondria parvula* Ag. Syst. p. 207.

The (sterile) specimen agrees in its habit with *Lomentaria parvula β. vaga* Kg. Tab. phyc. XV. t. 87.

4 miles S. of Koh Saket, in 9 fathoms water (shells).

Area: Mediterranean; Atlantic; Australia; Japan.

Caloglossa (Harv.) J. Ag.

49. **C. muioides** Harv. Alg. exsicc. Friendl. Isl. Nr. 33; J. Ag. Epic. p. 500; De Toni Syll. IV. p. 729. — *Hypoglossum Vieillardi* Kg. Tab. phyc. XVI. t. 10.

Very young specimens only, therefore somewhat doubtful as to species.

15 miles E. of Koh Chuen, in 10 fathoms water (shells.).

Area: N. Guinea; N. Caledonia; Friendl. Islds.; Ceylon. ?

Laurencia Lamx.

50. **L. divaricata** J. Ag. Spec. II. p. 754.

Koh Kahdat, in 1—2 fathoms water (coral-sand).

Area: Red Sea; Indian and Pacific Oceans.

51. **L. dendroidea** J. Ag. Spec. II. p. 753.

Koh Kahdat, cast ashore.

Area: Warm Atlantic; Pacific (Australia, Japan).

52. **L. obtusa** (Huds.) Lamx. Ess. p. 42; J. Ag. Epic. p. 653. — *Fucus obtusus* Huds. flor. angl. p. 586.

Some of the present specimens agree tolerably with var. *squarrulosa* Grun. Alg. Fidji-Samoa Islds. p. 23. (from Tongatabu).

Koh Chang-Strait at Lem Ngob, on rocks between tide-marks.

Area: Widely distributed in all warm Oceans.

Acanthophora Lamx.

53*. **A. orientalis** J. Ag. Spec. II. p. 820.

The specimen from Lem Ngob is sterile, therefore doubtful, but I have seen some little fertile fragments between Algæ from Koh Kahdat which certainly belong to this species.

Lem Ngob, Koh Kahdat in shallow water.

Area: Manila; Samoa-Tonga-Marianes Isls.; (Siam? sub nomine A. Thieryi).

Polysiphonia Grev.

54. **P. scopulorum** Harv. Mar. Bot. W. Aust. Nr. 88; J. Ag. Spec. II. p. 940.

On stones.

Koh Chang Noi, on coral-reef in shallow water.

Area: W. Australia.

Tolypiocladia Schmitz.

55. **T. glomerulata** (Ag.) Schm. in Engl. u. Prantl. Pfl. fam. p. 441. — *Polysiphonia glomerulata* (Ag.) J. Ag. Spec. II. p. 1016. — *Polysiphonia calodictyon* Harv.; *Polysiphonia calacantha* Harv. — *Hutchinsia glomerulata* Ag. Syst. p. 158.

Koh Kahdat, Koh Chang Noi, on coral-reefs in shallow water.

Area: Indian and Pacific Oceans.

Leveillea Dcne.

56. **L. jungermannioides** (Mart. et. Her.) Harv. Mar. Bot. W. Aust. p. 539. — *L. gracilis* Dcne. — *Polyzonia jungermannioides* (Mart. et. Her.) J. Ag. Spec. II. p. 1169. — *Amansia jungermannioides* Mart. et Her. in Flora 1836 p. 485.

Koh Chang Noi, Koh Lom, on coral-reefs in shallow water.

Area: Red Sea; Indian and Pacific Oceans.

Ceramiaceae.

Ceramium (Roth) Lgby.

57. **C. fastigiatum** Harv. in Hook. Journ. Bot. p. 303; J. Ag. Epic. p. 96; Anal. alg. Cont. II. p. 16.

The specimens are provided with tetraspores (exteriore latere ramulorum prorumpentibus).

Off Tung Kaben, in 6 fathoms water (mud).

Area: Mediterranean; Atlantic; Australia?

58. **C. Kützingianum** Grun. Alg. Samoa, Fidji Isl. p. 9. — *Gongroceras subtile* Kg. Tab. phyc. XIII. t. 2 (non *Ceramium subtile* Ag.).

Fragments of this species, one of the finest and most delicate of the genus often occur epiphytically on other Algæ in our material.

Koh Chang Noi, on coral-reef in shallow water; between Koh Mesan and Cape Liant, in 9 fathoms water.

Area: Samoa Isl.; N. Caledonia; Sandwich Isls.

Spyridia Harv.

59. **S. filamentosa** (Wulf.) Harv. in Brit. Fl. p. 336; J. Ag. Epic. p. 268. — *Fucus filamentosus* Wulf. Crypt. aq. p. 64.

Koh Kahdat, in 1—2 fathoms water (coral-sand); off Koh Kam, in 10 fathoms water (gravel).

Area: Widely distributed in all warm and temperate Seas.

Grateloupiaceae.

Cryptonemia.

60. **C. sp.**

The little specimen is too much torn and incomplete to be determined exactly as to species.

Between Koh Mesan and Koh Chuen, in 15 fathoms water (stones).

Squamariaceae.

Peyssonnellia Decne.

61. **P. Gunniana** J. Ag. Epic. p. 387. — *P. rubra* Harv. alg. austr. exsicc. Nr. 327.

Koh Chang Noi, on coral-reef in shallow water.

Area: Australia.

62. **P. rubra** (Grev.) J. Ag. Spec. II. p. 502. — *Zonaria rubra* Grev. in Transact. Linn. Soc. XV. p. 340.

Between Koh Mesan and Koh Chuen, in 15 fathoms water (stones).

Area: Mediterranean; Atlantic; Red Sea; Ceylon; Australia; Tonga Islds.

The *Corallinaceae* by M. Foslie have already been published in part II. of the „Flora of Koh Chang", Botanisk Tidsskrift, vol. 24, fasc. 1, p. 15—22.

Myxophyceae hormogoneae

by **M. Gomont** — Paris.

(With plate 5.)

Peu de travaux ont été publiés jusqu'ici sur les Algues de la partie Sud-Est de l'Asie, et les Myxophycées n'y sont représentées en général que par un nombre infime d'espèces [1]). Quant à la région même explorée par l'Expédition danoise et à la partie du continent qui l'avoisine, nous ne pensons pas qu'aucun Algologue l'ait jamais visitée. Les matériaux récoltés au cours de l'Expédition danoise de 1899—1900 dans le golfe de Siam méritaient donc d'être étudiés avec attention. S'ils ne nous ont fourni, que 27

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[1]) Voici les seuls renseignements que nous a fourni à cet égard la littérature. Encore les territoires mentionnés dans les travaux ci après sont ils presque tous assez éloignés de la localité qui nous occupe.

G. von Martens — Die preussische Expedition nach Ost-Asien, Botanischer Theil, die Tange, Berlin 1866. L'expédition a visité Java, Singapore, Siam, Macao, Hongkong, les Philippines et Macassar. L'ouvrage mentionne six Nostocacées seulement, des mers de la Chine et des îles de la Sonde — List of Algæ collected by Kurz in Burma; in Proceedings of Asiatic Society of Bengal, p. 462, 1871.

Zanardini, Phycearum indicarum pugillus a d. Ed. Beccari ad Borneum, Singapore et Ceylonum, annis 1865—67 collectarum, in Mem. R. Istituto veneto vol. XVII, 1872.

Quinze Anhomocystées et dix Homocystées figurent dans ce travail. Elles proviennent de Singapore, Ceylan et Sarawak dans l'île de Borneo.

Zeller, Algæ collected by M. Kurz in Arracan and British Burma, in Journ. Asiatic Soc. of Bengal, vol. XLII, part II, p. 165, 1873.

La liste donnée par l'auteur comprend 24 Homocystées et 36 Anhomocystées.

Heydrich, Beiträge zur Kenntniss der Algenflora von Ost-Asien, in Hedwigia, Band XXXIII, p. 267, 1894.

Ce travail comprend les îles Formose, Liukiu, Bonin et deux des Moluques. Trois espèces de Nostocacées seulement sont indiquées dont une est indéterminée.

Des ouvrages beaucoup plus importants ont été publiés récemment par M. de Wildeman sur les Indes Néerlandaises, mais ces îles ne sont généralement pas considérées comme appartenant à l'Asie.

espèces de Nostocacées hormogonées, il est à remarquer que, sur ce nombre, il s'en est réncontré deux nouvelles parfaitement caractérisées.

Ces 27 espèces se répartissent entre 13 genres, dont 6 appartiennent aux Homocystées et 9 aux Anhomocystées. Si on examine le catalogue que nous en donnons, on s'aperçoit immédiatement que les Algues à gaines épaisses et colorées l'emportent de beaucoup par le nombre des espèces et par leur fréquence. Ainsi, tandis que les genres *Oscillatoria, Lyngbya, Phormidium, Hydrocoleum* ne sont représentés chacun que par une espèce, les *Scytonema* et *Stigonema* en renferment treize à eux seuls. Deux *Schizothrix* seulement se trouvent, il est vrai, mentionnés sur notre liste, mais le *S. thelephoroides*, qui est pourvu d'une enveloppe remarquablement épaisse et ferme a été récolté dans six localités différentes. On a donc des raisons de croire qu'il abonde dans la région [1]).

Cette pénurie d'Algues à gaines minces ou molles peut n'être qu'apparente et résulter du moment où s'est faite l'exploration qui a eu lieu pendant la saison sèche, c'est à dire à une époque où les flaques d'eau peu profondes avaient disparu, ainsi que leurs hôtes habituels. Or c'est là surtout que se rencontrent les plantes insuffisamment protégées par leurs enveloppes, comme les *Oscillatoria, Phormidium, Nostoc, Anabœna* etc. Notons cependant que les rochers éclaboussés ou baignés par les cours d'eau permanents sont aussi l'habitat des espèces dont l'absence nons a frappé.

On pourrait conclure de cette dernière remarque que cette absence n'est pas purement accidentelle mais que, ainsi qu'on l'a maintes fois observé, les plantes les mieux adaptées aux régions tropicales sont celles qui trouvent dans l'épaisseur, la consistance ou la coloration de leur gaine une protection contre les sécheresses fréquentes et l'intensité de la lumière.

Les données que nous avons pu réunir sur l'aire d'habitation des espèces ont été indiquées dans le catalogue qui suit. Il ne faudrait pas cependant s'en exagérer l'importance. Bien que les recherches aient été poussées assez activement dans cette direction

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[1]) Ce n'est pas sans quelque étonnement que j'ai constaté l'absence du *Porphyrosiphon Notarisii* dans les spécimens soumis à mon examen. Cette Homocystée, dont les gaines sont épaisses et fortement colorées, se rencontre en effet fréquemment dans toutes les régions chaudes. Elle a été notamment récoltée dans l'Inde par Kurz et Bélanger et à Ceylan par Ferguson.

depuis que la systématique des Myxophycées est devenue plus précise, il reste encore beaucoup à faire. Les observations que je présentais il y a huit ans, dans la *Monographie des Oscillariées*, sur l'état incomplet de nos connaissances géographiques sont encore vraies en grande partie et, même en Europe, de vastes territoires sont restés jusqu'à présent inexplorés [1]).

Myxophyceæ Stizenberger.

Hormogoneæ Thuret.

Homocysteæ Bornet et Flahault.

Lyngbyeæ Hansgirg (extensæ).

Oscillatoria Vaucher.

1. **O. tenuis** Agardh.

Alg. Dec. II, p. 25, 1813.

var. *α* **natans** Gomont, Monogr. des Oscill., in Ann. des Sc. nat., VIIe Série, Bot., t. 16, p. 221, Pl. VII, fig. 2 et 3 — *O. natans* Kütz., Alg. aq. dulc. Dec., IV, n° 34.

Waterhole near Lem Ngob.

Aire géogr.: Grœnland, Suède, Danemark, Pays-Bas, Belgique, France, Allemagne, Hongrie, Italie, Afrique boréale et équatoriale, États Unis, Antilles Amérique équatoriale, Sumatra, Nouvelle Zélande, Nouvelle Calédonie.

Trichodesmium Ehrenberg

2. **T. Hildebrandtii** Gomont.

Loco cit. p. 197, Pl. VI, fig. 1 — *T. Ehrenbergii*, forma *indica* Hauck, Ueber einige von J. M. Hildebrandt im Rothen Meere und Indischen Ocean gesammelten Algen, in Hedwigia, vol. XXVII, Heft 4, p. 93.

Abundant in maritime plankton throughout the area explored.

Aire géogr.: Ceylan, Singapore, Cap St Andréas (Ile de Madagascar).

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[1]) Pour l'indication des aires géographiques j'ai seulement tenu compte des données qui présentaient un certain caractère d'authenticité. On sait en effet, qu'en l'absence d'échantillons originaux les déterminations ne doivent être acceptées qu'avec beaucoup de réserve, surtout chez les anciens auteurs.

Phormidium Kützing.

3. **P. inundatum** Kützing.

Spec. Alg., p. 251, 1849 — Gomont, loco cit. p. 172, Pl. IV, fig. 31 et 32.

Waterhole near Lem Ngob.

Aire géogr.: France occidentale, Belgique, Saxe, Mont Cameron (Afrique équatoriale), États Unis, Guyane, Nouvelle Zélande.

Lyngbya Agardh.

4. **L. majuscula** Harvey.

In Hooker, Engl. Fl., V, part 1, p. 370, 1833 — Gomont, loco cit. p. 131, Pl. III, fig. 3 et 4.

Mangrove-swamp near Lem Dan on aërial roots of *Rhizophora conjugata* between tide-marks.

Aire géogr.: Norvège, Danemark, côtes de la Manche, côtes orientales et occidentales de l'Atlantique, Mer Méditerranée, Adriatique, Mer Rouge, Mer des Indes, Océan Pacifique.

Vaginarieæ Gomont.

Hydrocoleum Kützing.

5. **H. lyngbyaceum** Kützing.

Spec. Alg., p. 259, 1849 — Gomont, Monogr. des Oscill., in Ann. des Sc. nat., VIIe série, Bot., t. 15, p. 337, Pl. XII, fig. 8 à 10.

var. β **rupestre** Kützing, loco cit.

Mangrove-swamp near Lem Ngob, forming black, shining patches on the muddy ground and on aërial roots of *Avicennia officinalis*.

Aire géogr. Mer du Nord, Mer Baltique, Manche, Mer Méditerranée sur les côtes de France, d'Algérie et de Syrie, Océan Atlantique sur les côtes de France, d'Espagne, des Etats Unis et aux Bermudes, Ile Maurice, Borneo.

Schizothrix Kützing (emend.).

Subgen. **Chromosiphon** Gomont.

6. **S. Lamyi** Gomont.

In Bornet, Algues du département de la Haute-Vienne contenues dans l'herbier Lamy de la Chapelle, in Bull. de la Soc. bot. de France, t. XXXVIII, p. 250, 1891; Monogr. des Oscill., loco cit., p. 323, Pl. XI, fig. 1 à 3.

With *Schizothrix thelephoroides* on wet rocks in the jungle near Klong Munsé.

Aire géogr.: France centrale, Nouvelle Zélande.

7. **S. thelephoroides** Gomont.

Monogr. des Oscill., loco cit. p. 319, Pl. X, fig. 1 à 4.

Abundant on rocks in the jungle near Klong Munsé.

Aire géogr.: Ceylan, Brésil, Porto Rico.

Anhomocysteæ Gomont.

Sur quelques Oscillariées nouvelles, in Bull. de la Soc. bot. de France, t. XLVI, p. 33, 1899.

Heterocysteæ Hansgirg, Bemerk. zur System. einig. Süsswasseralgen, p. 9, 1884 — Bornet et Flahault, Revision des Nostocacées hétérocystées, in Ann. des Sc. nat., VIIe série, Bot., t. 3, p. 337.

Nostoceæ Kützing.

Nodularia Agardh.

8. **N. spumigena** Mertens.

var. β, **litorea**, Bornet et Flahault in Ann. des Sc. nat., VIIe série, Bot., t. 7, p. 246.

Bien que l'échantillon soit stérile, on ne peut, à cause du diamètre du trichome (15 μ), l'attribuer à une autre espèce que le *N. spumigena*. Il ne nous a d'ailleurs paru différer en rien des échantillons types de la forme *litorea*; cependant l'absence de spores nous empêche d'être absolument affirmatif sur ce dernier point.

Koh Kong, on the sandy sea-shore between tide-marks.

Aire géogr.: Suède, Mer Baltique et Mer du Nord, Pays Bas, Angleterre. Marais salans et d'eau douce de la France et de l'Allemagne.

Scytonemaceæ Rabenhorst.

Desmonema Berkeley et Thwaites.

9. **D. Wrangelii** Bornet et Flahault, Rev. des Nostoc. hétér., in Ann. des Sc. nat., VIIe série, Bot., t. 5, p. 127, 1887.

Thorea Wrangelii Agardh, Disp. Alg. Suec., p. 40, 1812.

Dans la plante adulte, les gaines renferment souvent plusieurs trichomes; il n'en est pas de même lorsqu'elle est peu développée, comme c'est ici le cas. L'échantillon ne peut cependant être confondu avec un *Tolypothrix*, les ramaux étant agglutinés le long du filament principal, ce qui n'a jamais lieu dans ce dernier genre. De plus, dans le plante siamoise, les hétérocystes sont à parois minces et peu différenciés, ce qui est également un caractère du genre *Desmonema* où ils manquent quelquefois (conf. Bornet et Flahault, loco cit.).

Jungle near Klong Sarlakpet (alt. 700 ft.), on rocks in a waterfall.

Aire géogr.: Europe septentrionale et occidentale, Allemagne, Italie, États Unis, Bolivie.

Scytonema Agardh.

10. **S. mirabile** Bornet.

Les Nostocacées hétérocystées du Systema Algarum d'Agardh, in Bull. de la Soc. bot. de France, t. XXXVI, p. 155, 1889.

Conferva mirabilis Dillwyn, Brit. Conf., tab. 96, 1809.

Scytonema figuratum Bornet et Flahault, Revision des Nostocacées hétérocystées, loco cit., p. 101.

On dry rocks in the jungle near Klong Munsé.

Aire géogr.: Europe, Amérique du Nord, Indes orientales, Cochinchine, Ile Bourbon, Nouvelle Calédonie, Iles Sandwich.

11. **S. Hofmanni** Agardh.

Synops. Alg. Scand. p. 117, 1817 — Bornet et Flahault, loco cit. p. 97.

Common in the jungle all over Koh Chang, epiphytic on ferns and other low plants and also on rocks.

Aire géogr.: Europe, Indes orientales, Cochinchine, Ile Maurice, Amérique du Nord, Antilles, Terre de Feu, Tahiti.

12. **S. ocellatum** Lyngbye.

Hydrophyt. dan. p. 97, tab. 28, A, 1819. — Bornet et Flahault, loco cit. p. 95.

Lem Dan on the stem, of Cocoa-palms; jungle near Klong Munsé, on rocks.

Aire géogr.: Europe, Indes orientales, Ceylan, Cochinchine, Afrique, Madère, Amérique de Nord, Antilles, Bermudes, Guyane, Brésil, Iles Borneo, Sandwich et Marquises.

13. **S. Schmidtii** Gomont, n. sp. (Pl. V, fig. 1 à 4.)

Stratum extensum, fusco-nigrum, crustaceo-tomentosum, ad millimetrum crassum, superficie sulcatum. Fila eximie et subregulariter undulata, crispa, arcte intricata, 10—12 μ, inferne usque ad 16 μ crassa, primaria repentia stoloniformia, abundanter et repetite pseudoramosa, pseudoramis patentibus; vaginæ luteo-fuscæ, inferne crassæ et rugosæ, chlorozincico iodurato haud cærulescentes. Trichomata eximie torulosa, æruginosa, 9—12 μ crassa; articuli sæpius compressi, passim subquadrati, 2—6 μ longi — Heterocystæ quadratæ vel compressæ, achromaticæ (v. s.).

Les gaines homogènes de cette plante la placent dans la section *Euscytonema* Bornet et Flahault. Elle nous paraît voisine des *S. javanicum* et *ocellatum*. Sa croissance en gazons uniformes, sans fascicules, la sépare du *S. javanicum*; ses filaments crépus, ses articles généralement plus courts que ceux du *S. ocellatum* et ses trichomes fortement toruleux la distinguent nettement de cette dernière espèce.

Open ground near Lem Dan, on lime-stones.

14. **S. javanicum** Bornet.

In Bornet et Thuret, Notes Algologiques p. 148, 1880 — Bornet et Flahault, loco cit., p. 95.

Lem Dan, on trees and rocks near the Sea; Klong Son, on trees in the jungle.

Aire géogr.: Ceylan, Jamaïque, Guyane, Brésil, Java, Iles Sandwich.

15. **S. Guyanense** Bornet et Flahault.

Loco cit. p. 97, 1887.

Lem Dan on trees near the Sea; jungle near Klong Munsé, on rocks.

Aire géogr.: Ceylan; Amérique du Nord, Antilles, Brésil, Guyane, Vénézuela, Honolulu.

16. **S. crispum** Bornet.

Les Nostocacées hétérocystées du Systema Algarum de C. Agardh, in Bull. de la Soc. bot. de France, t. XXXVI, p. 156, 1889.

S. cincinnatum Thuret, Essai de class. des Nostochinées, in Ann. des Sc. nat., 6e sér., Bot. t. I, p. 380. — Bornet et Flahault, loco cit. p. 89.

With *Stigonema minutum* on rocks in the jungle near Klong Munsé.

Aire géogr.: Suède, Danemark, France centrale et méridionale, Corse, Allemagne, Ile Maurice, Amérique du Nord, Jamaïque, Brésil, Iles de l'Océan Pacifique.

Sirosiphoniaceæ Rabenhorst.

Stigonema Agardh.

17. **S. mamillosum** Agardh.

Syst. Alg. p. 42, 1824. — Bornet et Flahault, loco cit., p. 77.

Lem Dan, on stones in a stream.

Aire géogr.: Norvège, Suède, Angleterre, France, États Unis.

18. **S. informe** Kützing.

Spec. Alg. p. 319, 1849. — Bornet et Flahault, loco cit. p. 75.

Jungle near Klong Munsé, on wet rocks with *Stigonema ocellatum* and *Schizothrix thelephoroides* etc.

Aire géogr.: Angleterre, France, Suisse, Allemagne, Autriche, États Unis, Brésil, Guyane, Java.

19. **S. turfaceum** Cooke.

Brit. Freshwat. Algæ p. 273, 1884. — Bornet et Flahault, loco cit. p. 74.

Jungle near Klong Munsé, on humid rocks in company with *S. minutum*.

Aire géogr.: France, Allemagne, États Unis.

20. **S. minutum** Hassall.

Hist. of the Brit. freshwat. Alg. I, p. 230, pl. 67, fig. III, IV, 1845. — Bornet et Flahault, loco cit. p. 72.

Klong Munsé, on rocks in the jungle; Lem Dan, on stones in a stream.

Aire géogr.: Grœnland, Péninsule Scandinave, Danemark, Angleterre, France septentrionale et centrale, Allemagne, Autriche, États-Unis, Brésil, Iles Sandwich.

21. **S. ocellatum** Thuret.

Essai de classif. des Nostochinées in Ann. des Sc. nat., VIe série Bot., t. I, p. 380. — Bornet et Flahault, loco cit. p. 69.

Klong Son and Klong Munsé, on wet rocks in the jungle.

Aire géogr.: Grœnland, Europe septentrionale, occidentale et centrale, États Unis, Antilles, Guyane, Japon, Ceylan, Iles Sandwich, Nouvelle Calédonie Hawai.

22. **S. hormoides** Bornet et Flahault.

Loco cit. p. 68, 1887.

Jungle near Klong Son, epiphytic on the leaves of small herbs.

Aire géogr.. Danemark, France septentrionale et centrale, Allemagne, Suisse, Autriche, Italie, États-Unis.

Hapalosiphon Nägeli.

23. **H. fontinalis** Bornet.

Les Nostocacées hétérocystées du Systema Algarum d'Agardh, in Bull. de la Soc. bot. de France, t. XXXVI, p. 155, 1889.

H. pumilus Kirchner, Kryptogamenflora von Schlesien, Algen p. 231, 1878. — Bornet et Flahault, loco cit. p. 61.

Muddy rice-field near Lem Dan, epiphytic on *Monochoria vaginata*, and in a waterhole among other algæ.

Aire géogr.: Grœnland, Péninsule Scandinave, Danemark, France septentrionale et centrale, Allemagne, États-Unis, Brésil, Iles Sandwich, Indes orientales.

Rivulariaceæ Kützing.

Brachytrichia Zanardini.

24. **B. Quoyi** Bornet et Flahault.

Revision des Nostocacées hétérocystées, in Ann. des Sc. nat. VIIe série, Bot., t. IV, p. 373, 1886.

Nostoc Quoyi Agardh, Syst. Alg. p. 22, 1824.

Lem Dan, on stones in the sea-shore between tide-mark; Koh Kahdat, coral-reef in shallow water.

Aire géogr.: Océan Atlantique sur la côte des États-Unis; Mer des Indes, Océan Pacifique.

25. **B. maculans** Gomont n. sp. (Planche V, fig. 5 à 7.)

Frondes planæ, crustaceæ, tenues, pagina inferiori rupibus arcte adhærentes, maculas atras, initio orbiculares, deinde confluentes ideoque ambitu irregulares, ad centimetrum et ultra latas formantes, e strato unico filorum compositæ. Trichomata torulosa, recta, parallela, arcte congesta, muco tenaci agglutinata, inferne pseudoramosa, sæpe medio affixa et utrinque erecta, 6—8 μ, basim versus tantummodo 4 μ crassa; articuli irregulares, sæpius subquadrati, inferne longiores; heterocystæ subquadratæ; hormogoniæ ad 70 μ longæ (v. s.).

Tandis que, chez les deux espèces de *Brachytrichia* connues jusqu'ici, les frondes sont globuleuses, le thalle de celle-ci est étalé et aplati, rappelant jusqu'à un certain point celui de l'*Isactis plana*. Le mode de ramification, aussi bien que la place des hétérocystes, qui sont intercalaires et non basilaires, rend d'ailleurs impossible toute confusion avec ce dernier genre.

Les filaments de la plante siamoise sont presque droits, très serrés et parallèles; dans les *B. Balani* et *Quoyi*, ils m'ont paru plus lâches et plus irrégulièrement contournés. Enfin la fronde du *B. maculans* n'est jamais creuse, même dans les parties les mieux développées, ni conformée de manière à le devenir. Ces différences justifient l'établissement de la nouvelle espèce.

Lem Dan. on maritime rocks between tide-marks.

Mastichotricheæ Kützing.

Calothrix Agardh.

26. **C. crustacea** Thuret.

In Bornet et Thuret, Notes algologiques fasc. I, p. 13—16, tab. IV, 1878. — Bornet et Flahault, in Ann. des Sc. nat. VIIe série, Bot., t. III, p. 359.

Lem Ngob, mangrove-swamp, on aërial roots of *Avicennia officinalis* between tide-marks.

Aire géogr.: Skagerrack, Kattegat, Grande Bretagne, France, Espagne, dans le Golfe de Gascogne, Tanger, mer Méditerranée, Adriatique, États Unis, Antilles, Japon, Iles du Pacifique.

27. **C. scopulorum** (?) Agardh.

Syst. Alg. p. 70, 1824. Bornet et Flahault, loco cit. p. 353.

La plante est trop peu développée pour être déterminée avec certitude.

Lem Dan, on stones in the sea-shore between tide-marks.

Aire géogr.: Océan arctique; Océan Atlantique jusqu'à Tanger et Madère et sur la côte d'Amérique; Méditerranée et Adriatique; Iles St Paul dans l'Océan Pacifique.

Calothrix spec.

Peut-être *C. æruginea* ou *C. scopulorum.*

La plante est trop peu développée pour être déterminée avec certitude.

Lem Ngob and Lem Dan, mangrove-svamp, on stem and aërial roots of *Avicennia officinalis* between tide-marks.

Calothrix spec.

Plante insuffisamment développée. Peut-être le *C. æruginea.*

Lem Ngob, mangrove-swamp, on the leaves of young specimens of *Avicennia officinalis* between tide-marks.

Explication des figures de la planche V.

Fig. 1. — *Scytonema Schmidtii* n. sp. Touffe de filaments. (Grossissement 120 diamètres.)

Fig. 2. — Filament rampant de la même plante portant des rameaux dressés. (Grossissement 288 diamètres.)

Fig. 3. — Extrémité d'un rameau. (Grossissement 550 diamètres.)

Fig. 4. — Deux hormogonies. (Grossissement 288 diamètres.)

Fig. 5. — *Brachytrichia maculans* n. sp. Taches formées sur une pierre par les frondes de la plante. (Grandeur naturelle.)

Fig. 6. — Coupe verticale à travers une fronde. (Grossissement 288 diamètres.)

Fig. 7. — Début de la formation d'un rameau en forme de V. (Grossissement 550 diamètres.)

Peridiniales

by **Johs. Schmidt.**

The following list of marine *Peridiniales* is due to the examination of a number of plankton samples collected by the Danish Expedition in the inner part of the Gulf of Siam. The samples which are 10 in number, were obtained from the surface of the Sea by means of fine silk-nets and were preserved in formaline (4 %)[1]).

This is a list of the samples collected:

Nr. 1.	25/12 1899.	Strait between Lem Ngob and Koh Chang.
„ 2.	9/1 1900.	Between Koh Kahdat and Koh Kut.
„ 3.	11/1 1900.	S. of Koh Chang.
„ 4.	16/1 1900.	W. of Koh Chang, N. of Koh Savan.
„ 5.	17/1 1900.	W. of Koh Chang, S. of Koh Savan.
„ 6.	18/1 1900.	S. of Koh Chang.
„ 7.	27/1 1900.	North End of Koh Kut.
„ 8.	28/1 1900.	7 miles S. of Koh Kut.
„ 9.	31/1 1900.	18 miles W. of Koh Chang[2]).
„ 10.	21/3 1900.	1—2 miles S. of Koh Kram.

In the following list of species recorded

c means *predominant*
+ „ *common*
r „ *rare*
rr „ *very rare* (only a few specimens seen).

[1]) The *Diatoms* contained in the Plankton-samples will be published later on.
[2]) This sample seems to consist exclusively of *Trichodesmium Hildebrandtii* Gomont.

Prorocentraceae.

Exuviella Cienk.

1. **E. compressa** (Bail.) Ostenfeld, Iagttagelser over Overfladevandets Temperatur, Saltholdighed og Plankton paa islandske og grønlandske Skibsrouter, 1899, p. 59; *Dinopyxis compressa* Stein, Der Organismus der Infusionsthiere III. Abtheil., Leipzig 1878—83, Pl. I, f. 34—38.

6 (rr).
Area: Almost ubiquitous.

Prorocentrum Ehrenbg.

2. **P. micans** Ehrenbg.

1 (rr) — 2 (rr) — 3 (rr) — 6 (rr) — 8 (rr).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

Peridiniaceae.

Pyrophacus Stein.

3. **P. horologium** Stein l. c., Pl. XXIV, f. 1—13.

1 (rr) — 2 (rr) — 7 (rr) — 10 (rr).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

Ceratium Schranck.

4. **C. tripos** (O. F. Müller) Nitsch.

var. **baltica** Schütt, Pflanzenleben d. Hochsee, p. 266, f. 4 a.

I observed two slightly different forms both of which may be referred to the above variety by Schütt. The first form differs from Baltic specimens by the left posterior horn being somewhat bent forward. The second form observed is characterized by the posterior horns being longer and running more parallel. I name this form:

f. **parallela** Schm. n. f. (see fig. 1).

It closely approaches to the forms figured by Cleve in Report on the Phyto-Plankton collected on the expedition of H. M. S. „Research", 1896, Fifteenth Annual Report of the Fishery Board for Scotland, Part III, Pl. 1, fig. 1, 1897.

1 (rr) — 2 (rr) — 3 (rr) — 4 (rr) — 6 (rr) 8 (rr).
Area: Atlantic.

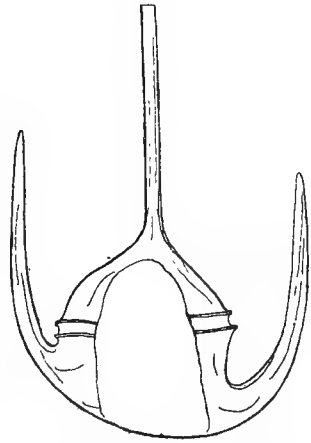


Fig. 1. *Ceratium tripos*, var. *baltica* Schütt, f. *parallela*. Ventral view.

var. **brevis** Ostenfeld & Schmidt, Plankton fra det Røde Hav og Adenbugten, Vidensk. Meddel. Naturh. Foren. Kjøbenhavn, 1901, p. 164, f. 13.

10 (rr).
Area: Red Sea, Indian Ocean.

var. **dispar** Pouchet, Contributions à l'histoire des Péridiniens marins, Journ. de l'anat. et de la physiol. 1883, p. 423, fig. D; non Pouchet in Voyage de „La Manche" à l'île Jan Mayen et au Spitzberg (Juillet—Août 1891), p. 171, fig. 13 B, Paris 1894 = *C. curvicorne* (Daday) Cleve.

A few specimens not differing from Pouchet's figure were met with in two collections.

2 (rr) — 6 (rr).
Area: Mediterranean.

var. **gracilis** Schröder, Phytoplankton des Golfes von Neapel, Mitth. a. d. Zool. Stat. zu Neapel, Bd. 14, 1900, Pl. 1, f. 17 b, e; Ostenfeld & Schmidt l. c. p. 164, f. 14; non Gourret, Péridiniens du golfe de Marseille, Annal. du Musée d'hist. nat. de Marseille, zool., vol. I, n° 8, 1883, Pl. 1, f. 1.

2 (rr) — 3 (rr) — 4 (+) — 5 (rr) — 6 (r) — 10 (rr).
Area: Mediterranean, Red Sea, Indian Ocean.

5. **C. dens** Ostenfeld & Schmidt, l. c., p. 165, f. 16.

In the main species the left posterior horn is straight or somewhat curved (l. c. fig. 16). In one collection I found a variety of *C. dens* viz.

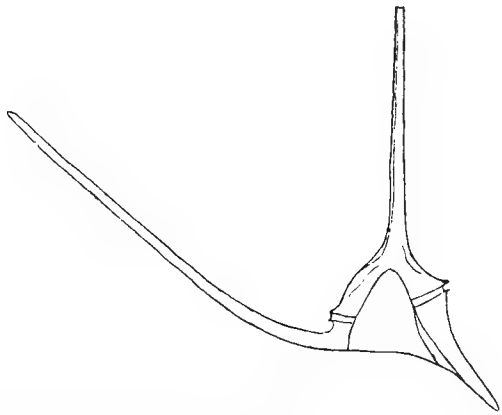


Fig. 2. *Ceratium dens* Ostenfeld & Schmidt, var. *reflexa*. Ventral view.

var. **reflexa** Schm. n. var. (Fig. 2), which is characterized by the direction of the left posterior horn.

In the Gulf of Siam this characteristic species often occurs in short chains (4 specimens together).

1 (rr) — 2 (+) — 3 (+) — 4 (+) — 5 (r) — 7 (+).
and var. *reflexa* 4 (rr).

Area: Red Sea, Indian Ocean.

6. **C. curvicorne** (Daday) Cleve, Notes on some Atlantic Plankton-Organisms, Kgl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 14; *C. tripos* var. *curvicorne* Daday, Termezetrajzi füzetek, 1887—88, Pl. III, figg. 4, 8, 12, 14; figurae nostrae 3 et 4.

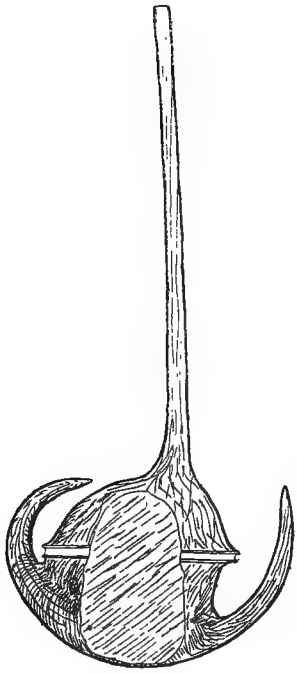


Fig. 3.
Ceratium curvicorne (Daday) Cleve.
Ventral view.

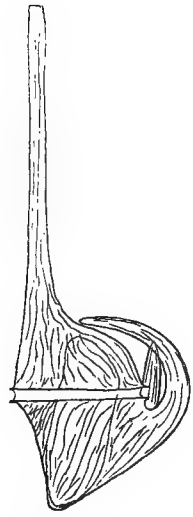


Fig. 4.
Ceratium curvicorne (Daday) Cleve
Lateral view.

This species seems to be abundant in the Gulf of Siam. The specimens observed agree well with Dadays figures; but sometimes the curvature of the right posterior horns is less pronounced. As shown in fig. 4 the ventral face of the body is concave and the basilar parts of the posterior horns proceed in a nearly right angle to the transversal axis.

2 (r) — 3 (+) — 4 (+) — 5 (rr) — 6 (+) — 7 (+) — 8 (rr) — 10 (rr).
Area: Warmer Atlantic, Mediterranean, Red Sea, Indian Ocean.

7. **C. contortum** (Gourret) Cleve, Notes on some Atlantic Plankton-Organisms, Kgl. Sv. Vet.-Ak. Handl. Bd. 34, No. 1, p. 14, Pl. VII, f. 12, 1900; *C. gibberum* var. *contortum* Gourret l. c. Pl. II, f. 33; Schütt, Pflanzenleben d. Hochsee, p. 268, fig. 78 VII b.

2 (rr) — 4 (r).
Area: Warmer Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

8. **C. tenue** Ostenfeld & Schmidt l. c. p. 166, fig. 18.

2 (rr).
Area: Red Sea, Indian Ocean.

9. **C. macroceras** Ehrenberg?; *C. tripos β macroceras* Claparède & Lachmann, Études sur les Infusoires et les Rhizopodes, vol. I, Pl. 19, f. 1, Mém. de l'Inst. Génévois, t. V—VI, 1858—59.

This species varies much in regard to length, direction and spinosity of the posterior horns. I saw forms agreing with Bergh's figure (Organismus d. Cilioflagellaten, Morphol. Jahrb. Bd. 7, 2, Taf. XIV, fig. 27), further a form with longer and more straight posterior horns (cfr. the quoted figure by Claparède & Lachmann) and also the form figured by Ostenfeld & Schmidt l. c. fig. 19, where the posterior horns are short and ventrally bent. In the Gulf of Siam *C. macroceras* sometimes occurs in short chains (2 specimens together).

2 (r) — 3 (r) — 4 (rr) — 5 (rr) — 7 (r) — 10 (r).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

10. **C. volans** Cleve, Notes on some Atlantic Plankton-Organisms, Kongl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 15, Pl. VII, Fig. 4, 1900; Ostenfeld & Schmidt, Plankton fra det Røde Hav og Adenbugten, Vidensk. Meddel. Naturh. Foren. Kjøbenhavn, 1901, p. 168, f. 21.

2 (rr).
Area: Warm Atlantic, Red Sea, Indian Ocean.

11. **C. flagelliferum** Cleve, Notes on some Atlantic Plankton-Organisms, Kongl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 14, Pl. VII, Fig. 12, 1900.

The horns are often much longer than figured by Cleve.

1 (rr) 2 (+) 3 (+) 4 (r) 5 (rr) 6 (rr) 7 (r) 10 (r).
Area: Tropical Atlantic, Red Sea, Indian Ocean.

12. **C. furca** (Ehrbg.) Dujardin, Hist. nat. d. Zoophytes, Infusoires, Paris 1841.

This species occurs in large quantity in our area.

1 (rr) — 2 (+) — 3 (+) — 4 (r) — 5 (r) — 6 (c) — 7 (+) — 8 (rr) — 10 (r).
Area: Ubiquitous.

13. **C. lineatum** (Ehbg.) Cleve, Plankton collected by the Swedish Expedition to Spitzbergen in 1898, Kgl. Sv. Vet.-Ak. Handl. Bd. 32, No. 3, 1899, p. 36; *Peridinium lineatum* Ehrenbg.

Sparingly with the preceding species.
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Bering Sea.

var. **longiseta** Ostenfeld & Schmidt, Plankton fra det Røde Hav og Adenbugten, Vidensk. Meddel. Naturhist. For. Kjøbenhavn, 1901, p. 163, fig. 12.

This variety sometimes occurs in short chains (2 specimens together); then only the free specimen has a long superior horn.

2 (rr) — 3 (rr) — 4 (+) — 5 (rr) — 6 (r).
Area: Red Sea, Indian Ocean.

var. **robusta** Cleve, Plankton from the Southern Atlantic and the Southern Indian Ocean, Öfv. af Kongl. Sv. Vet.-Ak. Förh. Nr. 8, p. 925, fig. 6, 1900.

4 (rr).
Area: Southern Indian Ocean.

14. **C. candelabrum** Ehbg.; Stein, l. c. Pl. XVI, f. 15, 16.

2 (rr) — 4 (rr) — 7 (rr).
Area: Warm Atlantic, Mediterranean, Red Sea, Indian Ocean.

15. **C. fusus** (Ehbg.) Dujardin l. c.

1 (rr) — 2 (r) — 3 (r) — 6 (r) — 7 (r) — 10 (r).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

var. **extensum** Gourret, Annal. du Musée d'hist. nat. de Marseille, zool., vol. I, n° 8, p. 52, Pl. 4, f. 56.

2 (rr) — 3 (rr).
Area: Warm Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

Gonyaulax Diesing.

16. **G. polygramma** Stein, l. c. Pl. IV, f. 15.

2 (rr) — 4 (+) — 5 (r) — 6 (+) — 7 (r).
Area: General in warm and temperate Seas.

17. **G. spinifera** (Clap. & Lachm.) Stein, l. c. Pl. IV, f. 10—12.

2 (rr) — 3 (r) — 6 (+).
Area: Atlantic, Mediterranean.

18. **G. hyalina** Ostf. & Schm., l. c. p. 172, f. 24.

4 (r) — 5 (r) — 6 (r).
Area: Indian Ocean.

Goniodoma Stein.

19. **G. acuminatum** Stein, Pl. VII, f. 1—16.

2 (rr) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (r) — 7 (r) — 10 (rr).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

20. **G. armatum** (Schütt); *G. acuminatum* var. *armata* Schütt, Die Peridinieen Pl. IX, fig. 32; *G. fimbriatum* Murray & Whitting, Transactions of the Linnean Society of London, 2nd Ser., Botany, Vol. V, Part 9, 1899, p. 325, Pl. XXVII, fig. 1 a, b.

2 (rr) — 4 (rr) — 10 (rr).
Area: Atlantic, Red Sea, Indian Ocean, Pacific.

Diplopsalis Bergh.

21. **D. lenticula** Bergh, l. c. Pl. XVI, fig. 60—62.

1 (+) — 2 (rr) — 3 (rr) — 10 (+).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

22. **D. saecularis** Murray & Whitting l. c. p. 325, Pl. XXVIII, fig. 5 a, b.

10 (rr).
Area: Atlantic from a little south of the Azores to the Isthmus of Panama, Red Sea, Indian Ocean.

Ostreopsis Schm. nov. gen.

Body flattened, oyster-shaped. Apex excentric, marked by a narrow, slit-shaped area. Longitudinal girdle small, not proceeding to apex, only to be seen on the inferior valve. 3 apical plates (one of which being reduced) and 1 antapical plate are present. Structure of plates porous.

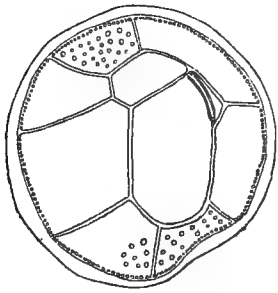


Fig. 5. *Ostreopsis siamensis* Schmidt. Arrangement of plates in the superior valve.

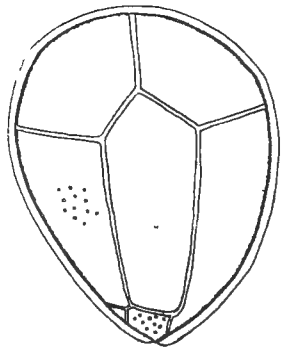


Fig. 6. *Ostreopsis siamensis* Schmidt. Another specimen. Arrangement of plates in the inferior valve.

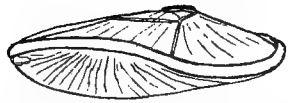


Fig. 7. *Ostreopsis siamensis* Schmidt. Sketch of a specimen in lateral view. Arrangement of plates not indicated.

In its shape this peculiar genus is nearest to *Pyrophacus* Stein of the genera hitherto known; the number of apical- and antapical plates reminds of *Gonyaulax* Diesing, but from both those genera it is easily distinguished by the above features.

23. **O. siamensis** Schm. n. sp., figg. 5, 6, 7.

Body flat, oyster-shaped, somewhat convexo-concave, in a transversal section view triangular or roundish. Superior valve convexe, with 3 apical plates (one of which being very small) and 7 præmedian plates; inferior valve a little concave, with 1 antapical and 4 larger postmedian plates (and sometimes with small accessory plates). Longitudinal girdle short, only on the inferior valve. Structure coarsely porous, like that of *Ceratium tripos*. Length of sagittal axis about 90 μ.

2 (r) — 3 (rr) — 6 (rr).

Peridinium Ehrenberg.

24. **P. divergens** Ehrenberg.

This species, which appears in large quantity in the Gulf of Siam, varies exceedingly much in regard to size, shape and length of the posterior horns.

1 (+) — 2 (r) — 3 (+) — 4 (rr) — 5 (r) — 6 (+) — 7 (+) — 10 (+).
Area; Ubiquitous.

25. **P. conicum** (Gran) Ostenfeld & Schmidt l. c., p. 174; *P. divergens* var. *conica* Gran, Hydrographic-Biologic Studies of the North-Atlantic Ocean and the Coast of Nordland, 1900, p. 47; Fig. Bergh l. c., Pl. XV, f. 43—44; Pouchet l. c., Contributions I, fig. 31—33; Schütt l. c. Pl. XIII, f. $43_{13, 14}$.

1 (rr) — 6 (r) — 7 (rr) — 10 (r).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

26. **P. oceanicum** Vanhöffen, in Drygalski, Grönland-Expedition der Gesellsch. für Erdkunde zu Berlin, vol. II, 2 part, Pl. V, fig. 2.

2 (rr) — 6 (rr) — 7 (rr) — 10 (rr).
Area: Atlantic, Red Sea, Indian Ocean.

27. **P. elegans** Cleve, Notes on some Atlantic Plankton-Organisms, Kgl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 16, Pl. VII, fig. 15—16.

3 (rr) — 6 (rr).
Area: Warm Atlantic, Red Sea, Indian Ocean.

28. **P. Steinii** Jørgensen, Protophyten u. Protozoën im Plankton aus der norweg. Westküste, Bergens Museums Aarbog, 1899, No. VI, p. 38; *P. Michaelis* Stein l. c., Pl. IX, f. 9—14 (non Ehrenberg).

2 (rr) — 3 (rr) — 4 (rr) — 6 (r).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

29. **P. tristylum** Stein var. **ovata** Schröder l. c., p. 18, Taf. 1, fig. 13.

2 (rr) — 3 (rr) — 6 (rr).
Area: Mediterranean, Red Sea, Indian Ocean.

30. **P. pellucidum** (Bergh) Schütt, Die Peridineen p. 157, Pl. XIV, f. 45.

1 (rr) — 2 (rr) — 6 (rr).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

31. **P. globulus** Stein, l. c. Pl. IX, f. 5—8.

5 (rr) — 10 (rr).
Area: Atlantic, Red Sea, Indian Ocean.

32. **P. pedunculatum** Schütt, Die Peridineen, Pl. XIV, f. 47.

1 (rr) — 4 (rr) — 6 (rr) — 10 (rr).
Area: Atlantic, Red Sea, Indian Ocean.

Podolampas Stein.

33. **P. bipes** Stein l. c., Pl. VIII, fig. 6—8.

2 (rr) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (rr) — 7 (rr).
Area: Tropical and subtropical Seas.

Blepharocysta Ehrenberg.

34. **B. splendor maris** Ehrenberg; Stein, l. c. Pl. III. f. 17—19, Pl. VIII, f. 3—5.

2 (rr) — 3 (rr) — 4 (rr) — 5 (+) — 6 (r) — 10 (r).
Area: Atlantic, Mediterranean. Red Sea, Indian Ocean, Pacific.

Phalacroma Stein.

35. **P. doryphorum** Stein, l. c. Pl. XIX, f. 1—4.

2 (rr).
Area: General in warm Seas.

36. **P. vastum** Schütt, Die Peridineen, Pl. III, fig. 16.

6 (rr) — 7 (rr).
Area: Warm Atlantic.

37. **P. Rudgei** Murray & Whitting l. c, p. 331, Pl. XXXI, fig. 6 a, b.

In one single sample I found a small species of *Phalacroma*, which agrees with the quoted figure by Murray & Whitting.

2 (rr).
Area: Atlantic (37° 55′ N., 36° 42′ W.).

Dinophysis Ehrenberg.

38. **D. homunculus** Stein, l. c. Pl. XXI, f. 2, 5.

Together with the type there occurs in the Gulf of Siam a form viz.

f. **pedunculata** Schm. n. f., which is characterized by the long and plainly set off posterior protuberance.

3 (r) — 4 (r) — 6 (+) — 7 (rr).
Area: General in warmer Seas.

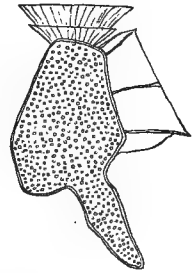


Fig. 8. *Dinophysis homunculus* Stein, f. *pedunculata*. Lateral view.

39. **D. miles** Cleve, Plankton from the Red Sea, Öfv. af Kongl. Sv. Vet.-Ak. Förh. 1900, No. 9, p. 1030, Fig. 1; *D. aggregata* Weber van Bosse, Annal. du Jardin Bot. de Buitenzorg, 2e sér., vol. II, p. 140, Pl. XVII, f. 3—4; *Heteroceras Schröteri* Achille Forti, Ber. d. deutsch. Botan. Ges. 1901, p. 6, f. I—II.

var. **indica** Ostf. & Schm. l. c. p. 170.

2 (rr) — 4 (rr).
Area: Indian Ocean.

40. **D. sphaerica** Stein l. c. Pl. XX, f. 3—4.

5 (rr) — 10 (rr).
Area: Atlantic, Red Sea, Indian Ocean.

41. **D. rotundata** Clap. & Lachm., l. c. p. 409, Pl. XX, f. 16; Jørgensen, l. c. p. 31.

5 (rr).
Area: Atlantic.

Amphisolenia Stein.

42. **A. bidentata** Schröder, l. c. p. 20, Pl. I, f. 16 a—c.

2 (rr) — 3 (rr) — 4 (rr) — 5 (rr) — 7 (rr).
Area: Mediterranean, Red Sea, Indian Ocean.

Ornithocercus Stein.

43. **O. magnificus** Stein. l. c. Pl. XXIII, f. 1; Schütt, Centrifugal. Dickenwachsthum der Membran, Bot. Ztg. 1900, p. 18 (Sep.), f. 8—10.

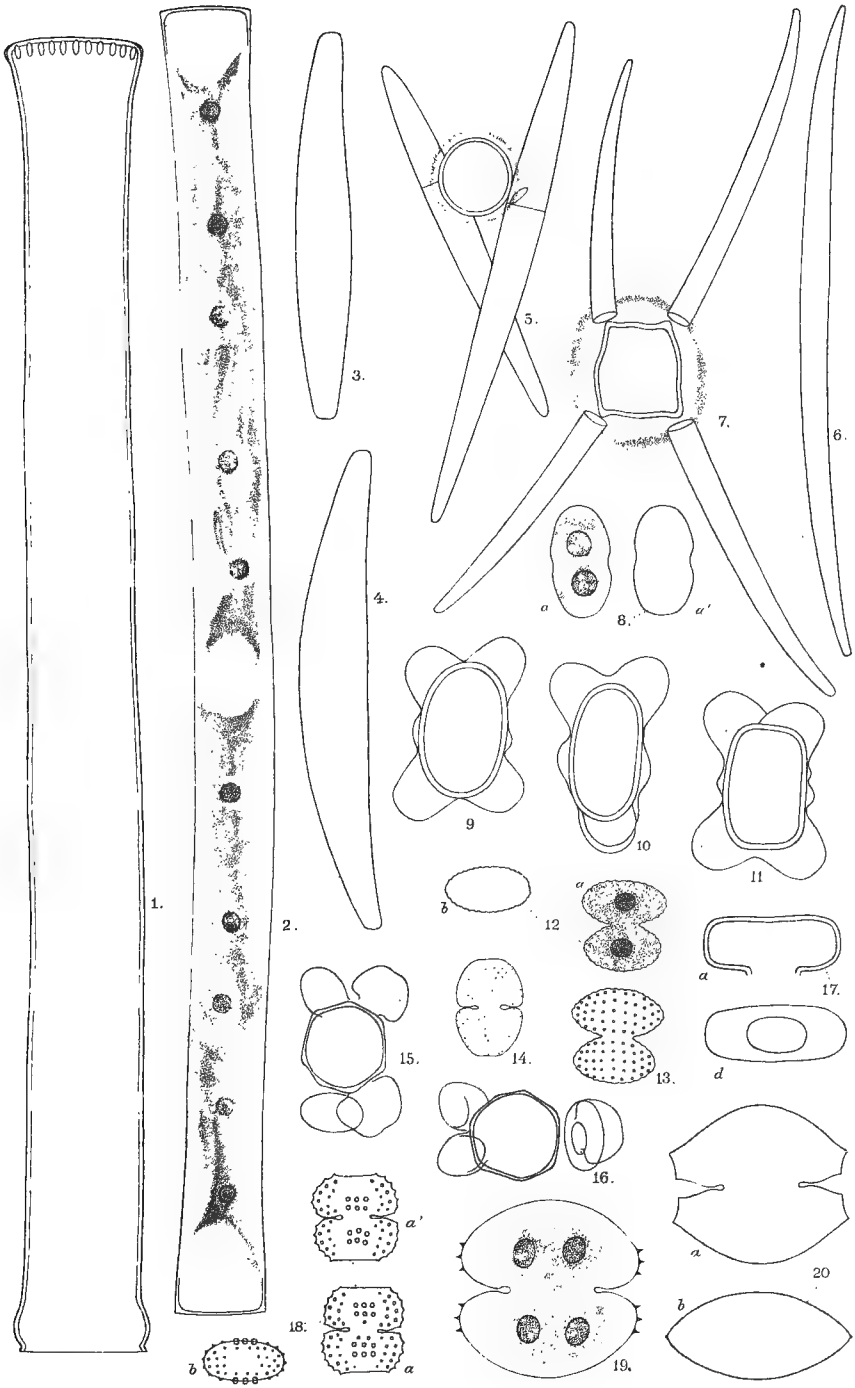
2 (rr).
Area: Warm Atlantic, Mediterranean, Red Sea, Indian Ocean.

Murracytae.

Pyrocystis Murray.

44. **P. lunula** Schütt.

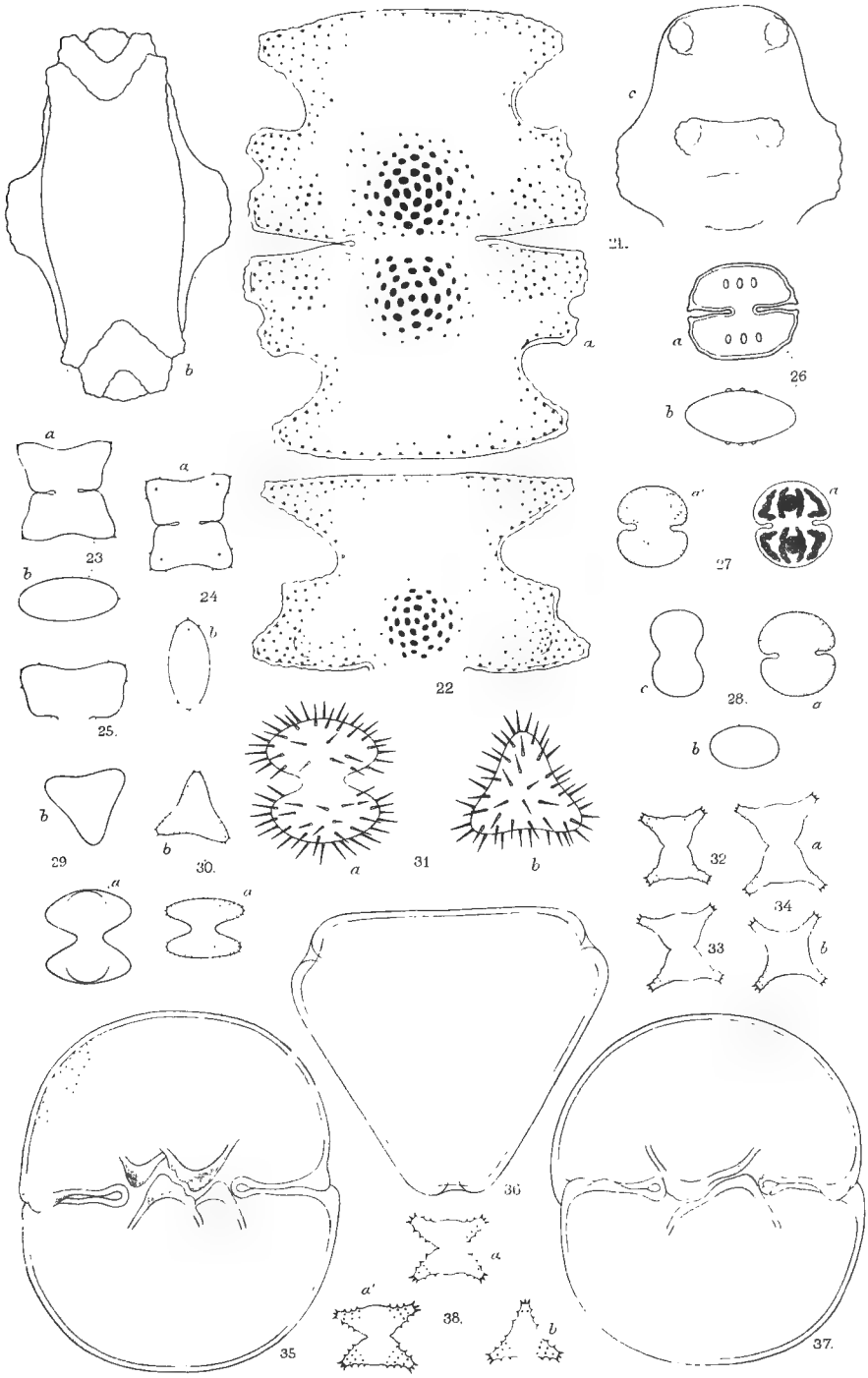
2 (rr).
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.



G S West ad nat del

AXEL E AAMODT KIØBENHAVN.

SIAMESE DESMIDS



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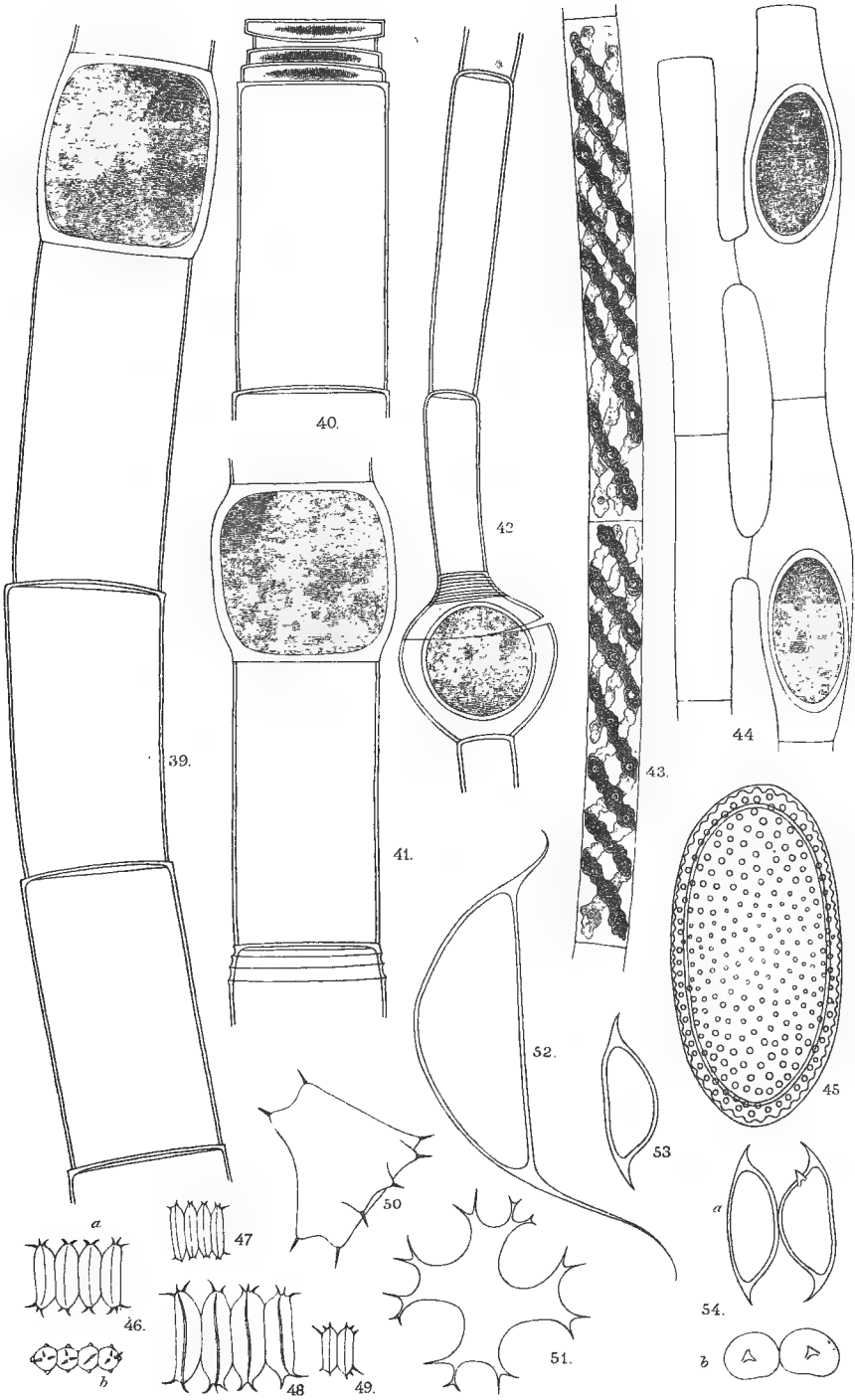
SIAMESE DESMIDS



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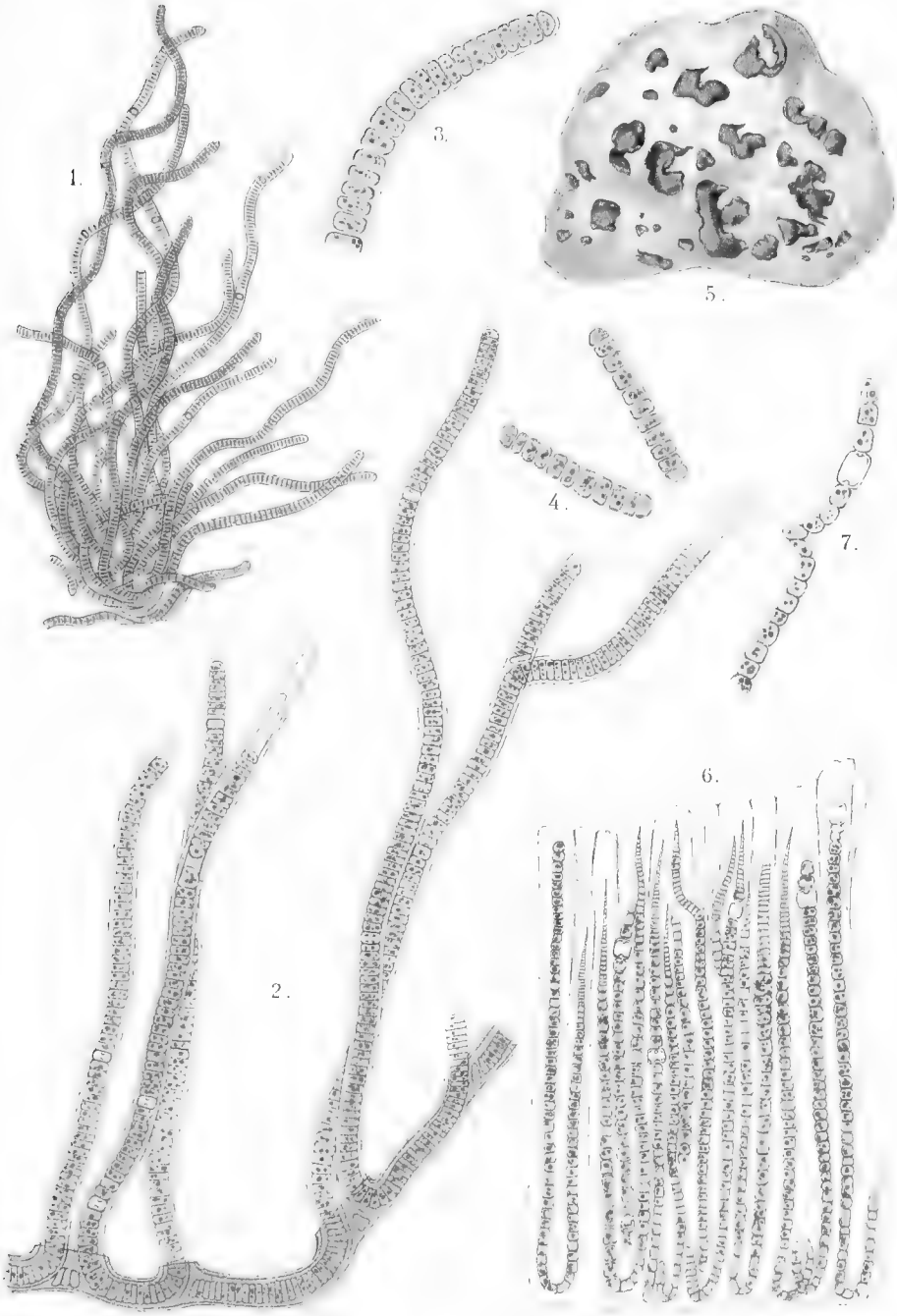
AXEL E ARNOLDT KIØBENHAVN

SIAMESE ALGÆ



Gomont del.

1-4. SCYTONEMA SCHMIDTII, Gomont. 5-7. BRACHYTRICHIA MACULANS, Gomont

PRELIMINARY REPORT ON THE BOTANICAL RESULTS OF THE DANISH EXPEDITION TO SIAM (1899—1900).

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Part V.

C. B. Clarke: Compositae, Umbelliferae.
Johs. Schmidt: Rhizophoraceae.
Ove Paulsen: Fagaceae.
F. K. Ravn: Loranthaceae.
Eug. Warming: Podostemaceae.
C. H. Ostenfeld: Hydrocharitaceae, Lemnaceae, Pontederiaceae, Potamogetonaceae, Gentianaceae (Limnanthemum), Nymphaeaceae,
H. Harms: Leguminosae.
K. Schumann: Scitamineae.
A. Engler: Araceae.
F. Stephani: Hepaticae.

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Compositae (= Asteraceae, Lindley)

by **C. B. Clarke** — Kew.

The Compositae sent me collected in Koh Chang by the Danish Expedition to Siam (1899—1900) are 19; and are all known from the Eastern part of British India, at elevations 0—400 metr. above the sea. The plant enumerated below as *Blumea subracemosa* is no real exception, as it might be almost, if not exactly, matched out of the innumerable forms of *Blumea lacera* in the Indian collections.

The low-level Compositae of Eastern British India consist of wide-spread tropical plants that accompany cultivation, of a few maritime plants, and of the universal *Blumea*, — the *Hieracium* of Bengal.

Sphaeromorphaea Russeliana is a rare plant, known to me only as a weed in cultivated land.

Wedelia scandens, Roxb., is known to me only as a strictly maritime plant, in the Mangrove swamps and Soondreeboom. Its distribution in Bombay is (fide Dr Cooke) similar. It appears to be very widely spread quite close to the sea in the tropics.

As all the plants in the collection have been lately treated by Sir Joseph D. Hooker in the Flora of British India v. 3 [1881], I have given a reference for each species to that book instead of copying out all the synonymy. To shew the local geographic distribution, I have added references to

Miq. Fl. Ind. Bat. v. 2 [1856]
Vidal Pl. Vasc. Filip.
Hemsley Known Pl. of China
(in Journ. Linn. Soc. v. 23 [1886—8]).

The principal genus is *Blumea*, 6 „species" or forms (besides *Laggera*). In dealing with these, I have only attempted to match the exemples of the Danish Expedition, stating where the match appears to me exact; and, if not exact, in what particular it does not quite agree. I have not made any attempt to revise the genus critically or to improve on Sir J. D. Hooker's sorting and characters. Such a revision would occupy months, nor do I feel sure that the results would be an improvement. Similarly, as regards *Wedelia scandens* [Roxb. sub *Verbesina*], I have not sorted afresh the numerous examples of it in Kew, from Malaya, North Australia, Polynesia, mixed under numerous other names but nearly all of it included under the name *Wedelia biflora* by Bentham.

The present 19 species may possibly include nearly all the indigenous Compositae of the Island of Koh Chang; but there is a considerable number of rice-field Compositae, any other of which might turn up in cultivation; or, if carried to Koh Chang, become plentiful there.

Vernonia Schreb.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 227.]

1. **V. cinerea** Less. in Linnaea v. 4 [1829], p. 291; DC. Prod. v. 5, p. 24; Miq. Fl. Ind. Bat. v. 2, p. 11; Hook. f. Fl. Brit. Ind. v. 3, p. 233; Vidal Pl. Vasc. Filip. p. 160; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 401.

Conyza cinerea Linn. Sp. Pl. [ed. 2], p. 1208.

Exemplum n. 18 est forma typica *C. cinereae*, species communis, cui varietates numerosae junctae sunt.

Lem Dan, common in cultivated ground.
Area: In calidis Orbis Veteris, communis.

2. **V. elliptica** DC. in Wight Contrib. [1834], p. 5; DC. Prod. v. 5, p. 22.

V. elaeagnifolia DC. Prodr. v. 5 [1836], p. 22; Hook. f. Fl. Brit. Ind. v. 3, p. 237.

Conyza elaeagnifolia Wallich ms. [List. n. 3041].

Wight Nr. 1377 (*V. ellipticae* origo) in herb. Wight sine habitat est ex mea sententia *V. elaeagnifoliae* (a Griffith in Mergui lectae) exemplum alterum. Griffith Wightio plantas plurimas dederat.

Mouth of Klong Munsé, climbing on trees near the sea.

Area: Malay Peninsula; Siam (Schomburgk n. 116).

Elephantopus Linn.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 237.]

3. **E. scaber** Linn. Sp. Pl. [ed. 2], p. 1313, syn. quibusdam excl.; DC. Prod. v. 5, p. 86; Wight Ic. Pl. Ind. Or. t. 1086; Miq. Fl. Ind. Bat. v. 2, p. 21; Hook. f. Fl. Ind. Or. v. 3, p. 242; Vidal Pl. Vasc. Filip. p. 160; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 402.

Common everywhere, in cultivated ground.

Area: In calidis utriusque Orbis, communis.

Adenostemma Forst.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 239].

4. **A. viscosum**, J. R. et G. Forst. Gen. Pl. [1776], p. 90, t. 45; DC. Prod. v. 5, p. 111; Miq. Fl. Ind. Bat. v. 2, p. 23; Hook. f. Fl. Brit. Ind. v. 3, p. 242 cum syn.; Vidal Pl. Vasc. Filip. p. 160; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 403.

A. latifolium, D. Don Prod. Fl. Nepal p. 181; Wight Ic. Pl. Ind. Or. t. 1087.

A. angustifolium, Arnott in Nova Acta Nat. Cur. v. 18, pars. 1 [1836], p. 347.

Verbesina Lavenia, Linn. Sp. Pl. ed. 2, p. 1271.

Var. *α* **latifolia** (sp.) D. Don; foliis ovatis.

Lem Dan, in rice-field.

Area: In calidis [et temperatis] utriusque Orbis.

Var. *β* **angustifolia** (sp.) Arnott; foliis lanceolatis, imo interdum linearilanceolatis.

Klong Munsé, Klong Son: on river-banks.

Area: India; quam in Zeylaneâ tam in Himalaya Occidentali. Hujus Var. forma foliis linearilanceolatis antea e Malaya non visa.

Ageratum Linn.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 241.]

5. **A. conyzoides**, Linn. p. Pl. eSd. 2, p. 1175; DC. Prod. v. 5, p. 108;

Miq. Fl. Ind. Bat. v. 2, p. 28; Hook. f. Brit. Ind. v. 3, p. 243; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 403.

Common in cultivated ground near Lem Dan.
Area: In omnibus regionibus calidis sparsa.

Erigeron Linn.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 279].

6. **E. Canadensis** Linn. Sp. Pl. ed. 2, p. 1210; DC. Prod. v. 5, p. 289, Oederi tab. excl.; Bentl. et Trim. Medic. Pl. t. 149; Hook. f. Fl. Brit. Ind. v. 2, p. 254; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 418.

Klong Sarlakpet, edge of the jungle.
Area: In omni fere Orbe Terrarum sparsa; ex America Boreali forsan orta.

Blumea DC.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 289].

7. **B. glomerata** DC. in Wight Contrib. [1834], p. 15, Prod. v. 5. p. 443; Hook. f. Fl. Brit. Ind. v. 3, p. 262; Vidal Pl. Vasc. Filip. p. 162; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 420.

B. fasciculata DC. Prod. v. 5, p. 442.
Conyza glomerata Wallich ms. [List n. 3055]; Miq. Fl. Ind. Bat. v. 2, p. 45.
C. fasciculata Wallich ms. [List n. 3094]; nec Wallich ms. [List n. 3017], nec Miquel.
Exempl. n. 80 b cum Hookeri fil. exemplis (in Chittagong lectis), et Wallichii exemplis (in Malaya Peninsulari lectis) exacte quadrat.

Lem Dan.
Area: India, China, Malaya, Philippines.

8. **B. lacera** DC. in Wight Contrib. [1834], p. 14, Prod. v. 5, p. 436; Hook. f. Fl. Brit. Ind. v. 3, p. 263; Vidal Pl. Vasc. Filip. p. 162.

Conyza lacera herb. Roxb.; Wallich List n. 3082 scheda prima.
Exemplum n. 21 est Var. *α* C. B. Clarke [Comp. Ind. p. 76] „foliis parum incisis subtus villosis, inflorescentia oblonga dense sericea; var. in Bengalia et Pegu vulgatissima.
Formae aut varietates, „foliis magis incisis minus sericeis, paniculâ laxiore magis cinerea", sunt —
Conyza lacera Roxb. Fl. Ind. v. 3, p. 428 et Ic. Ined. t. 429 in herb. Kew; Miq. Fl. Ind. Bat. v. 2, p. 42 partim; [forsan ? Burm. Fl. Ind. p. 180. t. 59, fig. 3?] = *Blumea lacera* Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 421.

Lem Dan, in open country.
Area: India, China, Malaya, Philippines, Africa.

9. **B. hymenophylla** DC. Prod. v. 5 [1836], p. 440.

B. lacera Var. *γ hymenophylla* C. B. Clarke Comp. Ind. p. 77.

B. membranacea Hook f. Fl. Brit. Ind. v. 3, p. 266 partim.
Conyza hymenophylla Wallich ms. [List n. 3038].
In Wallich n. 3038, phyllaria sunt fere (neque omnino) glabra. In Koh Chang exemplis phyllaria admodum pilosa videntur.

Lem Dan, in open country; Klong Sarlakpet. on rocks in the jungle.
Area: Pegu, Malaya, Philippines.

10. **B. oxyodonta** DC. in Wight Contrib. [1834], p. 15, Prod. v. 5, p. 444 partim; C. B. Clarke Comp. Ind. p. 85 partim.

B. virens herb. Wight partim; Hook. f. Fl. Brit. Ind. v. 264 partim.
B. spinellosa C. B. Clarke Comp. Ind. p. 84 partim, non DC.
Conyza oxyodonta Wallich ms. [List n. 3015]; Miq. Fl. Ind. Bat. v. 2, p. 45 partim.
In Wallich List n. 3015 (*Conyza oxyodonta* Wallich) rami basi decumbentes, suberecti, longi videntur; fere = Koh Chang n. 161. DC. in Wight Contrib. p. 15, Wightii plantam Negapatensem descripsit; Wallichii planta Malayana autem parum differt.
B. oxyodonta Hook. f. Fl. Ind. v. 2, p. 266 „prostrata" est planta minor = *Conyza tenera*, Wallich List n. 3023 = *B. oxyodonta* Var. DC. Prod. v. 5, p. 444.

Lem Dan, in dry, open places.
Area: India Australis, Malay Peninsula.

11. **B. subracemosa** C. B. Clarke.

Conyza subracemosa Miq. Fl. Ind. Bat. v. 2 [1856], p. 41.
Blumeae bifoliae DC. (in Wight Contrib. p. 14, Prod. v. 5, p. 434) forsan quasi Var. *aestimanda*; ob pedunculos breves diversa. A *Blumea oxyodonta*, praeter folia latiora longius petiolata, parum diversa.

Klong Sarlakpet, in humid places.
Area: Java.

12. **B. balsamifera** DC. Prod. v. 5 [1836], p. 447; Hook. f. Fl. Brit. Ind. v. 3, p. 270; Vidal Pl. Vasc. Filip. p. 161; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 420; Hook. Ic. Pl. t. 1957.

Conyza balsamifera Linn. Sp. Pl. ed. 2, p. 1203; Miq. Fl. Ind. Bat. v. 2, p. 55 cum syn.
C. appendiculata Blume Bijd. p. 895 non Lam.

In dry open country near Lem Dan.
Area: India, Malaya, Cochin China, Ins. Philippine, Formosa, Hainan, vulgaris, in cultis derelictis pestis, 1—3 metr. alt.

Pluchea Cass.

13. **P. indica** (L.) Lessing in Linnaea v. 6 [1831], p. 150; Hook. f. Fl. Brit. Ind. v. 111, p. 272; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 422.

Lem Ngob, Klong Sarlakpet. in mangrove-swamps.
Area: Malaya, China.

Laggera Schultz-Bip.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 190.]

14. **L. flava** Benth. in Benth. et Hook. f. Gen. Pl. v. 2 [1873], p. 290; Hook. f. Fl. Brit. Ind. v. 3, p. 270.

Blumea flava DC. Prod. v. 5, p. 439.
Conyza fasciculata Wallich ms. [List n. 3017 nec n. 3094]; Miq. Fl. Ind. Bat. v. 2, p. 49.

Lem Dan, in grassy spots.
Area: India Borealis, Peninsula Malayana, frequens.

Sphaeranthus Linn.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 294.]

15. **S. Africanus** Linn. Sp. Pl. ed. 2, p. 1314; Hook. f. Fl. Brit. Ind. v. 3, p. 275; Vidal Pl. Vasc. Filip. p. 162; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 423.

S. microcephalus Willd. Sp. Pl. v. 3, p. 2395; DC. Prop. v. 5, p. 369; Miq. Fl. Ind. Bat. v. 2, p. 36.

In rice-fields near Klong Munsé.
Area: In calidioribus Africae, Asiae, Australiae.

Wedelia Jacq.

[Benth. et Hook. f. Gen. Pl. v. 3, p. 370].

16. **W. scandens** C. B. Clarke Comp. Ind. [1876], p. 136, in Proc. Linn. Soc. [1894—5], p. 23.

W. biflora Hook. f. Fl. Brit. Ind. v. 3, p. 306 partim; Benth. Fl. Hongk. p. 183; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 433.
W. strigulosa K. Schum. in Engl. Jahrb. v. 9 [1887—8], p. 223.
Verbesina strigulosa Gaud. in Freycinet Voy. [1826], p. 463?
V. scandens Roxb. Fl. Ind. v. 3, p. 441.

Frutex 2—4-metralis et ultra; sequitur descriptio Roxburghii abbreviata:

„Perennial. Stem long, straggling or climbing, often as thick as the little finger. Leaves 2—4 in long, petioled, cordate, serrate, 3-nerved. Peduncles terminal, generally 3 fold, erect, the lateral ones 3-flowered, [while that] of the centre has only one. Flowers pretty large, bright yellow."

Errore typographico, Roxburgh habuerat „white, that" pro „while that". Ob hanc causam cl. Hooker f. (in Fl. Brit. Ind.) speciem *Verbesinam scandentem* Roxb. (imo in indice) praeterviserat.

Verbesina biflora Linn. (Sp. Pl. ed. 2, p. 1272, „staturâ Siegesbeckiae") est = Rheede Hort. Mal. v. 10, t. 40, annua, erecta, 2-pedalis [cf. Roxb. Fl. Ind. v. 3, p. 440]. *Wedelia biflora* DC. in Wight Contrib. [1834] p. 18 est planta Linnaei et Rheedei (exemplis *Wed. scandentis* fusis). *Wedelia aristata* Less. in Linnaea v. 6 [1831], p. 160 est fide Lessingii „gracilis"

sed verosimiliter est *V. scandens* e ramulis descripta. *Wedelia scandens*, viva, a caeteris *Wedeliae* speciebus insigniter differt.

Klong Prao, Koh Kahdat, on sandy sea-shores.

Area: In maritimis Asiae Orientalis, Australiae trop., Polynesiae, sat communis.

Cosmos Cav.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 387.]

17. **C. sulphureus** Cav. Ic. v. 1 [1791], p. 56, t. 79; Hook. f. Fl. Brit. Ind. v. 2, p. 310.

Adenolepis calva Schultz-Bip. in Zoll. Verz. Ind. Archip. p. 123; Miq. Fl. Ind. Bat. v. 2, p. 79.

Bidens calva C. B. Clarke Comp. Ind. p. 141.

Lem Dan, Lem Ngob common in dry open places.

Area: Mexico, planta culta; in India, Malaya, non raro efferata.

Sphaeromorphaea DC.

Prod. v. 6 [1837], p. 140.

[Centipeda, Benth. et Hook. f. Gen. Pl. v. 2, p. 430 partim.]

18. **Sph. Russeliana** DC. Prod. v. 6 [1837], p. 140; Deless. Ic. Select. v. 4, t. 49; Hook. f. Fl. Brit. Ind. v. 3, p. 317.

Centipeda orbicularis C. B. Clarke Comp. Ind. p. 151; Kurz in Journ. Asiat. Soc. Bengal. v. 46, pars 2 [1877], p. 179, non Lour.

Cotula Russelliana Wallich ms. List n. 3240.

Exempla in herb. Kew conservata, e Malaya, Tonkin, China, Philippines, sunt *Centipeda orbicularis* Lour.

Klong Son, Klong Sarlakpet, in wet places.

Area: Madras; (Circars) Russell; Bengal, Chota Nagpore, C. B. Clarke n. 34806. Siam; fide Kurz l. c.

Emilia Cass.

[Benth. et Hook. f. Gen. Pl. v. 2, p. 583.]

19. **E. sonchifolia** DC. in Wight Contrib. Bot. Ind. p. 24, Prod. v. 6, p. 302; Miq. Fl. Ind. Bat. v. 2, p. 101; Hook. f. Fl. Brit. Ind. v. 3, p. 336; Vidal Pl. Vasc. Filip. p. 164; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 449.

Cacalia sonchifolia Linn. Sp. Pl. ed. 2, p. 1169.

Exemplum Koh Chang est forma „glabra" Wallich ms. List n. 3145.

Klong Son in a pool.

Area: In calidioribus Orbis Veteris communis, Orbis Novi inquilina.

Umbelliferae

by **C. B. Clarke** — Kew.

Hydrocotyle Linn.

1. **H. Asiatica** Linn. Sp. Pl. ed. 1, p. 234, ed. 2, p. 338; Hook. f. Fl. Brit. Ind. v. 2, p. 669 cum syn.

Centella Asiatica Urban in Mart. Fl. Brasil v. 11, p. 1, p. 287, t. 78, fig. 1.

Klong Son, in pools.

Area: In tropical and warm regions both of the New and Old World.

Eryngium Linn.

2. **E. foetidum** Linn. Sp. Pl. ed. 1, p. 232, ed. 2, p. 336; Urban in Mart. Fl. Brasil. v. 11, pars 1, p. 302, t. 79, fig. 2; Hemsl. in Journ. Linn. Soc. v. 34 [1898—1900], p. 475.

This plant has been received from Singapore where it was introduced, and from Yunnan. It has been cultivated as of medicinal value; and Hemsley l. c. shews that it was introduced into the Dutch East Indies, and is satisfied that none of Asian collection is indigenous.

Koh Kong; in dry, sandy spots near the sea.

Area: Trop. America. In South-East Asia, introduced.

Carum Linn.

3. **C. Roxburghianum** Benth. in Benth. et Hook. f. Gen. Pl. v. 1 [1867], p. 891; Hook. f. Fl. Brit. Ind. v. 2, p. 682 cum syn.

Lem Dan, in dry grassy spots, probably escaped from cultivation.

Area: Throughout India extensively cultivated. Not known to me wild; it may be a cultivated form of one of the closely-allied wild species of *Carum*.

Rhizophoraceae

by **Johs. Schmidt.**

The Rhizophoraceae of our area are 8 and except one species, *Carallia integerrima*, which grows in the inland jungle, confined to the sea-shores and estuaries of rivers, forming the bulk of the mangroves or tidal-forests so characteristic to Eastern tropical coasts. Along the shores of the Gulf of Siam the mangrove is very luxuriant and nearly all the species generally recorded from the tropics of the Old World occur here. Of the *Rhizophoraceae*[1]) only one or two species (*Kandelia Rheedii* W. and Arn. and *Bruguiera parviflora* W. and Arn., see below) are wanting in the Siamese mangrove. As to *Kandelia Rheedii* it is said by Schimper (in Engler und Prantl Nat. Pflanzenfam. III, 7, p. 52) to occur from India to Hongkong and it is also quoted from the Malay Archipelago[2]); so we might expect to find it in the Gulf of Siam, but although I looked for it with great attention I was not fortunate enough to find it. It is widely distributed along the shores of the Bay of Bengal and is common in some places e. g. near Calcutta (according to a private communication by Mr. C. B. Clarke); but East of the Malay Peninsula it seems to be a rare plant and neither Schimper[3]) nor Karsten[4]), who lately studied the Indo-Malayan mangroves, have found it. In a letter to me Mr. H. N. Ridley from Singapore writes: „Kandelia Rheedii seems to be very rare in our region. I have never been able to find it but once, in one of the rivers in Johore". This is the nearest locality, that I know.

I have examined the specimens of *Kandelia Rheedii* contained in the Kew and Copenhagen herbaria. Those specimens doubtful

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[1]) As to the circumscription of species I follow Schimper in his excellent work, Die Indo-Malayische Strandflora, Jena 1891.

[2]) Henslow in Hook. f. Fl. Brit. India II, p. 437.

[3]) Indo-Malayische Strandflora.

[4]) G. Karsten: Über die Mangrove-Vegetation im Malayischen Archipel, Bibliotheca Botanica Heft 22, 1891.

as to locality being excluded the geographic range of the species is to be seen from the following data:

Indian Ocean: Quilon (Herb. Wight propr. 1042). Travenocore (Herb. Wight). Mangalore near Madras (Herb. Wight n. 992). Soondreeboon (Herb. of the late East India Company n. 2204, C. B. Clarke n. 2176 b (Koolna); Calcutta, cultivated in the Botanical Garden). Tenasserim and Andamans (Herb. Helfer); Mergui (Herb. of the late East India Company n. 2219). Singapore (according to Ridley).

Pacific Ocean: Borneo, Sarawak (Beccari), (Haviland n. 2097). Tonkin, Haïphong (Balansa n. 1135). Hongkong (Champion), Lantao Island (Herb. Hongkong Bot. Gard. n. 144). Formosa, Tamsuy (Oldham).

Rhizophora L.

1. **R. mucronata** Lam. Encycl. VI, p. 89, Ill. t. 396; Hooker f. Fl. Brit. India II, p. 435; Theobald in Mason Burma its people and productions, vol. II (1883), p. 480; Miq. Fl. Ind. Bat. I, 1, p. 583; G. Karsten in Bibliotheca Botanica Heft 22 (1891), t. I, IV, IX; Schimper Indo-Malayische Strandflora (1891) p. 92, t. V (fig. bona) et in Engler und Prantl Nat. Pflanzenfam. III, 7, p. 52; Wight Ill. I, p. 209 et Icon. t. 238; Kurz For. Fl. Burma I, p. 447; Brandis For. Fl. p. 217; Koorders en Valeton Boomsoorten van Java, Bijdrage n. 4 (1896), p. 278. — *R. latifolia* Miq. Suppl. Fl. Ind. Bat. p. 324; *R. macrorhiza* Griff. in Transact. Med. Phys. Soc. Calcutta VII, 2; *R. candelaria* W. et Arn. Prod. I, 310; *R. mangle* Roxb. Fl. Ind. II, p. 459; — Rheede Hort. Mal. VI, t. 34.

Var. *α* **typica** Schimper Indo-Malay. Strandflora p. 92 (1891).

In estuaries and swamps, far less common than the next species, but in some places (Klong Wen, Lem Ngob) forming large dense mangrove forests. In Koh Chang this species is rather rare. A moderate sized tree, which sends down stout aërial roots.

Area: Eastern tropical coasts (also in Africa).

2. **R. conjugata** L.; D. C. Prodrom. III, p. 33; Hooker f. Fl. Brit. India II, p. 436; Theobald in Mason, Burma its people and productions, vol. II, p. 480 (1883); Schimper Indo-Malay. Strandflora p. 92, t. 5 et in Engl. und Prantl Nat. Pflanzenfam. III, 7, p. 52; G. Karsten in Bibliotheca Botanica Heft 22 (1891), t. II, fig. 1 (fig. bona); Koorders en Valeton Boomsorten van Java, Bijdrage n. 4 (1896), p. 282; *R. candelaria* D. C.

Prodrom. III, p. 32; Trimen Flora of Ceylon II, 1894, p. 151; *R. apiculata* Bl. Fl. Jav. I, 91 et Mus. Bot. 134; Wight Ill. I, 209; Kurz For. Fl. Brit. Burm. I, p. 447.

Abundant everywhere over the explored area forming with *R. mucronata*, *Bruguiera gymnorhiza* and *Avicennia officinalis* the bulk of the mangroves or tidal-forests of the coasts. In Koh Chang it is the most common species of the mangroves and seems to be very indifferent to the quality (rocks, mud, sand) and salinity of the ground on which it grows. A moderate sized tree (smaller than *R. mucronata*) with flowers and fruit in December, January, February, March.

Area: All Eastern tropical coasts (not in Africa).

Ceriops Arn.

3. **C. Candolleana** Arn. in Annals of Nat. Hist. I, p. 353; Bl. Mus. bot. 143; Wight Icon. t. 240; Bedd. Flor. Sylv. Anal. Gen. t. 13, fig. 5; Miq. Fl. Ind. Bat. I, p. 590; Brandis For. Fl. 218, I, 448; Hooker f. Fl. Brit. India II, p. 438; Theobald in Mason: Burma, its people and productions, vol. II (1883), p. 481; Schimper Indo-Malay. Strandflora p. 94, t. IV, V, et in Engl. und Prantl Nat. Pflanzenfam. III, 7, p. 52; G. Karsten in Bibliotheca Botanica Heft 22 (1891) p. 10, t. III (fig. bona), IV, IX; Koorders en Valeton, Boomsorten van Java, Bijdrage n. 4 (1896), p. 284. — *C. timoriensis* D. C. Prodr. III; *C. lucida* Miq. Suppl. Fl. Ind. Bat. 325; Boerlage in Teysmannia VI, 165.

Schimper l. c. p. 36 and Pflanzengeographie (1898, p. 431) states the occurrence of negative geotropical aërial roots in *Ceriops Candolleana* like those of *Sonneratia acida* and *Avicennia officinalis*. I have examined a great number of specimens of this species, which is very common in the Gulf of Siam, but I was never able to find even a trace of such aërial roots.

Abundant in the tidal-forests throughout the explored area (all round Koh Chang; Klung; Koh Chick; Lem Ngob; Koh Kong) with the mangroves on muddy and stony ground; a small or moderate-sized tree or a shrub, which bears flowers and fruit in December, January, February and March.

Area: Tropical shores of the Old World.

4. **C. Roxburghiana** Arn. in Annals of Nat. History I, p. 363; Miq. Fl. Ind. Bat. I, 1, p. 591; Kurz Fl. Br. Burma I, p. 448; Hooker f. Fl. Brit. India II, 436; Schimper Indo-Malay. Strandflora (1891), p. 94 et in Engl. und Prantl Nat. Pflanzenfam. III, 7, p. 52; G. Karsten in Bibliotheca Botanica Heft 22 (1891), p. 10, t. III (fig. bona); Koorders en Valeton Boomsoorten van Java, Bijdrage n. 4 (1896), p. 287. — *C. Zippeliana* Bl. Mus. bot. 143; *C. decandra* Theobald in Mason: Burma, its people and productions vol. II (1883), p. 480; *Rhizophora decandra* Roxb. Hort. Beng. 36; Wall. Cat. 4875; *Rh. glomerulata* Herb. Zipp.

C. Candolleana and *Roxburghiana* are closely allied. The most im-

portant distinguishing character is found in the petals, as it has already been sufficiently pointed out by Arnott l. c. p. 364: „In the first species (*C. Candolleana*) the petals are only furnished towards the apex with about three stout bristles of equal thickness on each side giving to them a palmate appearance". But in *C. Roxburghiana* the petals are setoso-ciliate above towards their apex (fringed by numerous small bristles). Karsten states another good discriminating character in the position and directior of the sepals; l. c. p. 10 he says: „Die Kelchblätter der ersteren Art (*C. Candolleana*) bleiben ganz am Rande der Frucht inserirt und stehen ab, diejenigen der *Ceriops Roxburghiana* rücken weit auf die Fruchtwand selbst hinauf und legen sich derselben an."

Lem Dan, tidal-forest on stony ground; a small shrub, which appears to be far less common than the preceding larger species. Flowering in January.

Area: Tropical shores of the Old World.

Bruguiera Lam.

5. **B. gymnorhiza** Lam.

Miq. Fl. Ind. Bat. I, p. 586; Kurz Fl. Burma I, 450: Brandis For. Fl. 219; Blume Mus. bot. 136; Hook. f. Fl. Brit. Ind. II, p. 437; G. Karsten in Bibliotheca Botanica Heft 22 (1891) t. II, X; Schimper Indo-Malayische Strandflora (1891) p. 95, t. II, IV, V et in Engl. und Prantl Nat. Pflanzenfam. III, 7 p. 54; Koorders en Valeton Boomsoorten van Java, Bijdrage n. 4 (1896) p. 292. — *B. Rheedii* Baill. Hist. Pl. 287; Wight Icon. t. 239; Miq. Fl. Ind. Bat. I. 587; Benth. Flor aust. non Blume; *B. rhedii* Hemsley in Voyage of H. M. S. Challenger, Botany, p. 237; *B. Rumphii* Bl. Mus. bot. 137 non Hook. f. Fl. Brit. Ind. II, 438; *B. Wightii* Bl. et *B. Zippelii* Bl. Mus. bot. 138, 139; *B. gymnorhiza* p. p. Theobald in Mason: Burma, its people and productions, vol. II (1883), p. 481; *Rhizophora gymnorhiza* Roxb. Fl. Ind. II, 460; Loureiro Fl. Cochinchin. tom. I, p. 297; Griff. Ic. Pl. As. t. 645.

In foliage this species resembles *Rhizophora conjugata* and though easily distinguished when flowering sterile branches of the two species have often been confounded, However the leaves of *Rhizophora* are dotted beneath with minute black spots, which are not to be found in *Bruguiera.*

Common everywhere throughout the explored area with the mangroves, especially in the interior of the tidal-forests on swampy muddy ground (more seldom on rocky and sandy ground). A handsome, large tree, taller than any other in the mangrove [1]). Flowers and fruit found in December, January, February and March.

Area: East Africa, Tropical Asia, Australia and Pacific.

6. **B. eriopetala** W. et Arn. in Wight Ill. I, p. 210; Icon. t. 239 B; Hook. f. Flor. Brit. India II, p. 438; Schimper Indo-Malay. Strandflora (1891),

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[1]) Up to 28 metr. according to Koorders en Valeton l. c. p. 293.

p. 95, t. V et in Engl. und Prantl Nat. Pflanzenfam. III, 7, p. 54, fig. 27 H-L; G. Karsten in Bibliotheca Botanica Heft 22 (1891), t. V, VIII, IX, XI. Koorders en Valeton Boomsoorten van Java, Bijdrage n. 4 (1896), p. 295. — *B. Rheedii* Bl. in Herb. Lugd. Bat. non auct.; Mus. bot. 138; *B. parietosa* Griff. Not. IV, 670; Icon. t. 641; *B. Rumphii* Hook. f. Fl. Brit. Ind. non Blume; *B. gymnorhiza* Benth. in Fl. austral. non Lam.; *B. cylindrica* Bl. Mus. bot. 137; *B. oxyphylla* Miq. Fl. Sumatr. 324; *B. gymnorhiza* p. p. Theobald in Mason: Burma, its people and productions, vol. II (1883), p. 481.

In the explored area this is less common than the preceding larger species[1]). I have found it only on muddy ground in the interior of the tidal-forest (Klong Prao, Lem Dan, Lem Ngob). A rather small tree or a shrub with flowers in January, February and March.

Area: Malaya, China.

7. **B. caryophylloides** Bl. Mus. bot. I, p. 141; Hook. f. Fl. Brit. India II, 438; Kurz For. Fl. Burma I, 450; Theobald in Mason: Burma, its people and productions, vol. II (1883), p. 481; Schimper Indo-Malay. Strandflora (1891), p. 96, t. V et in Engl. und Prantl Nat. Pflanzenfam. III, 7, p. 54, fig. 27 M, N; G. Karsten in Bibliotheca Botanica Heft 22 (1891), t. II (fig. bona), V; Koorders en Valeton Boomsoorten van Java, Bijdrage n. 4 (1896), p. 298. — *Kanilia caryophylloides* Bl. Mus. bot. 141; *Rhizophora caryophylloides* Jack. Mal. Misc. I, 39; Wight Ill. t. 210; Griff. Icon. t. 642. — Rheede Hort. Mal. VI, t. 33; Rumph. Herb. Amboin. III, t. 69 A, B.

Rather common within our area in the tidal-forests with *B. gymnorhiza*, on muddy ground (Klong Wen, Koh Chick, Lem Ngob, Klong Sarlakpet). A small or moderate-sized tree or a shrub. Flowers and fruit met with in January and February.

Area: India from Malabar to Malacca, Ceylon, Malaya.

B. parviflora W. & Arn. Prodr. I, p. 311. Sterile branches of a *Bruguiera*, which may possibly belong to this species, have been collected in the mangrove at Lem Ngob; but the specimens cannot be determined with certainty.

Carallia Roxb.

8. **C. integerrima** D. C. Prodr. III, p. 33; Hook. f. Fl. Brit. India II, p. 439 c. synon.; Wight Illustr. t. 90, non Icon. t. 605; G. Karsten in Bibliotheca Botanica Heft 22 (1891), t. V, f. 36—41; Trimen, Flora of Ceylon II, 1894, p. 155; Koorders en Valeton Bijdrage n. 4 (1896), p. 301; *C. lucida* Kurz For. Flor. Brit. Burma I, 451, non Roxb. Cor. pl. t. 211.

The leaves of this widely spread species vary exceedingly. In all my

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[1]) In Java, *B. criopetala* appears to be more common than *B. gymnorhiza* according to Koorders en Valeton l. c. p. 296.

Siamese specimens they are broadly obovate and very obtuse (as in Cingalese specimens) and always quite entire; but my material is not very large and Koorders en Valeton state l. c. p. 304 that they have found (in Java) specimens with entire (or nearly so) and dentate-serrulate leaves in the very same tree. It is not quite correct when Henslow (in Flora Brit. India p. 439) says that „the petals are not embracing the filaments"; I have examined good flower material and found that the filaments were always enclosed by the small petals; see also Koorders en Valeton l. c. p. 304 „Petala ...., ineunte anthesi stamina involventia"

A rather large tree with slender bare trunk and wide-spreading top, common on riverbanks in the jungle near Klong Munsé. Flowering in February and March.

Area: Ceylon, India, Burma, Malay Peninsula, China, Malaya, Tropical Australia.

Fagaceae

by **Ove Paulsen** — Copenhagen.

Quercus L.

1. **Q.** (*Cyclobalanopsis*) **semiserrata** Roxb. Fl. Ind. III, 641; Hooker f. Fl. Brit. Ind. V, 604; Geo. King: Ind.-Mal. sp. Quercus a. Castanopsis p. 28, pl. 22 (Ann. roy. bot. Garden Calcutta II, 1889).

A form with globose-ovoid velutine glands, 2 cm. long.

Klong Munsé; Klong Son, in the jungle.
Area: Assam, Silhet, Cachar, Khasia hills, Tenasserim, Sumatra, Banka.

2. **Q.** (*Pasania*) **lanceæfolia** Roxb. Fl. Ind. III, 634; Hooker f. Fl. Brit. Ind. V, 616; King l. c. p. 79, pl. 74.

Klong Munsé; north-end of Koh Chang; Lem Dan, in the jungle.
Area: Sikkim, Bhotan, Assam, Munipore, Chittagong, Upper Burma.

Castanopsis Spach.

3. **C. armata** (Roxb.) Spach Hist. Veg. Fau. XI, 185; Roxb. Fl. Ind. III, 640. Hooker f. Fl. Brit. Ind. V, 622. King l. c. p. 101, pl. 93.

Having no example of this species for comparison I refer to the description and figure of King, with which the Koh-Chang-specimens agree.

Jungle near Klong Majum.
Area: Sikkim, Bhotan, Assam, Cachar, Burma, Khasia hills, Chittagong.

Loranthaceae

by **F. Kølpin Ravn** — Copenhagen.

Elytranthe (Bl.) Engl.

1. **E. ampullacea** (Roxb.) Engl.

Loranthus ampullaceus Roxb. et *L. globosus* Roxb. in Hooker; Flora of British India V, p. 220; *L. subumbellatus* Bl. in Flora Javae Fasc. 40—41, tab. XVIII; *L. sphærocarpus* Bl. ibd. tab. XVII; *L. Cochinchinensis* Willd. (?) in Loureiro: Flora Cochinchinensis tom. I, p. 241.

Klong Prao; riverbank.

Area: North-East India, Burma, Malacca, Penang, Singapore, Java; Cochinchina (?).

Loranthus (L.) Engl.

2. **L. heteranthus** Wall.

Hooker l. c. p. 208.

Lem Dan, on *Mangifera indica.*

Area: Burma, Malay Peninsula (Ridley), Java, Borneo.

3. **L. pentapetalus** Roxb.

Hooker l. c. p. 206; Blume l. c. p. 39, tab. XIV et XXIII, fig. A. *Helixanthera parasitica* Loureiro (?) l. c. p. 176.

Lem Dan, on a tall tree near the village.

Area: Nepal, Assam, Yunnan, Burma, Malacca, Penang, Singapore, Java, Sumatra, Borneo; Cochinchina (?).

4. **L. chrysanthus** (G. Don) Bl.

Blume l. c. p. 25, tab. V. *Dendrophthoë chrysantha* G. Don. in Miquel: Flora Indiae Batavae vol. I, pars I, p. 812.

The specimens differ from the type in the straight corolla-tube with well-marked longitudinal furrows.

Lem Dan, riverbank, on *Ficus fistulosa.*

Area: Penang (according to specimens in the Botanical Museum of Copenhagen, collected by Mr. Rink), Sumatra, Java.

5. **L. pentandrus** L.

Hooker l. c. p. 216; Blume l. c. p. 33, tab. X—XI.

Some of the specimens collected differ from the type in the smaller, elliptic to lanceolate, acute to acuminate leaves.

Koh Kahdat, sea-shore on *Hernandia peltata*; Klong Munsé, riverbank; Lem Dan, mangrove on *Bruguiera eriopetala* W. et Arn.

Area: Burma, Malacca, Penang, Singapore, Sumatra, Java, Borneo.

Viscum (L.) Engl.

6. **V. orientale** Willd.

Var. **obtusatum** (Wall.) Miq.

Miquel l. c. p. 805. *V. obtusatum* Wall. in De Candolle: Prodromus t. IV, p. 279.

Lem Dan on *Ficus consociata* Bl. var. *Martoni* King: Koh Kahdat, sea-shore.

Area: Ceylon, India, Burma, Malacca, China, Malay Islands, New Guinea, North Australia. The var. *obtusatum* is only observed in Asia.

Podostemaceae

by **Eug. Warming** — Copenhagen.

The Danish Expedition has been so fortunate as to find a new *Podostemacea*, the first known from Siam. As far as I can see it is a new species. In habit, size, the structure of stem, form of leaf and more particularly in the flower having only one stamen it much resembles the *Podostemon metzgerioïdes* published by Trimen in 1892 (Handbook of the Flora of Ceylon, part III, p. 419, pl. 76), which latter, however, differs widely from it in other respects and is now (1900) placed under a new genus *Farmeria* by Dr. John Willis (see Trimen's Handbook part V, Additions p. 286). Strangely enough during the last few years there has been found a third monandrous *Podostemacea* in Asia (Java), viz. *Cladopus Nymani* Hj. Möller, and in some points the Siamese *Podostemacea* approaches close to this species also.

I have named the new Siamese species *Polypleurum Schmidtianum* in honour of the finder.

Regarding the reasons why I prefer recording Hooker and Bentham's subgenus *Polypleurum* as a distinct genus and prefer placing the new Siamese species under it I beg to refer to my 6th paper on the order *Podostemaceae* in the „Kgl. Danske Videnskabernes Selskabs Skrifter" 1901, where both *Polypleurum Schmidtianum* and *Cladopus Nymani* are figured.

I give the following diagnosis of it: —

Polypleurum.

P. Schmidtianum Warmg. n. sp.

Radices in rupibus repentes, iisdem arcte adpressæ, late lineares, planæ, irregulariter subdistiche ramosæ. Caules in facie superiore radicum prope margines nascentes brevissimi, foliis paucis (ad 5—6) instructi. Folia disticha simplicia, linearia, obtusa. Flos in caulibus solitarius terminalis, primum inter folia duo ad basin in vagina ampliata occultus, dein emergens longe pedicellatus. Spathella

rupta ad basin pedicelli relicta. Stamen unicum, basi in utroque latere squamula perigoniali anguste lineari, filamento fere æquilonga, munitum.

Radices c. 2—4(—6) mm. latæ. Folia 5—8 mm. longa, $^1/_3$—$^1/_2$ mm. lata. Pedicelli fructiferi 6—10 mm. long. Squamulæ perigoniales c. 1 mm. longæ. Stamina c. 1,2 mm. longa. Styli duo, rarius 3, longiusculi, lineares acuti. Capsula matura non visa; immatura c. 1,5 mm. longa.

With regard to figures and a more exhaustive description I beg to refer to my 6th paper on the order *Podostemaceæ* in the „Kgl. Danske Videnskabernes Selskabs Skrifter" 1901.

On rocks in quickly flowing water. Only met with in two localities, both in Koh Chang, viz. Klong Majum alt. 700 ft. and Klong Sarlakpet alt. 600 ft. in small waterfalls in the jungle; it does not grow where the stream is less rapid. The specimens from Klong Majum were collected on February 23rd and were sterile, whereas those from Klong Sarlakpet found on March 15th bore flowers and unripe fruit which extended above the surface of the running water.

Hydrocharitaceæ, Lemnaceæ, Pontederiaceæ, Potamogetonaceæ, Gentianaceæ (Limnanthemum), Nymphæaceæ

by **C. H. Ostenfeld** — Copenhagen.

Hydrocharitaceæ.

Blyxa Thouars.

1. **B.** sp. (*octandra* (Roxb.) Planch.?).

It is impossible to determine the collected specimens of *Blyxa* because they are sterile.

Rice-field near Lem Dan.

Area (of *B. octandra*): Tropical Asia and Australia.

Halophila Thouars.

2. **H. ovalis** (R. Br.) Hook. fil., Fl. Tasman. II, p. 45; B. Balfour, On the Genus Halophila, Transact. and Proc. of the R. Soc. Edinburgh vol. XIII, 1879, p. 290; *Caulinia ovalis* R. Br., Prodr. Fl. Nov. Hollandiæ p. 339; *H. ovata* Gaud., in Freycinet, Voy. Bot. p. 429, t. 40, f. 1; Hook. f., Fl. of British India V, p. 663.

The few present specimens which are sterile, belong to f. *minor* (Zoll.) Aschs., Linnæa 1867, p. 174 (*Lemnopsis minor* Zollinger, Verzeichn. 1854, p. 75).

Between Koh Riat and Koh Mesan, in 3—5 fathoms water (coral-sand).

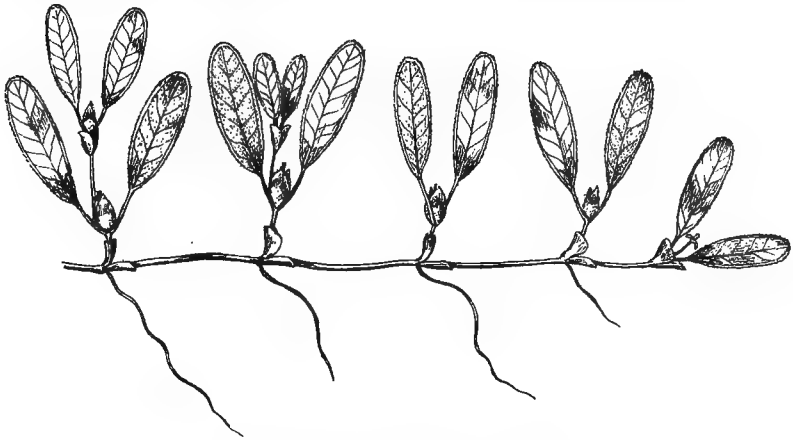
Area: Shores of the Indian, Malayan, Australian and Pacific Oceans (from the Canal of Suez to Luchnan Islands (Japan)).

3. **H. decipiens** Ostf., n. sp.

Leaves oblong-elliptic, their ventral surfaces hairless, but their dorsal surfaces and the margins covered with very fine, short, unicellular star hairs or teeth; the same hairs are found on the outside of the scale- and spathe-leaves; from the midvein of the foliage leaves 6—9 lateral veins pass on each side outwards to the intramarginal vein; the petioles $^1/_2$—1 time as long as the laminæ.

Plants monœcious, flowers unisexual, 1 male and 1 female flower enclosed in the spathe-leaves, corresponding in regard to structure etc. very closely with those of *H. Baillonis* (see: Theo.

Holm: Recherches anatomiques et morphologiques sur deux monocotylédones submergées (Halophila Baillonii Aschs. et Elodea densa Casp.); Bih. till k. Svenska Vet.-Akad. Handl. Bd. 9, No. 13, 1885).



Halophila decipiens Ostf.; nat. size.

The Expedition has brought home a large material of this new *Halophila*, as well flowering as fruitbearing specimens preserved in alcohol. It resembles very much the Westindian *H. Baillonis*. I have examined for comparison a very large alcohol material of the latter (amongst other the same specimens as Mr. Theo. Holm has used for his above mentioned carefull treatise), and I have found but a slight difference between this and the new species; the main difference consists in the absence of the short hairs on the ventral surfaces of the leaves in the new species, while *H. Baillonis* has short hairs on both sides. If the geographical distribution was not so quite different, I should prefer to regard it as a variety of *H. Baillonis*, but it is not probable to suppose such a connection as the sea-phanerogams generally have very natural and limited areas and *H. Baillonis* is confined to the shores of the Westindian Archipelago.

From *H. ovalis* which is common along the shores of the Indian Ocean, the new species is very different; the monœcious flowers, the small teeth in the margins and the short hairs on the surfaces of the leaves, the few lateral veins etc. remove it far from this.

Off Koh Kahdat, in 5 fathoms water (coral-sand).

Lemnaceæ.

Lemna L.

4. **L. paucicostata** Hegelm., Die Lemnaceen, 1868, p. 139; Hook. f., Fl. of British India VI, p. 556.

Only sterile specimens have been collected.

Koh Kong, in a pool.

Area: Tropical Africa, Asia, Australia and Polynesia; (tropical America?).

Pontederiaceæ.

Monochoria Presl.

5. **M. hastata** (L.) Solms in De Candolle, Monographia Phanerog. IV, 1883, p. 523; *M. hastæfolia* Presl, Reliq. Hænk. II, p. 128; Hook. f., Fl. of British India VI, p. 362; *Pontederia hastata* L., Fl. Zeyl. p. 129.

Abundant in pools at the mouth of Klong Sarlakpet.

Area: Ceylon, India, Malaya, China.

6. **M. vaginalis** Presl, Reliq. Hænk. II, p. 128.

var. **plantaginea** (Roxb.) Solms, l. c. p. 524; Hook. f., Fl. of British India VI, p. 363; *Pontederia plantaginea* Roxb., Fl. Ind. II, p. 123.

Abundant in pools near Lem Dan; Klong Sarlakpet.

Area of the variety: India, Java; of the main species: Tropical Africa, India, Malaya, China, Japan.

Potamogetonaceæ.

Halodule Endl.

7. **H. uninervis** (Forsk.) Aschs. in Boissier, Fl. Orientalis V, 1882, p. 24; *H. australis* Miquel, Flora v. Nederl. Indië III, p. 227; *Zostera uninervis* Forskål, Fl. Ægypt.-Arab. CXX and 157, 1775; *Cymodocea australis* Hook. f., Fl. of British India XI, p. 570.

The collected specimens are sterile, the leaves very narrow, those from Koh Kong 1 mm., those from Koh Chang 0,5 mm. broad.

Ascherson[1]) and Sauvageau[2]) mention a difference in the structure of the leaf-end between the two existing species of *Halodule*, viz. that *H. uninervis* has a tooth in the middle of the leaf-end besides the two marginal teeth, while the West-indian *H. Wrightii* instead of the middle tooth has a kerf, but this difference does not really exist according to my researches. I have examined specimens of both species (*H. Wrightii* preserved in alcohol, from the Danish Westindian Islands), and found that the young leaves have three teeth (two marginal besides the middle-tooth), but the fullgrown ones have only the two marginal, the cells which have formed the middle tooth being destroyed and having fallen out, such as Sauvageau[3]) has pointed out with respect to various other *Potamogetonaceæ*. — On the whole it is not possible to distinguish the two species when sterile, except using their quite different geographical distribution as criterion.

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[1]) Ascherson, P., l. c. and: Die geographische Verbreitung der Seegräser in Neumayer, Anleit. zu wissensch. Beobacht. auf Reisen, Berlin, 1875, p. 364.

[2]) Sauvageau, C.: Sur la structure de la feuille des genres *Halodule* et *Phyllospadix*. Journ. de Botanique IV, 1890, p. 321.

[3]) Sauvageau, C.: Sur la structure des feuilles des plantes aquatiques. Ibid. p. 46.

Koh Kong and Koh Saket, cast ashore or floating in the surface of the water; Koh Chang near Lem Dan growing in shallow water on muddy ground.

Area: Red Sea, Indian and Pacific Oceans.

Gentianaceæ.

Limnanthemum Gmel.

1. **L. indicum** (L.) Griseb., Genera et Species Gentianearum 1839; Hook. f., Fl. of British India IV, p. 131.

var. **siamensis** Ostf., nov. var.

Leaves smaller, 2—5 cm. long, broadly obovate, deeply cordate with obtuse lobes and a triangular sinus, rather thin; flowers few (2—3) in the umbel; pedicels 3—4 cm. long; bracts ovate, obtuse, about 5 mm. long; lobes of the corolla 5, oblong, 10—15 mm. long, covered in the margins and above with numerous long cottony papillose hairs, white with a yellow base; capsule?, seeds?.

According to the above description it will be easy to see that this little pretty *Limnanthemum* differs in some important points from the ordinary *L. indicum*; but having only few flowers and no fruit at my disposal I prefer to regard it as a variety of *L. indicum* hoping that future investigations will settle this point.

Lem Ngob, in a small pond.

Area: of the main species: from the Mascarene Islands throughout India, Malaya, Australia to Fiji Islands.

Nymphæaceæ.

Nymphæa L.

9. **N. stellata** Willd. Spec. II, 1799, p. 1152; Hook. f., Fl. of British India I, p. 114.

The collected specimens belong to var. 1. *punctata* Caspary, Annales Musei Botan. Lugdano-Batavi vol. II, 1865—66, p. 244, A, *maculata* Casp., ibid., a, *coerulea* Casp., ibid.

Abundant in pools near Lem Dan.

Area: Egypt, Cordofan, Senegambia, Guinea, East Africa, Madagascar, India, Malaya.

Nelumbo Adans.

10. **N. nucifera** Gaertn., De Fructibus 1788 I, p. 73; *N. speciosum* Willd., Spec. II, 1799, p. 1258, Hook. f., Fl. of British India I, p. 116; *Nymphæa Nelumbo* Linné, Spec. Plant. 1753.

Cultivated everywhere throughout the area explored.

Area: Persia, India, Malay Archipelago, Japan, China to Amur-river, Australia.

Leguminosae

by **H. Harms** — Berlin.

Mimosoideae.

Mimosa L.

1. **M. pudica** L. Spec. pl. 518.

Lem Dan in dry grassy spots.
Area: In den tropischen und subtropischen Gebieten weit verbreitet.

Neptunia Lour.

2. **N. oleracea** Lour. Fl. cochinch. 654.

Lem Ngob, Lem Dan, in pools.
Area: In den tropischen Gebieten weit verbreitet.

Adenanthera L.

3. **A. pavonina** L. Spec. pl. 384.

Koh Kahdat, in sandy sea-shore.
Area: Trop. Asien, in den Tropen weit verbreitet.

Parkia R. Br.

4. **P. sp.**

Jungle near Lem Dan.

Caesalpinioideae.

Tamarindus L.

5. **T. indica** L. Spec. pl. 34.

Cultivated all over the area explored.
Area: In den Tropen weit verbreitete Kulturpflanze.

Bauhinia L.

6. **B. sp.**

Woody climbing *Bauhiniae* are very common in the jungle of Koh Chang, but I was never fortunate enough to secure flowers of any.

Cassia L.

7. **C. alata** L. Spec. pl. 378.

In dry plains near Klong Munsé.
Area: In den Tropen weit verbreitet.

8. **C. occidentalis** L. Spec. pl. 377.

Klong Prao, in dry grassy spots.
Area: In den Tropen weit verbreitet.

Pterolobium R. Br.

9. **P. Schmidtianum** Harms n. sp.

Ramulis angulatis, puberulis, ad foliorum basim aculeis geminis instructis; foliis circ. 10—13-jugis, petiolo communi aculeato, puberulo, pinnis circ. 20—25-jugis, puberulis, foliolis linearibus, apice leviter emarginulatis vel obtusis, subtus glaucis; panicula terminali, ampla, axi et ramis breviter ferrugineo-velutinis vel puberulis; floribus ignotis; pedicellis in statu fructifero satis brevibus, tenuibus, puberulis vel parce puberulis; leguminis ala oblique oblonga.

Foliorum petiolus communis 20—25 cm. longus, pinnae 4—6 cm. longae, foliola circ. 6 mm. longa, 1—1½ mm. lata. Pedicelli 4—6 mm. longi. Legumen 4—5 cm. longum.

Species foliolis parvis satis angustis subtus glaucis bene distinguenda.

A woody climber in the jungle near Klong Munsé with ripe fruit in February.

Caesalpinia L.

10. **C. Bonducella** Fleming in As. Res. XI (1810), 159.

A woody climber; Lem Ngob in the sandy sea-shore.
Area: In den Tropen weit verbreitet.

Peltophorum Vog.

11. **P. dasyrhachis** Kurz ex Baker in Hook. f. Fl. Brit. India II, 257.

Common in dry plains near Lem Dan; Koh Chang Noi.
Area: Malayische Halbinsel.

Papilionatae.

Sophora L.

12. **S. tomentosa** L. Spec. pl. 373.

Kok Kahdat, very common on the sandy sea-shore.
Area: In den Tropen weit verbreitet.

Sesbania Pers.

13. **S. grandiflora** Pers. Synops. II, 316.

Lem Dan, in humid spots.
Area: Trop. Asien.

Geissaspis W. et Arn.

14. **G. cristata** W. et Arn. Prodr. 217.

Lem Dan in humid spots.
Area: Trop. Asien.

Desmodium Desv.

15. **D. umbellatum** D. C. Prodr. II, 325.

Koh Kahdat, Koh Saket, in sandy sea-shores.
Area: Trop. Asien.

16. **D. triquetrum** D. C. Prodr. II, 326.

Lem Dan, in dry plains.
Area: Trop. Asien.

17. **D. sp.**

On rocks in the jungle near Klong Munsé; a very minute species with ripe seeds in February.

18. **D. polycarpum** D. C. Prodr. II, 334.

Lem Dan, in dry plains.
Area: In den Tropen der alten Welt weit verbreitet.

Derris Lour.

19. **D. scandens** Benth. in Journ. Linn. Soc. IV. Suppl. 103.

Lem Dan, a climber on trees in the sandy sea-shore.
Area: Trop. Asien und Australien.

Clitoria L.

20. **C. ternatea** L. Spec. pl. 753.

Lem Dan, in dry grassy spots; not climbing.
Area: In den Tropen weit verbreitet.

Erythrina L.

21. **E. indica** Lam. Encycl. II, 391.

A very common tree all over the area explored in sea-shores. Also commonly planted near villages.
Area: Trop. Asien und Australien.

Canavalia Adans.

22. **C. ensiformis** D. C. Prodr. II, 404.

Lem Dan, Koh Kahdat, a twiner in sandy sea-shores.
Area: In den Tropen weit verbreitet.

23. **C. obtusifolia** D. C. Prodr. II, 404.

Klong Prao, Mouth of Klong Wen, sandy sea-shores (a prostrate perennial herb).

Area: In den Tropen weit verbreitet.

Cajanus D. C.

23. **C. indicus** Spreng. Syst. III, 248.

A shrub or a small tree in dry plains near Klong Munsé and Klong Sarlakpet.

Area: In den Tropen weit verbreitete Kulturpflanze.

Phaseolus L.

24. **Ph. adenanthus** G. F. Mey. Prim. fl. esseq. 239.

Sandy sea-shore near Lem Dan, a twiner.

Area: In den Tropen weit verbreitet.

Scitamineae[1])

by **K. Schumann** — Berlin.

Zingiberaceae.

Curcuma Linn.

1. **C. aromatica** Salisb. Parad. londin. t. 96.

Plains near Klong Sarlakpet.

Area: The plant is cultivated throughout India and the greater part of the Malayan Archipelago on account of the hot aromatic rhizome. In India it is very often found as a wild plant.

Alpinia Linn.

2. **A. oxymitra** K. Sch. n. sp.

Herba perennis, probabiliter elata caulibus erectis glabris. Folia sessilia elongato-linearia longe attenuato-acuminata et longissime caudata basi angustata utrinque glabra ad 40 cm. longa et 3 cm. lata; ligula 3 mm. longa rotundata glabra. Racemus ad 16 cm. longus pendulus vel rectangulus, rhachis angulata subtomentosa. Flores breviter (vix 2 mm. longe) pedicellati solitarii; bracteae 18 mm. longae cucullatae longe apiculatae tomentellae. Ovarium ut calyx et corolla sericeum 2 mm. longum. Calyx 10 mm. longus late tubulosus irregulariter trilobus, unilateraliter fissus. Corollae albae tubus 1,2 cm. longus, lobi oblongi obtusi 1,3 cm. metientes. Labellum 1,5 cm. longum obovatum subtrilobum; staminodia lateralia late obovata 5 mm. longa subtriloba. Filamentum parce pilosulum 8 mm. longum; anthera glabra 5 mm. longa, connectivi appendicula elliptica obtusa 2,5 mm. longa.

This very remarkable and peculiar species is recognised on the first look by its caplike very long pointed bracts and its large exterior staminods. I know no species with which is could be compared.

Jungle near Klong Munsé. Flowers yellowish white, with pink spots.

3. **A. macroura** K. Sch. n. sp.

Herba perennis rhizomate repente. Caules metrales graciles. Folia longe (ad 3,5 cm.) petiolata, petiolus minutissime puberulus,

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[1]) Bananas (*Musa sapientium* L.) are commonly cultivated in the villages. Also wild bananas are said to occur in Koh Chang in the jungle. But I have never seen any of them.

lanceolata vel lineari-lanceolata attenuato-acuminata et longe caudata basi acuta vel angustata apice utrinque et mediano subtus minute pilosula margine dense puberula; vagina et ligula 4 mm. longa rotundata minute puberula. Pannicula ad 11 cm. longa, rhachis validiuscula chryseo-tomentosa. Flores geminati brevissime pedicellati, pedunculo communi ad 8 mm. longo suffulti. Bracteae conchiformes ad 25 cm. longae longe apiculatae apice villosae. Ovarium sericeo-villosum. Calyx 2 cm. longus triente superiore in lobos acuminatissimos divisus unilateraliter fissus. Corollae tubus 1,5 cm. longus, lobi oblongi obtusi 2,5 cm. metientes, dorsalis apice villosus. Labellum 4 cm. longum subtrilobum apice bilobatum; staminodia lateralia subulata 4 mm. longa. Filamentum 12 mm., anthera 13 mm. longa.

This species is near *A. formosana* K. Sch. but it differs by the apiculate bracts, the smaller stature and foliage.

Klong Son, Klog Sarlakpet, in dense jungle. Labellum yellow, with pink base.

Amomum Linn.

4. **A. hirticalyx** K. Sch. n. sp.

Herba perennis cum foliis ad 90 cm. alta. Folia breviter ad 10 mm. longe petiolata linearia vel lineari-oblanceolata attenuato-acuminata basi longe angustata utrinque glabra ad 25 cm. longa et 3,5 cm. lata; ligula vix 2 mm. longa obtusa ciliolata. Spica anguste ellipsoidea cum floribus 7 cm. longa pleiantha, pedunculo subaequilongo squamis brevibus velato subtomentoso suffulta; bracteae exteriores oblongae apiculatae puberulae apice barbellatae florentes paulo majores. Bracteola biloba puberula vel subtomentosa 3,2 cm. longa. Ovarium sericeum. Calyx 4,5 cm. longus quadrante fissus trilobulatus puberulus. Corollae tubus 3,5 cm., lobi 2 cm. metientes. Labellum basi dilatatum apice integrum 3,5 cm. longum. Anthera subglabra 6 mm. longa; filamentum hoc aequans.

This species is related to *A. linguiforme* Roxb. but by the much smaller leaves, by the entire anterior part of the lip very distinct from it; n. 685 is probably the same plant but the flowers already faded are not fit for examination.

Jungle near Klong Son. Flowers red. The rhizome has an aromatic smell.

Elettariopsis Bak.

5. **E. Schmidtii** K. Sch. n. sp.

Caules ad 80 cm. alti e rhizomate longe lateque repente. Folia ad 1,5 cm. longe petiolata lanceolata vel lineari-oblanceolata attenuato-acuminata et caudata basi longe angustata supra ad medianum tantum minute puberula subtus tomentosa mollia ad 25 cm. longa et 4,5 cm. lata; ligula vix 2 mm. longa rotundata subvillosa. Spica e rhizomate quadriflora pedunculo 1 cm. vix attingente glabro suffulta; bracteae exteriores oblongae acutae minute puberulae ad 3 cm.

longae, florentes breviores; bracteolae turbinatae oblique fissae 1,8 cm. longae. Ovarium sericeum. Calycis tubus 4,2 cm. longus, lobi 1 cm. longi lanceolati. Corollae tubus 5,2 cm., lobi lanceolati 1,8 cm. longi. Anthera 3 mm. longa glabra connectivi appendicula triloba aequilonga superata. Labellum 3 cm. longum apice obovatum crispatum emarginatum antice bicallosum.

This species can only be compared with *E. Kandariensis* K. Sch. which I formerly put with the other species of the genus *Elettariopsis* in the genus *Amomum*, Sect. *Mastigamomum* (*Amomum Kandariense* K. Sch. in Engl. Jahrb. XXVII, 323). It is conspicuously different from the latter by the much smaller leaves and the longer tomentum on the underside of the leaves.

Jungle near Klong Sarlakpet. Flowers white, labellum with an yellow spot.

Cannaceae.

Canna L.

6. **C. Warszewiczii** Dietr. in Allgem. Gartenzeit. XIX (1851), 289.

Klong Sarlakpet, on vaste ground near the village.

Area: It has been introduced to Europe by the renowned Warszewicz from Central-America and is now very often cultivated in the warmer parts of the globe.

Note. Another plant of the same genus is not complete enough to be clearly defined.

Marantaceae.

Clinogyne Salisb.

In Transact. Hort. Soc. I, 276.

7. **C. grandis** (Miq.) Benth. in Benth. et Hook. fil. Gen. pl. III, 651. *Maranta grandis* Miq. Fl. ind.-bat. Suppl. 616.

Klong Son, in dense jungle.

Area: It has a very large area from Java to New Guinea and still farther to the Polynesia Archipelago; I did not see it before from Siam or Indo-China. I have not cited Baker in the Flora of British India because I think, that the plant from Malacca cited there is an other species.

Phrynium Willd.

8. **P. capitatum** Willd. Spec. pl. I, 17; Baker in Hook. fil. Fl. Brit. Ind. VII (1898), 258.

Klong Sarlakpet, in dense jungle. Flowers white, fruit pink.

Area: Largely distributed from the Eastern Himalaya to Southern China and the Philippines over the Malayan Peninsula to Sumatra and Java.

9. **P. minus** K. Schum. n. sp.

Acaulis rhizomate repente tuberculoso vaginis flavicantibus 5 mm.

longis munitus. Vaginae basales aphyllae 3, folia bina ad 6 cm. longe petiolata, petioli pars summa 5 mm. longa callosa teres supra subtomentosa, lanceolata acuta vel subacuminata basi acuta utrinque glabra supra sicc. obscure subtus pallidius viridia ad 12 cm. longa et 3 cm. lata; vagina glabra haud ampla, ligula subnulla. Racemus terminalis vix 5 mm. longe pedunculatus; bracteae 3 lanceolatae acutae ad 2,5 cm. longae glabrae. Paria florum subsessilium solitaria rudimento alterius inferiore prophyllo adossato donato comitata. Ovarium glabrum submuriculatum 1,5 mm. longum. Sepala lanceolata 3 mm. longa. Tubus corollae 1,7 cm. longus, lobi 7 mm. metientes. Capsula pallida 8 mm. longa monosperma subcylindrica. Semina pallide castanea 5 mm. longa transverse subsulcata arillo bilobo munita.

The habit of this very peculiar plant goes far from what is generally known in the genus. Nearly all the other species are pretty large plants, this however is a dwarfy herb very similar to the species of *Haplochorema* from the *Zingiberaceae.* Indeed one may be uncertain to what family it belongs if not the swollen petiolus leads on the right place. It is a true *Phrynium* in the common sense of the genus up to date with a three celled ovary and solitary ovules in each cell. Two of the latter however perfectly disappear when the fruit ripens. It is related to *P. spicatum* Roxb. but I think it would be better to make a new genus consisting of 4 species of the same region.

Klong Munsé and Klong Sarlakpet, in dense jungle. Flowers pale yellowish.

Araceae

by **A. Engler** — Berlin.

Pothos L.

1. **P. scandens** L. Spec. ed. I, 968.

forma **angustior** Engl.

Foliorum lamina quam petiolus paullo latiore et breviore.

Eadem forma in Malaccae provincia Perak e collectore cli. Kingii collecta in herbario regio Berolinensi adest. Forma juvencula.

Jungle near Klong Munsé, a climber on trees.
Area of the type: India orientalis tropica.

Anadendron Scott.

2. **A. angustifolium** Engl. n. sp.

Caule tenui; foliis remotis; petiolo quam lamina circ. duplo breviore, ad geniculum longum usque anguste vaginato, lamina oblique et anguste lanceolata subfalcata, nervis lateralibus I. utrinque 4—5 adscendentibus; venis tenuibus reticulatis; pedunculis quam petioli longioribus tenuibus (spatha in speciminibus nostris deficiente); spadice stipite triplo breviore suffulto; cupula perigoniali brevi; baccis ovoideis monospermis.

Caulis internodia 2—3 cm. longa. Foliorum petiolus 4,5—7 cm. longus, lamina 0,8—1,5 dm. longa, ima tertia parte 2,5—3,5 cm. lata, valde inaequilatera. Pedunculi usque 1 dm. longi. Spadix stipite 7 mm. longo suffultus. Cupula perigonialis circ. 1 mm. alta. Staminum filamenta brevissima, antherae 1 mm. longae. Baccae 6 mm. longae, 4 mm. crassae.

Species affinis *Anadendro montano* (Blume) Schott differt foliis brevius petiolatis, angustioribus, a triente inferiore sursum versus angustatis.

Klong Munsé and Klong Prao in the jungle, a climber on trees.

3. **A. montanum** (Blume) Schott in Bonpl. V (1857), p. 45; Engl. in D. C. Suites au Prodr. II, 97.

Jungle near Lem Dan, climbing on trees.
Area: Malacca, Java, Sumatra, Borneo, Celebes.

Raphidophora Hassk.

4. **R. peepla** (Roxb.) Schott in Bonpl. V (1857), p. 45; Engl. in D. C. Suites au Prodr. II, 242.

Jungle near Lem Dan, a climber on trees.
Area: India orientalis, Java.

Scindapsus Schott.

5. **S. siamensis** Engl. n. sp.

Scandens, ramosus, internodiis quam petioli duplo vel magis brevioribus; cataphyllis lineari-lanceolatis; foliorum inferiorum petiolo ad laminae basin usque, superiorum ad geniculum usque late alato, quam lamina 1½—3-plo breviore, lamina rigido membranacea, anguste lanceolata inaequilatera, basi subacuta, apice acuminata subfalcata, nervis lateralibus numerosis adscendentibus; pedunculo petiolum superante; spatha convoluta oblonga, acuminata; spadice oblongo, acuto; pistillis obpyramidatis truncatis subhexagonis, stigmate in directione spadicis longitudinali lineari; baccis prismaticis; semine majusculo reniformi brunneo.

Ramulorum internodia 2—3 cm. longa. Cetaphylla 4—5 cm. longa, inferne fere 1 cm. lata. Foliorum petiolus 5—7 cm. longus, superiorum geniculum 2—3 mm. longum, lamina 1,3—1,7 dm. longa, 2—3 cm. lata, nervis lateralibus inter se circ. 2 mm. distantibus. Pedunculus 7—8 cm. longus. Spatha cum accumine 5 mm. longo 3—3,5 cm. longa. Spadix florifer circ. 3 cm. longus, 1 cm. crassus, fructifer 4 cm. longus, 1,5 cm. crassus. Pistilla vertice fere 3 mm. diametientia. Baccae vertice 5 mm. diametientes. Semen 5 mm. longum, 4 mm. latum, 2,5 mm. crassum.

A *Scindapso hederaceo* (Zoll.) Schott, cui haec species magis quam alteri accedit, differt foliis duplo angustioribus, longius petiolatis.

Jungle near Klong Munsé, a climber on trees.

Pseudodracontium N. E. Brown.

6. **P. Harmandii** Engl. in Bot. Jahrb. XXV, p. 15.

var. **Schmidtii** Engl.

Folii segmentis anguste lanceolatis, sursum longius angustatis usque 1,2 dm. longis, 4 cm. latis; spatha usque 1,5 dm. longa.

Klong Majum, on rocks in the jungle.
Area of type: Cambodia.

Hydrosme Schott.

7. **H. longituberosa** Engl. n. sp.

Tubere cylindrico valde elongato, crasso; folii petiolo viridi immaculato, lamina trisecta, segmentis I, bipinnatisectis, segmentis II et III lanceolatis acuminatis, infimis quam reliqua multoties brevioribus; nervis lateralibus segmentorum a costa fere horizontaliter

patentibus in nervum collectivum a margine distantem conjunctis; pedunculo quam spatha 3—4-plo longiore; spatha oblonga, spadicem aequante vel superante, intus basi verrucosa et atropurpurea; spadice sessili; inflorescentia feminea quam mascula fertilis duplo breviore eique contigua, appendice inflorescentiae masculae contigua conoidea quam ea 1½-plo longiore; pistillis (floribus femineis) circ. 4-seriatis; ovario depresso incomplete 3—4-loculari; ovulis in loculis solitariis basi in angulo sessilibus breviter ovoideis; stilo brevi adscendente; stigmate 3—4-lobo lobis erectis; floribus masculis 3—4-andris; staminibus subtetragonis claviformibus, thecis rimula verticali aperientibus; appendice basi vestigia distincta florum sterilium eam componentium monstrante, baccis subglobosis 3—4-spermis; seminibus ovoideis testa brunnea nitida instructis.

Tuber juvenculum napiforme, circ. 5 cm. longum, 2 cm. crassum, adultum elongatum 1 dm. et ultra longum, internodiis inter turiones 5—6 cm. longis, 1,5—2 cm. crassis. Folii petiolus circ. 3 dm. longus, segmenta I usque 1,5 dm. longa, ultima majora usque 1 dm. longa, 4 cm. lata, acumine 1 cm. longo instructa. Pedunculus circ. 3 dm. longus. Spatha usque 1 dm. longa, 4 cm. lata. Spadicis inflorescentia feminea 1,5 cm. longa, mascula fertilis 2 cm. longa, 8 mm. crassa, appendix 4 cm. longa, inferne 1,2 cm. crassa. Ovaria 2 mm. diametientia, stilo 1,5—2 mm. longo instructa; stigmatis lobis fere 1 mm longis. Flores masculi stipite 1 mm. longa instructi: stamina 1,5 mm. longa et crassa. Baccae 5 mm. diametientes. Semina 4 mm. longa, 3 mm. crassa.

Species valde insignis et ab omnibus tubere longo diversa.

Koh Kahdat, on sandy ground near the Sea.

Homalomena Schott.

8. **H. brevispatha** Engl. n. sp.

Caudiculi internodiis brevissimis; foliorum petiolo laminae aequilongo vel ea duplo longiore, lamina membranacea, oblonga basi obtusiuscula, acuminata, acuta, nervis lateralibus utrinque circ. 7 arcuatim adscendentibus; cataphyllis pedunculi dimidium inferius involucrantibus 2—3 gradatim longioribus; pedunculo petioli dimidium haud aequante; spatha ovata obtusa; spadice stipiti triplo breviori insidente et spatham superante crasse cylindrico, obtuso; inflorescentia feminea pauciflora; pistillis vix 10 ovario ovoideo, loculis 2-ovulatis stigmate lato peltato; staminodiis raris claviformibus; floribus masculis 2—3-andris, staminibus tetragonis compressis.

Caudiculi circ. 4—5 mm. crassi. Foliorum petiolus 1,5—2 dm. longus, lamina 1—1,7 dm. longa, 4,5—7,5 cm. lata, acumine 2 cm. longo instructa. Pedunculus 7 cm. longus. Spatha 1,8 cm. longa, 1 cm. lata. Spadix stipite 5 mm. longo suffultus, fere 2 cm. longus, inflorescentia mascula 7—8 mm. crassa.

Species valde insignis pedunculo solitario et spatha brevi obtusa, insuper foliorum lamina oblonga basi obtusiuscula, petiolo longo.

Jungle near Klong Son, alt. 500 ft., terrestrial.

9. **H. truncata** (Schott) Hook. f. Fl. Brit. Ind. VI, 535.

Jungle near Klong Munsé, on wet rocks near a waterfall; also a very common terrestrial jungle-herb.

Area: Malacca, Borneo.

Aglaonema Schott.

10. **A. siamense** Engl. n. sp.

Caudiculo alto superne dense foliato; foliorum petiolo laminae subaequilongo subterete, superne antice leviter canaliculato, ultra medium late vaginato, lamina crassiuscula, ovato-oblonga, basi obtusa vel leviter cordata, acuminata, costa semiterete et nervis lateralibus I arcuatim adscendentibus subtus prominentibus, nervis lateralibus I supra insculptis; pedunculis 2—3 petioli circ. 1/3 aequantibus; spatha ovata; spadicis stipite inflorescentiae femineae subaequilongo, baccis ovoideis leviter compressis.

Caudiculus usque 4 dm. longus inferne 2 cm. crassus. Foliorum superiorum petiolus vagina 8—10 cm. longa utrinque 3—5 mm. lata instructus, circ. 1,5 dm. longus, superne 4 mm. crassus, lamina 2—2,5 dm. longa, 2,5 cm. lata. Spadix stipite 5—7 mm. longo suffultus, inflorescentia feminea 7 mm. longa et crassa, mascula deficiens. Baccae 8 mm. longae, 6 mm. crassae.

Haec species *Aglaonemati marantifolio* affinis est, at differt foliis majoribus, latioribus, basi leviter cordatis.

Jungle near Lem Dan, terrestrial.

11. **A. tenuipes** Engl. n. sp.

Caudiculo tenui; foliis approximatis; petiolo tenui quam lamina breviore, vix ad tertiam partem usque vaginato, lamina membranacea, oblique lanceolata, inaequilatera, basi subacuta, apice leviter curvato acuminato acuto, nervis lateralibus I utrinque 4—5 leviter arcuatis adscendentibus; cataphyllis pedunculum brevem et spatham involventibus; spatha oblonga acuminata, spadicis stipite quam inflorescentia feminea pauciflora longiore; ovariis breviter ovoideis, stigmate crasso discoideo coronatis; inflorescentia mascula cylindrica subobtusa.

Caudiculi internodia circ. 5 mm. longa. Foliorum petiolus circ. 1 dm. longus, ad 3—4 cm. longitudinis vaginatus, lamina circ. 1,7—1,8 dm. longa, 5—6 cm. lata. Cataphylla 2—4 cm. longa. Pedunculus 2,5 cm. longus. Spatha circ. 1,8 cm. longa, convoluta 8 mm. lata. Spadicis stipes 3 mm. longus, inflorescentia feminea 2 mm., mascula 7 mm. longa, 3 mm. crassa.

Species habitu paullum ad *Aglaonema simplex* accedit sed differt petiolis tenuioribus et longioribus, brevius vaginatis, deinde inflorescentia parva.

Jungle near Lem Dan, terrestrial.

Alocasia Schott.

12. **A. indica** (Roxb.) Schott in Oest. Bot. Wochenbl. 1854, p. 410; Engl. in D. C. Suites au Prodr. II, 501.

Jungle near Klong Munsé, Koh Kahdat.
Area: India orientalis, Java.

13. **A. fornicata** (Roxb.) Schott in Oest. Bot. Wochenbl. 1854, p. 410; Engl. in D. C. Suites au Prodr. II, 505.

Lem Ngob.
Area: India orientalis: Bengalia, Assam, Chittagong.

14. **A. longiloba** Miq. Fl. Ind. batav. III, 207 et Bot. Zeit. 1856, p. 564; Engl. in D. C. Suites au Prodr. II, 506.

Jungle near Lem Dan, terrestrial.
Area: Malacca, Java, Borneo.

Pistia L.

15 **P. Stratiotes** L. [1])

Klong Wen, Menam, common.
Area: Tropics of both hemispheres.

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[1]) Named by Johs. Schmidt.

Hepaticae

by **F. Stephani** — Leipzig.

Metzgerioideae.

Aneura Dum.

1. **A. multifidioides** (Schffn.) St. Spec. Hep. I, p. 215.

Jungle near Klong Munsé and Klong Sarlakpet, on wet rocks in riverbeds.
Area: Java.

Hymenophytum Mitt.

2. **H. malaccense** St. Hedwig. 1875, p. 46.

Klong Munsé and Klong Son, on wet rocks in the jungle.
Area: Singapore, Nova Caledonia.

Epigoniantheae.

Plagiochila Dum.

3. **P. singularis** Schffn. Acad. Vindob. 1900, vol. 70, p. 187.

Jungle near Klong Majum, on stems.
Area: Java.

Trigonantheae.

Mastigobryum Nees.

4. **M. ceylanicum** Mitt. Proc. Linn. Soc. V, p. 105.

Klong Munsé and Klong Majum, on dry rocks in the jungle.
Area: Ceylon, Nepal, Sikkim, Java, Amboina, Japan, Viti, Samoa.

5. **M. inaequitextum** St. Hedwig. 1893, p. 208.

Klong Munsé, on rocks in the jungle.
Area: Nova Guinea.

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[1]) A considerable number of the collected specimens were sterile (species of *Frullania*, *Jungermannia*, *Lejeunea*, *Notoscyphus*, *Pallavicinius*, *Drepanolejeunea*) and therefore it was impossible to name them to species.

6. **M. oblongum** Mitt. Proc. Linn. Soc. V, p. 106.

Klong Munsé and Klong Son, on rocks in the jungle.
Area: Ceylon, Sikkim, Hongkong.

Jubuloideae.

Acrolejeunea Spruce.

7. **A. aulacophora** (Mont.) St. Hedwig. 1890, p. 133.

Koh Kahdat, epiphytic on trees near the Sea.
Area: Borneo, Nicobarae, Andaman, India orientalis.

Archilejeunea Spruce.

8. **A. caramuensis** St. Hedwig. 1895, p. 59.

Lem Dan, epiphytic on trees.
Area: Luzon.

Caudalejeunea Steph.

9. **C. Stephanii** Spruce, ms.

Jungle near Klong Son, on leaves.
Area: Nova Guinea, Andaman, Luzon, Tonkin.

Ceratolejeunea Spruce.

10. **C. emarginatula** Steph. n. sp.

Dioica, mediocris, brunnea, gracilis, dense depresso-caespitosa. Caulis ad 3 cm. longus, vage ramosus. Folia caulina imbricata, oblique a caule patentia, valde concava apiceque decurva, in plano falcato-ovata vel falcato-elliptica, apice rotundata, brevissime mucronata, integerrima, dorso caulem parum superantia. Cellulae foliorum apicales 12 μ, medio 20 μ, basi 27×32 μ, trigonis subnullis. Lobulus folii majusculus, folio 3-plo brevior, ovato-oblongus, apice oblique truncatus, angulo acuto; carina leniter arcuata, levi sinu in folii marginem excurrens. Amphigastria foliis aequimagna, imbricata, reniformia, caule multoties latiora, exciso-inserta, margine infero late truncata, supero late rotundata apiceque breviter emarginatula, lobis obtusatis. Flores fem. steriles axillares. Folia floralia caulinis multo majora, ovata acuta, sub apice denticulata, lobulo magno acuto integerrimo, plus minus longe soluto, basi longe attenuato. Amph. florale maximum, totam inflorescentiam tegens, in pano subrotundum, ad medium fere acute incisum, lobis late triangulatis breviter cuspidatis. Reliqua desunt.

Amphigastriis bidentulis facile cognoscenda.

Klong Majum, on dry rocks in the jungle.

Cololejeunea Spruce.

11. **C. Schmidtii** St. n. sp.

Sterilis, minor, in foliis vivis arcte repens. Caulis multiramosus, ramis late divergentibus. Folia parva, contigua nusquam imbricata nisi in apice ramorum, oblique — interdum subrecte patula, plana, optime ovata, dorso ampliata caulemque superantia, ibidem conico-denticulata, ceterum margine integerrima, apice obtusa. Cellulae foliorum 9 μ, basales 18×27 μ, parietibus validis, antice papillis globosis asperae. Lobulus folii majusculus, folio suo triplo brevior, ambitu obovato-triangulatus i. e. ex angusta basi valde ampliatus, apice truncatus ibidemque spina mediana magna valida et stricta armatus; carina curvata, in folii marginem sine ullo sinu excurrens, papillis altis grosse obtuseque dentata. Stylo nullo.

Jungle near Klong Munsé and Nipple (alt. 2000 ft.), on leaves of herbs and small shrubs.

12. **C. siamensis** St. n. sp.

Sterilis, minor, subhyalina, in foliis vivis arcte repens. Caulis ad 10 mm. longus, validus, simplex vel pauciramosus, ramis late divergentibus. Folia imbricata, pro planta magna, subcircularia, plano et recte patula, dorso usque ad basin soluta, dein brevissime inserta, integerrima, cellulis digitiformibus limbata, limbo in apice folii latissimo versus basin folii sensim decrescente sub basi desinente, cellulis hyalinis papuloso-prominulis formato. Reliquae folii cellulae hexagonae, alte minuteque sexpapillatae, subapicales 8 μ, medianae 8 × 12 μ; basi adsunt ocella oleifera 4, aggregata (18×36 μ). Lobulus parvus, valde rudimentarius (semper?) plicaeformis, angulo grosse spinoso; stylo nullo.

Jungle near Klong Munsé, on leaves.

Lopholejeunea Spruce.

13. **L. sundaica** Steph. Hedwig. 1896, p. 112.

Jungle near Lem Dan, on trees.
Area: Java, Philippinae Insulae.

Mastigolejeunea Spruce.

14. **M. humilis** (G.) Steph. Hedwigia 1890, p. 139.

Jungle near Klong Munsé, on trees.
Area: Common in the Sunda Islands.

Pycnolejeunea Spruce.

15. **P. grandiocellata** St. n. sp.

Sterilis, mediocris, pauca frustula in folio vivo repens. Caulis ad 15 mm. longus, simplex, validus. Folia conferta, recte patula, subplana, ambitu late ligulata, apice truncato-rotundata, dorso cauli incumbentia similiter truncata. Cellulae optime hexagonae, apice 15 μ, medio 18 μ, basales 18 × 36 μ, trigonis parvis. Ocella magna (27 × 45 μ) 6—8 aggregata, medio folii inserta, lobulo tamen ap-

proximata. Lobulus a caule recte patulus, magnus, oblongus, apice angustatus, ore oblique truncato angulo dentiformi; carina stricta apice abrupte arcuata, sinu parvo profundo in folii marginem excurrens. Amphig. contigua, transverse inserta, caule duplo latiora, medio infero optime obcuneata, medio supero abrupte angustata, utroque latere dein angulata, angulis obtusis vel in dentem solutis, apice ad medium biloba, sinu recto acuto, lobis acutis.

Jungle near Klong Munsé, on trees.

Thysanolejeunea Spruce.

16. **T. spathulistipa** (Ldbg.) Spruce Ed. Bot. Soc. 1884, p. 106.

Lem Dan, on trees near the Sea.

Area: Common in all the islands of the Sunda Archipelago; Viti, Madagascar, Kamerun.

Leptolejeunea Spruce.

17. **L. Balansae** St. Hedwig. 1896, p. 105.

Jungle near Klong Munsé and Klong Son, on leaves.

Area: Tonkin, Andaman.

CONTENT OF PRECEDING PARTS.

Part I.

JOHS. SCHMIDT: Introductory.

F. KRÄNZLIN: Orchidaceae, Apostasiaceae.

Part II.

M. FOSLIE: Corallinaceae.

Part III.

C. B. CLARKE: Cyperaceae.

E. HACKEL: Gramineae.

H. CHRIST: Pteridophyta (Selaginella auct. G. Hieronymus).

V. F. BROTHERUS: Bryales.

Part IV.

W. WEST and G. S. WEST: Fresh Water Chlorophyceae.

TH. REINBOLD: Marine Algae (Chlorophyceae, Phaeophyceae, Dictyotales, Rhodophyceae).

M. GOMONT: Myxophyceae hormogoneae.

JOHS. SCHMIDT: Peridiniales.

PRELIMINARY REPORT ON THE BOTANICAL RESULTS OF THE DANISH EXPEDITION TO SIAM (1899—1900).

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Rubiaceae

by **K. Schumann** — Berlin [1]).

Dentella Forst.

1. **D. repens** Forst. Char. gen. 20, t. 13. Hook. fil. Fl. Brit. Ind. III, 42.

Lippaya telephioides Endl. Atakta t. 13.

Klong Sarlakpet, in open moist ground near the village (n. 731).

Area: This small dwarfy prostrate plant is a very common weed in moist places from India to Polynesia and Australia.

Oldenlandia Linn.

2. **O.** (*Euoldenlandia*) **diffusa** Roxb. Hort. beng. 11; Hook. fil. Fl. Brit. Ind. III, 65.

Klong Sarlakpet, in open moist ground near a village (n. 730).

Area: It is also very common in the East Indies and goes through the tropical Asia as far as to the Philippines and is also recorded from Japan.

3. **O.** (*Euoldenlandia*) **pinifolia** Wall. in Don, Gen. Syst. III, 525; Hook. f. Fl. Brit. Ind. III, 60.

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[1]) A smaller number of specimens have been named by Mr. C. B. Clarke of Kew.

Klong Prao, on rocks in the jungle; Koh Kong on sandy ground near the Sea.

Area: It grows in Behar and Choto-Nagpore and on the Malayan Peninsula; in the Greater Sunda-Island it has yet been found.

4. **O.** (*Dimetra*) **mollis** Wall. in Don, Gen. Syst. III, 527; Hook. f. Fl. Brit. Ind. III, 59.

Open, dry plains near Lem Dan (n. 30).

Till now it has not been found but in the Southern part of the Malayan Peninsula, on the island of Penang.

5. **O.** (*Euhedyotis*) **costata** (Roxb.) K. Schum.

Spermacoce costata Roxb. Hort. beng. 10. — *H. vestita* Wall. in Don, Gen. Syst. III, 526; Hook. f. Fl. Brit. Ind. III, 58.

Riverbank in the jungle near Klong Munsé; a shrub (n. 412).

According to the rules of priority of specific names now accepted by the greater part of living botanists, excepted the English, it is not to be avoided to change the name. It is distributed from the subtropical Eastern Himalaya and the Khasia Mountains in the Malayan Peninsula, the Malayan Archipelago and the Philippines.

6. **O.** (*Euhedyotis*) **lineata** Roxb. Hort. beng. 10; Hook. f. Fl. Brit. Ind. III, 59.

Jungle near Klong Munsé; Klong Son in a pool (n. 119, 654a).

Area: The geographic area is not so far extended as in the last species; from Eastern Bengal it has been found till now only as far as to Chittagong and Tenasserim.

Note. There is collected (sub n. 742) another plant which probably belongs to the same genus, but it is too imperfect for determination.

7. **Argostemma** Wall.

I found in the collection a very dwarfy plant (n. 502) of the habit of this genus with a whorl of 4 unequal leaves on a 1,5 cm. high stem. The flowers are unfortunately very young, and it is therefore impossible to match it.

Ophiorrhiza Linn.

8. **O. mungos** L. Spec. pl. ed. I, 150.

Klong Son, on moist ground in the jungle (n. 631 partim).

Area: The plant is common in the eastern parts of tropical Asia and goes from the Khasia Mountains to New Guinea.

9. **O. Harrisiana** Heyne in Wall. and Arn. Prodr. 405; Hook. f. Fl. Brit. Ind. III, 78.

Klong Majum, alt. 700 ft., on rocks in the un le (n. 606).

Area: A very common and variable plant with numerous varieties which in a later time shall probably partly at least prove as well defined species. It grows in forests on mountains from the Concan to Ceylon and from the Khasia Mountains to Tenasserim; I found it also among the collections from German New Guinea.

10. **O. brachycarpa** K. Sch. n. sp.

Caules adscendentes ad 25 cm. alti teretes apice subtomenti basi glabrati simplices vel parce ramosi ad 25 cm. longi. Folia ad 8 mm. longe petiolata lanceolata apice acuta vel hoc loco basique acuminata tenuiter herbacea utrinque glabra margine solo scabrido-pilosula ad 2,5—8 cm. longa, 0,8—1,8 cm. lata sicc. obscure viridia; stipulae e basi late triangulari breviter subulatae vix 2 mm. longae ferrugineo-subtomentosae. Cyma pedunculo gracili 1,2—3,5 cm. longo sustenta bis trichotoma; cincinni c. 1 cm. longi; bracteae vix conspicuae; flores ad 3 mm. longe pedicellati, pedicelli ut rhachis inflorescentiae et ovarium papillosi; sepala triangularia brevissima; corollae lobi duplo tubum superantes; stamina prope basin affixa prope tubum villosa; capsula transverse lineari-oblonga rubra 1—1,5 mm. alta et 5 mm. lata.

It is distinguished from all other known species of the region by the very short capsula.

Klong Son on moist ground in the jungle. Herb with white flowers (n. 631 partim).

Coptosapelta Korthals.

11. **C. flavescens** Korth. in Ned. Kruidk. Arch. II, 113; Hook. f. Fl. Brit. Ind. III, 35 (partly determined by C. B. Clarke).

Plains near Lem Dan, open jungle near Klong Munsé (n. 222).

Area: This very interesting species has been found on the Malayan Peninsula from Tenasserim to Singapore as well as on the Greater Sunda Islands.

Nauclea Linn.

12. **N. purpurea** Roxb. Corom. pl. I, 41, t. 54; Hook. fil. Fl. Brit. Ind. III, 26.

Riverbank in the jungle near Klong Son, a moderate sized tree (n. 680).

Area: This species has only been found till now on the Western Peninsula; the specimens from Siam are not in the least different from the type.

13. **N. synkorynes** Korthals (det. C. B. Clarke) in Temminck Verh. Naturl. Geschied. [Leiden 1839—1842] p. 158; Miq. Fl. Ind. Bat. v. 2, p. 137; Haviland in Journ. Linn. Soc. v. 33 [1897—98] p. 60.

Klong Son.

Area: In Sumatra, Borneo, Celebes, Cochinchina.

Tarenna Gärtn.

14. **T. asiatica** O. Ktze. Rev. gen. 258.

Rondeletia asiatica Linn. Spec. pl. ed. I, 172. *Webera corymbosa* Willd. Spec. pl. I, 1224; Hook. f. Fl. Brit. Ind. III, 102; *Chomelia corymbosa* (W.) K. Sch. Nat. Pflz. IV, 4, p. 75.

Koh Chang Noi, on rocks in the jungle (n. 698).

Area: This species seems to be a very common plant not only in the Western Peninsula of the East Indies but also in the Malayan Archipelago. It is known under many names. After the rules of priority approved in Germany the above accepted name must be preferred. The name of *Chomelia* Linn. must fall against *Tarenna* because Linné himself had annihilated it, because he had not recorded a species of the genus and it has never been employed after him. The genus *Tarenna* Gaertn. whose type is the above named plant must be put on the head.

Randia Linn.

15. **R.** (*Gynopachys*) **oppositiflora** (Roxb.) K. Sch.

Webera oppositiflora Roxb. Fl. Ind. I. 698. — *R. densiflora* Benth. Fl. Hongk. 155; Hook. f. Fl. Brit. Ind. III, 112. — *Webera densiflora* Wall. in Roxb. Fl. Ind. ed. II, vol. II, 536.

Common on riverbanks in the jungle all over Koh Chang. A moderate sized tree (n. 397, 422, 524, 529, 591 a, 737 a).

This species has also been mistaken several times and very often taken as a new species and therefore described under many names. The full synonymy compare in the Fl. Brit. India. The oldest name is *Webera oppositiflora* Roxb. and therefore the above accepted name is to be preferred. It is a common plant from East India to North Australia and China.

16. **R.** (*Eurandia*) **fasciculata** (Roxb.) P. DC. Prodr. IV, 386; Hook. f. Fl. Brit. Ind. III, 109. — *Posoqueria fasciculata* Roxb. Fl. ind. II, 570.

Klung, in dry places (n. 372).

The spiny shrub in widely diffused from the tropical Himalaya to Tenasserim and not uncommon. The flowers are not collected so that I am not quite sure, that the plant is exactly named.

17. **R.** (*Eurandia*) **armigera** K. Sch. n. sp.

Rami graciles teretes flagellati apice subtomentosi mox glabrati, spinis curvatis vix 1 cm. longis armati. Folia ad 5 mm. longe petiolata, petiolus puberulus, lanceolata vel oblongo-lanceolatae breviter et obtuse acuminata et apiculata supra glabra nervis majoribus puberula ad 5,5 cm. longa et 2 cm. lata; stipulae subulatae ad 4 mm. longae puberulae. Flores ramos abbreviatos terminantes geminati brevissime pedicellati. Ovarium turbinatum sericeo-villosum. Calyx 7 mm. longus ultra medium in lobos subulatos divisus villosus. Corollae tubus calycem superans, lobi oblique lanceolati unilateraliter ciliolati.

This species is related to *R. fasciculata* but is conspicuously different by the highly split and clothed calyx.

Klong Majum, on riverbank near the Sea. A spiny shrub (n. 616).

18. **R.** (*Oxyceros*) **longiflora** Lam. Dist. III, 26. Illustr. genres I, 156, fig. 3; Hook. f. Fl. Brit. Ind. III, 111.

Jungle near Klong Son. A spiny shrub with pale yellow, aromatic flowers (n. 652).

Area: Also this species has been described many times and has been put in the most different genera (*Posoqueria, Canthium, Webera, Tocoyena, Gardenia, Pseudixora, Stylocoryne*). It grows from Assam and the Khasia Mountains to Burma and the Malayan Islands.

19. **R.** (*Gardenioides*) **eucodon** K. Sch. n. sp.

Rami modice validi tetragoni ad nodos dilatati glabri. Folia breviter (ad 8 mm. longe) petiolata oblonga vel oblongo-lanceolata breviter et obtuse acuminata utrinque glabra coriacea. Stipulae triangulares acutae 2 mm. longae intus secernentes. Cyma terminalis dein usurpatione rami ex axilla folii alterius spurie lateralis breviter (vix ultra 1 cm. longe) pedunculata pluriflora crispule puberula mox glabrata; bracteae ovatae acutae 2 mm. longae. Flores ad 1 cm. longe pedicellati erecti. Ovarium pisiforme appresse puberulum. Calyx 4 mm. longus obiter quinquedentatus intus sericeus. Corollae coriaceae tubus basalis ad 8 mm. longus, superior campanulatus 4,0—4,5 cm. longus, lobi late triangulares obtusi 10 mm. metientes. Stamina linearia 1,5 cm. longa. Stilus bifidus 3,7—4,0 metiens.

This very distinct species comes near to *R. exaltata* Griff. but has quite glabrous foliage and a flower with a much shorter groundtube of the corolla.

North-end of Koh Chang in the jungle (n. 717).

A tall tree with bare stem and a dense crown quite covered by white flowers (in March). Corollae white, with violet dots on their inside.

Gardenia Linn.

20. **G. tubifera** Wall. in Roxb. Fl. ind. ed. Carey et Wallich II, 562; Hook. f. Fl. Brit. Ind. III, 117.

Jungle near Klong Munsé, a tree (n. 512).

Area: From the Malayan Peninsula (in its southern part) to Sumatra, Java and Borneo.

Petunga P. DC.

21. **P. racemosa** (Roxb.) K. Sch. in Nat. Pflzf. IV, 4, 80, Fig. 29 A.

Randia racemosa Roxb. Hort. beng. 15; Fl. ind. I, 525. — *Hypobathrum racemosum* J. Kurz, For. Fl. Brit. Burma II, 51. — *Petunga*

Roxburghii P. DC. Prodr. IV, 399. — *P. variabilis* Hassk. in Flora 1845, p. 232.

Jungle near Kong Munsé, a small tree (n. 490).

Area: From East Bengal it is widely diffused in the Eastern Peninsula of the East Indies to Java and Borneo; it grows in swampy forests. The synonymy is very complicated cf. Fl. Brit. Ind. l. c.

Scyphiphora Gaertn.

22. **S. hydrophyllacea** Gaertn. Fr. III, 91, t. 196; Hook. f. Fl. Brit. Ind. III, 125. — *Epithinia malayana* Jack in Mal. misc. I, 12.

Lem Ngob, Koh Kong, on muddy, sandy or rocky ground near the Sea (n. 598).

Area: In mangrove swamps on the western coast of the Western Peninsula of the East Indies and Ceylon to the Malayan Archipelago, North Australia, New Caledonia and the Philippines, sometimes very copiously.

Diplospora DC. (det. C. B. Clarke).

23. **D. pubescens** Hook. f. Fl. Brit. Ind. v. 3 [1882], p. 124.

Jungle near Klong Son; Koh Chang Noi; a shrub with greenish flowers.

Area: Malay Peninsula.

24. **D. Malaccensis** Hook. f. Fl. Brit. Ind. v. 3 [1882], p. 124.

Jungle near Lem Dan; a shrub.

Area: Malacca.

The Examples, Schmidt n. 412, match the Malacca plant very well; but they are in extremely young flower, so that the identification is insecure.

Mussaenda Linn.

25. **M. lanceolata** K. Sch. n. sp.

Frutex alte scandens. Rami graciles teretes ferrugineo-subtomentosi tarde glabrati ad 55 cm. longi et vix 2,5 mm. diametro. Folia vix 2 mm. longe petiolata, lanceolata attenuato-acuminata et subrostrata basi acuta utrinque tomentosa sericeo-micantia subtus canescentia ad 12 cm. longa et 3 cm. lata vel jam angustiora; stipulae geminatae subulatae 5 mm. longae caducae. Flores apice ramorum capitato-condensati; capitulum vix 5 mm. longe pedunculatum; bracteae subulatae. Ovarium tomentosum. Sepala subulata 4 mm. longa puberula. Corolla 3 cm. longa extus subtomentosa, lobi vix 5 mm. longi ovati breviter acuminati flavi.

From the described species it differs by the very narrow leaves and beautifully clothed flowers.

Jungle near Klong Munsé. A tall liane with white bracts and yellow flowers (n. 521).

Urophyllum Wall.

26. **U. Schmidtii** C. B. Clarke n. sp.

Undique sparsim minute pilosula, foliis oblongo-ellipticis, 16 cm. longis, 55 mm. latis, basi acutis apice acuminatis subcaudatis, nervis utrinque c. 10, petiolo 6 mm. longo; stipulis 8—10 mm. longis, a basi ovata lineari-lanceolatis dense adpresse villosis; pedunculis axillaribus, 4—6 mm. longis, 3—8-floris; bracteis 4 mm. longis cum stipulis consimilibus, pedicellis 2—5 mm. longis; calyce 3—4 mm. longo, parce scabro-pilosulo, lobis 4—5 depresso-triangularibus; corolla fere glabra.

U. Blumeanum, Hook. f. Fl. Brit. Ind. v. 3, p. 99 (i. e. *Axanthes Blumeana*, Wight in Calc. Journ. Nat. Hist. v. 7 [1847], p. 145) paullo differt ramulis minus ligneis, foliis minoribus, nervis minus numerosis.

Jungle near Klong Son, alt 1000 ft.; a shrub with white flowers (n. 664).

Plectronia Lam.

27. **P. didyma** (Roxb.) Kurz For. Fl. Brit. Burma II, 35. —

Canthium didymum Roxb. Fl. ind. I, 535; Hook. f. Fl. Brit. Ind. III, 132. *Vanguiera spirostylis* et *V. lucidula* Miq. Fl. Ind. Cat. II, 250 et Suppl. 544. (Partly determined by C. B. Clarke).

Klong Prao, on rocks in the jungle; Klong Munsé; a shrub or a small tre.

Area: It is the most common species of the genus in East Asia. On the Western Peninsula it is found from the Concan southward, on the island of Ceylon it is very common; on the Malayan Peninsula it is widely distributed and is also found in the Malayan Archipelago and South China.

28. **P. siamensis** K. Sch. n. sp.

Rami graciles stricti teretes superne complanati novelli ipsi glabri. Folia ad 1 cm. longe petiolata oblonga breviter acuminata basi acuta utrinque glabra coriacea subtus in axillis nervorum maximorum domatiato-perforata ad 10 cm. longa et 5 cm. lata; stipulae 3 mm. longae ovato-triangulares caducae. Cymae axillares ad 3 cm. longae vix 5 mm. longe pedunculatae vulgo dichotomae, rami cinisimes ad 12 flores referentes, glabrae. Flores pentameri 3 mm. longe pedicellati. Ovarium turbinatum glabrum. Calyx breviter dentatus. Corolla 3 cm. longa alte divisa infra lobos contracta. Drupa globosa 1,8 cm. diametro canunc.

The species is distinguished from all known to me by the poorly branched cymes.

Jungle near Lem Dan. A small tree (n. 622).

29. **P. glabra** Kurz Forest Fl. Burma v. 2, p. 35, in Journ. Asiat. Soc. Beng. v. 46, pars 2 [1877], p. 153 (det. C. B. Clarke).

Canthium glabrum Blume Bijdr. [1826], p. 967; DC. Prodr. v. 4, p. 474; Miq. Fl. Ind. Bat. v. 2, p. 254, in Ann. Mus. Lugd. Bat. v. 4, p. 251; Hook. f. Fl. Brit. Ind. v. 3, p. 133.

The example Johs. Schmidt n. 463, having very young flowers, has been matched, not determined.

Klong Munsé, on rocks in the jungle; a tree (n. 463).

Area: Burma, Malay Peninsula, Java.

30. **P. Schmidtii** C. B. Clarke n. sp. [sub *Canthio*].

Internodiis 6 cm. longis compressis; stipulis 9 mm. longis, 3—2 mm. latis, oblongis, glabris, vix acutis; petiolis 5 mm. longis; foliis 12 cm. longis, 4 cm. latis, oblongo-ellipticis, apice basique acuminatis, glabris, nervis utrinque 10—11; cymis oppositis, 12 mm. in diam., compositis, paucifloris; calycis lobis 4, minutis, paulo pubescentibus; baccis 5—6 mm. in diam. (saltem saepe) 1—spermis.

Species multis aliis affinis, ob stipulas in parte superiore oblongas 2 mm. latas, nullo alio omnino similis. Haviland, n. 929 in Borneo lecta (sp. indescripta) ab inflorescentia copiose multiflora differt.

Koh Chang Noi in the jungle; a shrub with white fruit (n. 698 b).

Guettarda Linn.

31. **G. speciosa** Linn. Spec. pl. ed. I. 991; Hook. f. Fl. Brit. Ind. III, 126. — *Nyctanthes hirsuta* Linn. Spec. pl. ed. I, 6. — *Jasminum hirsutum* Willd. Spec. pl. I, 36.

Koh Lom, on rocks near the Sea (n. 715); Rayong, on sandy sea-shore.

Area: It is widely distributed from the East coast of Africa over the East Indies, the Malayan Archipelago to New Guinea and Polynesia. The most natives are very fond of the very lovely smelling flowers.

Stylocoryne Wight et Arn.

32. **S. Wallichii** (Hook. f.) K. Sch. Nat. Pflzfam. IV, 4, 108. — *Webera Wallichii* Hook. f. in Fl. Brit. Ind. III, 105.

Jungle near Lem Dan. A small tree (n. 800).

Area: Till now it has only been found in Malacca and the islands of Penang and Borneo.

Ixora Linn.

33. **I. stricta** Roxb. Hort. beng. 10; Hook. f. Fl. Brit. Ind. III, 145.

Klong Munsé and Klong Son, in the jungle (n. 601 b, 621 a, 801, 826).

Var. **Blumeana** Hook. fil., l. c.

Klong Majum, on riverbank in the jungle (n. 96).

Area: Probably this species is a native of the Moluccas and China; it is now cultivated in various parts of East Asia; S. Kurtz regards it as indigenous in Lower Birma and Tenasserim.

34. **I. amoena** Wall. Cat. n. 6121 D. F. F., in G. Don, Gen. Syst. III, 571; Hook. f. Fl. Brit. Ind. III, 146.

Open ground near Lem Dan, a shrub (n. 25).

Area: It grows at Mergui, Tenasserim and on the island of Penang.

35. **I. coccinea** Linn. Spec. pl. ed. I, p. 110; Hook. f. Fl. Brit. Ind. III, 145.

Open ground near Lem Dan.

It is indigenous not only in the Concan on the Western Peninsula of the East Indies n. 25a and very common in Ceylon, but lives also copiously in the district of Cittagong; it is very often cultivated.

36. **I. dolichophylla** K. Sch. n. sp.

Rami graciles novelli ipsi glabris. Folia ad 1 cm. longe petiolata ampla lanceolata attenuato-acuminata basi angustata chartacea utrinque glabra nervis majoribus c. 11 utraque mediani parte percursa ad 26 cm. longa et 6 cm. lata stipulae e basi lata subulatae 7 mm. longae intus villosae. Pannicula corymbosa sessilis pari solitario ramorum aucta modice congesta 4 cm. diametro glabra; bracteae bracteolaeque filiformes, inflorescentiae rami ramulique et ovarium globosum papillosae. Calyx quadri-lobatus, lobuli ovati obtusi. Corolla vix 2 cm. longa, lobi lineari-lanceolati 5 mm. longi. Stilus 6 mm. longus tubum corollae superans clavatus. Fructus didymus glaber 6 mm. longus.

This species is allied to *I. fulgens* from which it differs by the form of the foliage and the shorter corolla.

Jungle near Klong Munsé, a shrub (n. 813).

37. **I. nigricans** Wight et Arn. (det. C. B. Clarke).

Prodr. [1834], p. 428; Wight Ic. t. 318; Moritzi Verz. Zoll. Pfl. p. 65; Kurz For. Fl. v. 2, p. 23; Hook. f. Fl. Brit. Ind., v. 3, p. 148.

I. laxiflora Hassk. in Flora v. 28 [1845], p. 227 syn. excl.

Pavetta nigricans Miq. Fl. Ind. Bat., v. 2, p. 272, Suppl. p. 222, in Ann. Mus. Lugd. Bat. v. 4, p. 196.

P. acutiflora Korth. in Ned. Kruidk. Arch. ser. 1, v. 2, pars 2 [1850], p. 262.

P. subulata Teysm. et Binn. in Natuurk. Tijdsch. Ned. Ind. v. 3 [1855] p. 403.

The Koh Chang example agrees closely with the Java examples which have the calyx-segments 2 mm. long, linear acute: peduncle 4 cm. long; petioles 10—15 mm. long.

Klong Son in the jungle; a shrub (n. 825).

Area: Throughout India, Malaya.

Coffea Linn.

38. **C. fragrans** Wall. Cat. n. 8450 in Hook. f. Fl. Brit. III, 154.

Klong Majum, on riverbank near the Sea; a shrub with white flowers (n. 539, 619 a).

Area: It is known from the district of Silhet and Tenasserim.

39. **C.** (*Lachnostoma*) **Schmidtii** K. Sch. n. sp.

Rami florentes graciles teretes apice quadrangulares glaberrimi. Folia ad 5 mm. longe petiolata lanceolata vel oblongo-lanceolata breviter et obtuse acuminata basi acuta utrinque glabra subcoriacea nervis 3—4 tantum utraque mediani parte percursa ad 10 cm. longa et 3 cm. lata; stipulae subulatae vix 3 mm. longae caducae. Florum parvorum fasciculi brevissime pedunculati. Ovarium glabrum. Calyx obiter dentatus 0,5 mm. longus. Corollae tubus 2 mm. longus, lobi aequilongi oblongi, unilateraliter emarginati fauce albo-villosus. Antherae sessiles 2 mm. longae. Stili 2,5 mm. longi rami acuti longiusculi.

This species stands nearest to *C. Jenkinsii* Hook. fil. but it differs by still fewer and stronger nerves. The flowers are much smaller.

Klong Son, riverbank in the jungle. A shrub with pale yellow flowers (n. 690 a).

Psychotria Linn.

40. **P. sarmentosa** Bl. Bijdr. 904; Hook. f. Fl. Brit. Ind. III, 165.

Klong Munsé, Koh Chang Noi, climbing on trees in the jungle. Fruit white (n. 835, 697).

Area: It is distributed from Canara and Ceylon, where it adscends to 1300 m., to the Malayan Peninsula and Archipelago.

41. **P. fulva** Hamilt. in Wall. Cat. n. 8336 (B. excl.) in Hook. f. Fl. Brit. Ind. III, 169.

Klong Munsé, Klong Son in the jungle; a shrub with pink fruit (n. 123, 625 a, 824).

Area: It grows in Assam and the Khasia Mts. to 1300 m. and goes to Pegu.

42. **P. serpens** Linn. Mant. II. 204.

Nipple, alt. 2000 ft., in open jungle. A shrub with white flowers (n. 667).

Area: It is only known from China.

43. **P. Jackii** Hook. f. Fl. Brit. Ind. III, 167.

Mouth of Klong Majum; jungle near Klong Son (alt. 1000 ft.). A shrub with greenish flowers (n. 538, 664 a).

Area: It is only known till now from the Malayan Peninsula.

Chasalia Commers.

44. **C. curviflora** (Wall.) Thwaites, Enum. 150, 421; Hook. f. Fl. Brit. Ind. III, 176.

Klong Munsé, Klong Prao, Klong Sarlakpet in the jungle (n. 435, 718, 741 a).

Area: One of the most common species of the whole family; it is widely distributed in the Ghats southwards from Bombay and in Ceylon; from the Eastern Himalaya its area extends to Tenasserim, the Malayan Peninsula, Archipelago to Borneo.

Hydnophytum Jack.

45. **H. formicarum** Jack in Trans. Linn. Soc. XIV, 124.

Var. **siamense** Becc. Malesia II, 167, t. 48, fig. 12—17.

A very common epiphytic plant all over the area explored especially on trees near the sea (n. 200 d, 576).

Area: The species is widely spread from the peninsula of Malacca to Java, Borneo, Celebes and is the only species of the genus which goes as far as to Cochinchina and Siam; the variety has already been found in the gulf of Siam by Pierre (n. 45) on the Island of Phu-Quoc.

Lasianthus Jack.

46. **L. cyanocarpus** Jack in Trans. Linn. Soc. XIV, 125; Hook. f. Fl. Brit. Ind. III, 179.

Jungle near Klong Munsé. A shrub (n. 278).

If indeed *Triosteum hirsutum* Roxb. Fl. Ind. I, 538 is identical with this plant, the name is to be changed. It is an Eastern species which ranges from the Eastern Himalaya to Borneo.

47. **L. strigosus** Wight in Calc. Journ. nat. hist. VI, 512; Hook. fil. Fl. Brit. Ind. III, 189.

Jungle near Klong Munsé. A shrub (n. 837).

Area: Generally the plant is supposed only to be a Ceylon one and a citizen of the Deccan Highlands; but surely it also grows in the Malayan Archipelago: I have seen it in several specimens from New Guinea.

48. **L. lucidus** Bl. Bijdr. 997; Hook. f. Fl. Brit. Ind. III, 184.

Jungle near Klong Son (alt. 1000 ft.). A shrub (n. 667 b ex. p.).

Area: It is widely distributed from the Khasia Mountains to Java.

49. **L. caloneurus** K. Sch. n. sp.

Rami pro rata elongati graciles florentes 25 cm. longi et 3 mm. diametro appresse strigulosi. Folia ad 1 cm. longe petiolata ampla lanceolata breviter acuminata et cuspidata basi acuta nervis majoribus 6 tantum utraque mediani parte percursa pulchre transverse verrulosa supra glabra vix nitidula subtus in nervis strigulosa opaca ad 21 cm. longa et 5,5 cm. lata; stipulae triangulares 4 mm. longae strigulosae caducae. Flores plures fasciculati subsessiles. Ovarium quadriloculare strigulosum ut calyx 2 mm. longus dentibus ovato-lanceolatis. Corolla extus strigulosa 4 mm. longa, lobis margine

tantum pilosulis. Stilus brevis quadrilobus. Drupa ellipsoidea 4 mm. longa glabra.

This species is allied to *L. laurifolius* Hook. f. but is conspicuously different by its smaller flowers, tetramerous ovary and leaves which are percursed by a smaller number of nerves.

Riverbank in the jungle near Klong Son. A shrub with white flowers (n. 683).

50. **L. oligoneurus** K. Sch. n. sp.

Rami graciles teretes superne complanati novelli puberuli ad 20 cm. longi et basi 2 mm. diametro. Folia vix 5 mm. longe petiolata, petiolo pilosulo, oblonga vel oblongo-lanceolata rarius subobovato-oblonga breviter acuminata basi acuta supra glabra subtus in nervis tantum minutissime pilosula transverse venulosa utrinque opaca sicc. cinereo-viridia nervis 3 tantum ad summum 4 utraque mediani parte percursa 12 cm. longa et 4,5 cm. lata; stipulae triangulares strigillosae 3 mm. longae. Flores sessiles parvi pauci fasciculati. Drupa coerulea globosa 5 mm. longa trilocularis loculis 2 abortivis calyce 1 mm. longo dentibus ovato-lanceolatis coronata.

This species is very peculiar by the siaric indumentum the few nerves and the trilocular drupe.

Jungle near Klong Munsé. A shrub with blue, shining fruit (n. 390).

51. **L. Schmidtii** K. Sch. n. sp.

Rami graciles teretes superne complanati ferrugineo-subtomentosi. Folia ad 3 mm. longe petiolata oblonga acuminata basi acuta nitidula supra glabra, ciliolata subtus pubescentia mollia sicc. olivacea nervis 8 majoribus utraque mediani parte percursa ad 9,5 cm. longa et 4 cm. lata. Flores pauci solitarii vel geminati axillares sessiles. Ovarium quadriloculare ferrugineo-villosum. Calyx 2,5 mm. longus, lobis lanceolatis puberulis. Drupa globosa sepalis conniventibus coronata 4 mm. diametro.

The olivaceous colour of the dried villous leaves is very significant. The foliage ist not very large.

Jungle near Klong Son. A shrub (n. 667 b).

Damnacanthus Gaertn.

52. **D. indicus** Gaertn. Fruct. III, 18, t. 182; Hook. f. Fl. Brit. Ind. III, 158.

Klong Munsé, on rocks in the jungle. A spiny shrub (n. 282).

Area: The common opinion was that this plant is a native of China; afterwards Griffith found it on the Mishmi Hills (Upper Assam). It is very often cultivated.

Morinda Linn.

53. **M. citrifolia** Linn. Spec. pl. ed. I, 176; Hook. f. Fl. Brit. Ind. III, p. 155.

Lem Dan, Koh Kahdat, on sandy sea-shores; Koh Lom, on rocks near the Sea (n. 167, 557 a).

Area: Wild and cultivated for its yellow colour widely through India; it is particularly fond of the sea shore and grows behind the mangroves.

Rennellia Korth. (det. C. B. Clarke).

54. **R. speciosa** Hook. f. Fl. Brit. Ind. v. 3, p. 158.

Morinda speciosa Kurz For. Fl. Burma v. 2, p. 62, in Journ. Asiat. Soc. Beng. v. 46, pars 2 [1877], p. 152.

Species forsan ad *Tribrachyam* (si *Tribrachya* Korth. a *Rennellia* Korth. genus diversum sit habendum) olim transferenda.

Jungle near Klong Munsé, alt. 900 ft. (n. 122).

Area: Tenasserim, Borneo.

Borreria G. F. W. Mey.

55. **B. hispida** (Linn.) K. Sch. Natürl. Pflzf. IV, 4. *Spermacoce hispida* Linn. Spec. pl. ed. 1, 102; Hook. f. Fl. Brit. Ind. III, 200.

Dry open ground near Lem Dan. A small creeping herb. (n. 484).

Area: A very common weed throughout whole East India, the Malayan Archipelago as far as to S. China, it grows also in Madagascar.

Lythraceae

by **C. B. Clarke** — Kew.

Ammannia Linn.

1. **A. peploides** Spreng.

Syst. v. 1 [1825] p. 444; Kurz in Journ. Asiat. Soc. Beng. v. 46 [1877], pars 2, p. 84; Hook. f. Fl. Brit. Ind., v. 2, p. 566; Vidal Pl. Vasc. Filip. p. 138; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8] p. 303.

A. repens Mart. in Acad. Muench. Phil. v. 6 [1820], p. 150; DC. Prodr., v. 3, p. 80.

Ameletia Indica DC. Prodr. v. 3, p. 76; Blume Mus. Bot. v. 2, p. 135, t. 47.

A. elongata Blume Mus. Bot. v. 2, p. 135.

A. acutidens Miq. Flor. Ind. Bat. v. 1, pars 1, p. 617.

Rotala Indica, Koehne in Engl. Jahrb. v. 1 [1881], p. 172.

Plains near Lem Dan (n. 305).

Area: A weed in wet cultivations, from Persia to the Philippines.

Pemphis J. R. et G. Forst.

2. **P. acidula** J. R. et G. Forst.

Char. Gen. Pl. [1776], p. 67, t. 34; DC. Prodr. v. 3, p. 89; Blume Mus. Bot. v. 2, p. 128, t. 43; Miq. Fl. Ind. Bat, v. 1, pars 1, p. 619; Kurz For. Fl. Burma v. 1, p. 518, in Journ. Asiat. Soc. Beng. v. 46 [1877], pars 2, p. 86; Hook. f. Fl. Brit. Ind. v. 2, p. 573; Vidal Pl. Vasc. Filip., p. 138; Koehne in Engl. Jahrb. v. 3 [1882], p. 133; Hemsl. in Journ. Asiat. Soc. Beng. v. 23 [1886—8], p. 305.

Lythrum Pemphis Linn. f. Suppl., p. 249.

Maclellandia Griffithiana Wight Ic. Pl. Ind. Or., t. 1996.

Koh Kahdat, common on the sandy seashore (n. 323).

Area: Inhabits the Tropical seashore of the Old World.

Lagerstroemia Linn.

3. **L. Flos-Reginae** Retz.

Obs. v. 5 [1789], p. 25; Kurz For. Fl. Burma, v. 1, p. 524, in Journ. Asiat. Soc. Beng. v. 46 [1877], pars 2, pp. 87, 88; Hook. f. Fl.

Brit. Ind., v. 2, p. 577; Vidal Pl. Vasc. Filip., p. 139; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8], p. 305.

L. Muenchhausia Lam. Encycl. v. 3 [1789] p. 375, Illustr. t. 473, fig. 2.

L. Reginae Roxb. Corom. Pl. v. 1, p. 46, t. 65; DC. Prodr. v. 3, p. 93; Blume Mus. Bot. v. 2, p. 126, t. 41 A; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 623.

L. speciosa Pers., Syn. v. 2 [1807], p. 72; Koehne in Engl. Jahrb. v. 4 [1883], p. 28, non DC.

Meunchhausia speciosa Linn. Mant. Alt. [1771], p. 243.

Adambea glabra, Lam. Encycl. v. 1, p. 39.

Koh Chang.

Area: Also in East and South India, in Malay Peninsula and Archipelago, and in China.

4. **L. floribunda** Jack in Malay Miscell. v. 1 [1820], p. 38; DC. Prodr. v. 3, p. 93; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 623; Kurz For. Fl. Burma v. 1, p. 522, in Journ. Asiat. Soc. Beng. v. 46, pars 2 [1877], pp. 87, 88; Hook. f. Fl. Brit. Ind. v. 2, p. 577; Koehne in Engl. Jahrb. v. 4 [1883], p. 34; Hemsl. in Journ. Linn. Soc. v. 23 [1886—8] p. 305.

North-end of Koh Chang on rocks near the sea (n. 628a).

Area: Also in Burma, Malay Peninsula and Islands, and China.

Sonneratia Linn. f.

5. **S. alba** Smith in Rees Encycl. v. 33 [1819] [Yy 2]; DC. Prodr. v. 3, p. 231; Blume Mus. Bot. v. 1, p. 338; Miq. Fl. Ind. Bat. v. 1, p. 497; Kurz For. Fl. v. 1, p. 526, in Journ. Asiat. Soc. Beng. v. 46, pars 2 [1877], p. 89; Hook. f. Fl. Brit. Ind. v. 2, p. 580.

S. acida Benth. Fl. Austral. v. 3, p. 301 partim.

Very common all over the area explored with the mangroves (n. 44 etc.).

Area: Inhabits the Tropical seashore of the Old World.

Melastomaceae

by **C. B. Clarke** — Kew.

Melastoma Linn.

1. **M. Malabathricum** Linn. ed. 1, p. 390, ed. 2, p. 559; Wight Illustr. t. 95; Naud. in Ann. Sc. Nat. ser. 3, v. 13 [1850], p. 284; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 507 (calycis descr. emend.); Kurz For. Fl. Burm. v. 1, p. 503, in Journ. Asiat. Soc. Beng. v. 46 [1877], pars 2, p. 55; Triana in Trans. Linn. Soc. ser. 1, v. 28 [1873], p. 59; Hook. f. Fl. Brit. Ind. v. 3, p. 523 cum. syn.; Cogn. in DC. Monogr. v. 7, p. 349.

Jungle near Klong Majum (n. 607 a).

Area: In India very common; in Malaya, the Philippines, Australia, Polynesia, frequent (ex Cogniaux).

2. **M. polyanthum** Blume in Flora v. 15 [1831], p. 481, Mus. Bot. v. 1, p. 52, t. 6; Korth. Verh. Nat. Gesch. p. 225; Naud. in Ann. Sc. Nat. ser. 3, v. 13 [1850], p. 287; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 507; Triana in Trans. Linn. Soc. ser. 1, v. 28 [1873], p. 59; Hook. f. Fl. Brit. Ind. v. 2, p. 523; Cogn. in DC. Monogr. v. 7, p. 354.

M. Malabathricum Jack in Trans. Linn. Soc. ser. 1, v. 5 [1825], p. p. t. 1 figg. *a—g*; Blume Bijd., p. 1076; Benth. Fl. Austral. v. 3, p. 292 partim.

M. brachyodon Naud. in Ann. Sc. Nat. ser. 3, v. 13 [1850], p. 292.

In dry open places near Lem Dan, very abundant (nn. 27, 160).

Area: In South India, Malaya, the Philippines, Australia; frequent.

3. **M. sanguineum** D. Don in Mem. Soc. Wern. v. 4 [1822]. p. 289; Sims Bot. Mag. [1821], t. 2241; Blume Mus. Bot. v. 1, p. 55; Naud. in Ann. Sc. Nat. ser. 3, v. 13 [1850], p. 281; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 504; Triana in Trans. Linn. Soc. ser. 1, v. 28 [1873], p. 60; Hook. f. Fl. Brit. Ind. v. 2, p. 524.

M. decemfidum, Roxb. Hort. Beng. 1813—4 sine descript.; Jack in Trans. Linn. Soc. v. 14 [1822—5], p. 6; Blume Mus. Bot. v. 1, p. 55; Naud. in Ann. Sc. Nat. ser. 3, v. 13 [1850], p. 282; Kurz For. Fl. Burma v. 1, p. 503, in Journ. As. Soc. Beng. v. 46 [1877] pars 2, p. 75; Cogn. in DC. Monogr. v. 7, p. 345.

Nipple alt. 2000 ft., in the jungle (nn. 607 a, 672 a).

Area: Frequent in the Malay Peninsula and islands, extending to South China and the Philippines.

4. **M. villosum** Loddige Bot. Cab. 1824, tab. 853; Bot. Mag. 1826, tab. 2630; Cogn. in DC. Monogr. v. 7, p. 356.

Pteroma villosum DC. Prodr. v. 3, p. 152.

Dissotis villosa Triana in Trans. Linn. Soc. v. 28 [1873] p. 57.

Osbeckia Saigonensis O. Kunze Rev. Gen. v. 1, p. 247.

Koh Chang.

Area: Also known from Siam and Cochinchina.

Pternandra Jack.

5. **P. coerulescens** Jack in Malay Miscell. v. 2, n. 7 [1822], p. 61; Triana in Trans. Linn. Soc. ser. 1, v. 28 [1873], p. 153; Kurz For. Fl. Burma v. 1, p. 509, in Journ. Asiat. Soc. v. 46 [1877], pars 2, p. 79; Hook. f. Fl. Brit. Ind. v. 2. p. 551; Cogn. in DC. Monogr. v. 7, p. 1103.

Ewyckia cyanea Blume Rumphia v. 1 [1835], p. 24, t. 8, Mus. Bot. v. 1, p. 6, fig. 1; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 568.

E. Jackiana Walp. Rep. v. 5, p. 724.

Jungle near Klong Munsé.

Area: Malay Peninsula, Malaya to the Philippines.

Memecylon Linn.

6. **M. floribundum** Blume Mus. Bot. v. 1 [1849], p. 361; Triana in Trans. Linn. Soc. v. 28 [1873], p. 158; Cogn. in DC. Monogr. v. 7, p. 1162.

M. tinctorium Blume Bijdr., p. 1094.

M. laurifolium Naud. in Ann. Sc. Nat. ser. 3, v. 18 [1852], p. 277; Miq. Fl. Ind. Bat. v. 1, pars 1, p. 576.

Klong Prao, on rocks in the jungle (n. 706 d).

Area: Endemic in Java (so far as known to Cogniaux).

Scrophulariaceae

by **C. B. Clarke** — Kew.

Adenosma R. Brown.

1. **A. coeruleum** R. Br. Prodr. [1810], p. 443; Hook. f. Fl. Brit. Ind. v. 4, p. 263 cum syn.

Pterostigma villosum Benth. Scroph. Ind., p. 21; Miq. Fl. Ind. Bat. v. 2, p. 678.

P. strictum Griff. Notul. v. 4, p. 96, Ic. Pl. Asiat., t. 417, fig. 3.

Stemodia coerulea Benth. in DC. Prodr. v. 10, p. 381.

Herpestis lanuginosa Blume Bijd., p. 747.

Klong Sarlakpet, rice field (n. 727d).

Area: Extends from India throughout Malaya to Australia.

2. **A. capitatum** Hance in Journ. Linn. Soc. v. 13 [1873], p. 114; Benth. in Benth. et Hook. f. Gen. Pl. v. 2 [1876], p. 949; Hook. f. Fl. Brit. Ind. v. 4, p. 264; Hemsl. in Journ. Linn. Soc. v. 26 [1890] p. 184.

Stemodia capitata Benth. in Bot. Reg. t. 1470 in nota.

Pterostigma capitatum Benth. Scroph. Ind. p. 21, in DC. Prod. v. 10, p. 380, Fl. Hongk. p. 248.

Erinus bilabiatus Roxb. Fl. Ind. v. 3, p. 92.

Koh Chang, plains near Lem Dan (n. 158).

Area. Common in India and the Malay Peninsula; also in Banka, Borneo, Tonkin.

Scoparia Linn.

3. **S. dulcis** Linn. Sp. Pl. ed. 1, p. 116, ed. 2, p. 168; Gaertn. Fruct. v. 1, p. 251, t. 53, fig. [10]; Beauv. Fl. d'Owar. v. 2, p. 86, t. 115; Benth. in DC. Prod. v. 10, p. 431; Miq. Fl. Ind. Bat. v. 2, p. 699; Hook. f. Fl. Brit. Ind. v. 4, p. 289.

In dry open ground near Lem Dan (nn. 17, 157).

Area: A weed, in the tropics of both Hemispheres.

Limnophila R. Br.

4. **L. diffusa** Benth. in DC. Prodr. v. 10 [1846], p. 387; Hook. f. Fl. Brit. Ind. v. 4, p. 266; non G. Don.

In wet ground near Lem Dan (n. 146).

Area: A rice-field weed, in Eastern and Southern India, in the Malay Peninsula and Sumatra.

Vandellia Linn.

5. **V. crustacea** Benth. Scroph. Ind. [1835], p. 35, in DC. Prodr. v. 10, p. 413; Wight Ic. Pl. Ind. t. 863; Miq. Fl. Ind. Bat. v. 2, p. 690; Hook. f. Fl. Brit. Ind. v. 4, p. 279 cum syn.; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 189.

Capraria crustacea, Linn. Mant., p. 87.

Jungle near Klong Majum, on rocks.

Area: A weed, in the Tropics of the Old World.

Bonnaya.

6. **B. veronicifolia** Spreng. Syst. v. 1 [1825], p. 41; Benth. in DC. Prodr. v. 10, p. 421; Wight Ic. Pl. Ind., t. 1411; Miq. Fl. Ind. Bat. v. 2, p. 696; Hook. f. Fl. Brit. Ind. p. 4, p. 285; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 192.

Gratiola veronicifolia Retz Obs., fasc. 4, p. 8; Roxb. Corom. Pl. v. 2, p. 130, t. 154; Blume Bijd., p. 745.

Plains near Lem Dan (n. 182).

Area: A small weed in South East Asia.

7. **B. verbenifolia** Spreng. Syst. v. 1 [1825], p. 42; Benth. in DC. Prodr. v. 10, p. 421; Wight Ic. Pl. Ind., t. 1412; Miq. Fl. Ind. Bat. v. 2, p. 697.

B. veronicifolia var. Hook. f. Fl. Brit. Ind. v. 4, p. 285; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 192.

Gratiola racemosa Roxb. Fl. Ind. [ed. Carey et Wallich], v. 1, p. 139.

Rice-field at Lam Dan (n. 251).

Area: A small weed in South East Asia.

Acanthaceae

by **C. B. Clarke** — Kew.

Ebermaiera Nees.

1. **E. subcapitata** C. B. Clarke n. sp.

Foliis 25 mm. longis, 11 mm. latis, utrinque angustatis, subtus pallidioribus secus venas minute pubescentibus, petiolis 4 mm. longis; spicis terminalibus, subcapitatis 15—20 mm. in diam.; bracteis calycibusque ciliato-pilosis; bractea 9 mm. longa, lanceolata; calyce 5 mm. longo, segmentis 4 linearibus 1 paullo latiore; corolla 8 mm. longa; antheris, polline, stylo, capsula, seminibus omnino generis.

On river banks in the jungle near Klong Munsé. Flower light mauve (nn. 122, 271).

Area: Also in Borneo (Haviland nn. 3514, 3587).

Hygrophila Nees.

2. **H. quadrivalvis** Nees. in Wall. Pl. As. Rar. v. 3 [1832], p. 80, in DC. Prodr. v. 11, p. 89; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 3, p. 408; Miq. Fl. Nederl. Ind. v. 2, p. 778.

H. obovata, Wight Ic. Pl. Ind. Or., t. 1489.

H. salicifolia, T. Anders. in Journ. Linn. Soc. v. 9, p. 456.

Ruellia quadrivalvis, Wallich List n. 2374 (plagula 1).

— Rheede Hort. Malabar v. 2, t. 46.

Rice-field near Lem Dan (nn. 178, 241, 315).

Area: Throughout British India; Malaya; Tonquin. This species may be esteemed a Var. only of *H. salicifolia*, Nees; in which case its area will extend to Australia and Tropical America.

Strobilanthes Blume.

3. **S. rufescens** T. Anders. in Journ. Linn. Soc. v. 9 [1867], p. 472; C. B. Clarke in Hook f. Fl. Brit. Ind. v. 3, p. 430 cum syn.; Lindau in Engler und Prantl Pflanzenfam. v. 4, Abtheil. 3b, p. 305 (sect. Buteraea).

Ruellia rufescens, Roth Nov. Sp. Pl., p. 304.

Buteraea ulmifolia Nees in Wall. Pl. As. Rar. v. 3, p. 84 et in DC. Prodr. v. 11, p. 196.

Typischer Rippenpollen i. e. *Strobilanthes*, Lindau.

Klong Son, in the jungle (n. 637a).

Area: Also in Burma and Malaya.

4. **S. parvibracteatus** C. B. Clarke n. sp.-

Ramis apice rufo-hirsutis; foliis ovatis, vix acutis, parvis (usque ad 35 mm. longis); spicis usque ad 3 cm. longis, 8 mm. latis (quam *S. rufescentis* gracilioribus); calyce 9 mm. longo, usque ad basin 2-partito; bractea 4—5 mm. longa ovata, rotundata; ceteroquin ut *S. rufescens*.

Frutex rigidus, ramosus. Folia, quam *S. rufescentis*, crassiora hirsutiora. Spicae approximatae. Calyx ei *S. rufescentis* simillimus. Corolla quam *S. rufescentis* minor — capsula cum seminibus omnino ut *S. rufescentis*. — An *S. rufescentis* forma?, a qua inprimis differt bracteis quam calyces multo brevioribus.

Klong Majum (alt. 700 ft.), on rocks in the jungle (n. 609); flowers light blue with white veins.

Acanthus Linn.

5. **A. ilicifolius** Linn. Sp. Pl. ed. 1, p. 639, ed. 2, p. 892 partim; Blume Bijd., p. 806; Benth. Fl. Austral. v. 4, p. 458; Kurz For. Fl. Burm. v. 2, p. 241; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 3, p. 481, in Dyer Fl. Trop. Afr. v. 5, p. 108; Lindau in Engl. und Prantl Pflanzenf. v. 4, Abtheil. 3 B, p. 319.

A. Doloarius Blanco Fl. Filip., p. 487.

Dilivaria ilicifolia Nees in Wall. Pl. As. Rar. v. 3, p. 98, in DC. Prodr. v. 11, p. 268.

Delivaria ilicifolia Miq. Fl. Ind. Nederl. v. 2, p. 820.

— Rheede Hort. Malab. v. 2, p. 93, t. 48.

Lem Ngob, in mangrove-swamp (n. 48).

Area: Common on sea coasts from Africa to Australia and Oceania.

Var. **integrifolia** T. Anderson in Thwaites Enum. Pl. Zeyl., p. 232.

Foliis fere vel omnino integris.

Lem Ngob, mangrove-swamp (n. 821).

Area: This Var. occurs with the type in India, Malaya, Oceania.

Eranthemum Linn. partim.

6. **E. Zollingerianum** Nees in DC. Prodr. v. 11 [1847], p. 455 (syn. E. dianthero, Blume excl.).

E. crenulatum Nees in Wall. Pl. As. Rar. v. 3, p. 107, in DC. Prodr. v. 11, p. 453 pro magna parte; non Lindley.

E. Malaccense C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 3, p. 498.

Koh Chang, common in the jungle, especially on rocks (nn. 121, 392, 449).

Area: Extends from Malacca to the Philippines; Java, Zollinger n. 44; Koh Kong, Murton (n. 25).

7. **E. album** Nees in DC. Prodr. v. 11 [1847], p. 455; Miq. Fl. Ind. Nederl. v. 2, p. 837; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 3, p. 498.

Jungle near Lem Dan (n. 83).

Area: Known from Pegu, Andaman Isles, Nicobar Isles, Chittagong and Penang.

8. **E. Pumilio** C. B. Clarke n. sp.

Culmis ligneis, 2 dm. longis; foliis parvis (4 cm. longis 12—15 mm. latis), utrinque angustatis, nervis minute pilosis; spicis (vix racemis) 7 cm. longis, 4—7-floris, minute glanduloso-pubescentibus; bracteolis minutis; calyce 5 mm. longo; corollae tubo 26 mm. longo, lobis 11 mm. longis; capsula 17 mm. longa pilosa, in dimidia parte superiore 4-sperma.

Corolla and capsule as in other species of the genus. Stems very stout and rugged in proportion to their length. Leaves unusually small for the genus.

Jungle near Klong Munsé, on rocks (nn. 59, 98); flowers pale rose.

Justicia Linn.

9. **J. Gendarussa** Linn. f. Suppl. 1781, p. 85; Blume Bijd. p. 785; Blanco Fl. Filip., p. 14; Kurz For. Fl. Burm. v. 2, p. 247; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 4, p. 532, in Dyer Fl. Trop. Afr. v. 5, p. 203; Hemsl. in Journ. Linn. Soc. v. 26, p. 244.

Gendarussa vulgaris Nees in Wall. Pl. As. Rar. v. 3, p. 104, in DC. Prodr. v. 11, p. 410; Wight Ic. Pl. Ind. Or. t. 468; Miq. Fl. Nederl. Ind. v. 2, p. 831.

— Rheede Hort. Malab. v. 9, t. 42.

Common in wet places all round Koh Chang (n. 239, 637, 726a, 820).

Area: Also in Africa, India, China, Malaya; often cultivated. In Johs. Schmidt n. 637 the leaves are very broadly lanceolate, as in some examples from the Malay Peninsula.

Adhatoda Nees.

10. **A. Vasica** Nees in Wall. Pl. As. Rar. v. 3 [1832], p. 103, in DC. Prodr. v. 11, p. 387; Miq. Fl. Nederl. Ind. v. 2, p. 829; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 4, p. 540.

Justicia Adhatoda Linn. Sp. Pl. ed. 1, p. 15 ed. 2, p. 20; Blume Bijd. p. 785; Hemsl. in Journ. Linn. Soc. v. 26, p. 244.

— Rheede Hort. Malab. v. 9, t. 43.

Plains near Lem Dan (n. 414).

Area: Common in India, Malaya; also in Siam, China.

Rungia Nees.

11. **R. parviflora** Nees in Wall. Pl. As. Rar. v. 3 [1832], p. 110, in DC. Prodr. v. 11, p. 469 syn. excl.; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 4, p. 550 cum syn.

The Koh Chang examples are very small, shrubby, as though growing on rocky ground; the leaves are very small, 10—14 mm. long at most, elliptic or ovate: the spikes and bracts are small, the calyx very villous.

Klong Prao, on rocks in the jungle (n. 706 b).

Area: Common throughout India, Malaya.

Hypoestes R. Br.

12. **H. ? Schmidtii** C. B. Clarke n. sp.

Parva, ramulosa, parce pilosa, foliis ovato-ellipticis 20 mm. longis, 12 mm. latis (foliis lanceolatis 40 mm. longis 9 mm. latis in eodem ramulo interdum additis), petiolo 2—4 mm. longo piloso; spicis parvulis in cymulis depauperatis paucis (saepe 1—3—5) sparsis; bracteis 2 linearibus, admodum inaequalibus (altera 8—10 mm. longa, altera vix 5 mm. longa) 2—3-flores includentibus; sepalis 5 mm. longis, linearibus, pilosis; bracteolis quam sepala vix majoribus; capsula 1 cm. longa, patentim pilosa, in parte superiore 4-sperma (omnino generis); seminibus nigris, a punctis elevatis minutis ornatis.

Flores desunt; genus parum incertum.

Jungle near Klong Majum in chinks of rocks. Flowers light rose (nn. 615 a, 900 a).

Urticaceae

by **O. Warburg** — Berlin.

Ficus L.

Sect. *Urostigma.*

1. **F. pilosa** Reinw. in Blume Bijdr. 446. var. **chrysocoma** King f. (= *F. chrysocoma* Bl. Bijdr. 443).

Koh Kahdat, sandy sea-shore (n. 579 b).

Area: Tenasserim, Penang (?), Java, Borneo, North Australia.

2. **F. bracteata** Wall. Cat. 4498.

Jungle near Klong Munsé (n. 142, 594 a).

Area: Penang, Perak, Singapore, Java.

3. **F. altissima** Bl. Bijdr. 444 (*F. laccifera* Roxb.).

Koh Lom, on rocks near the sea (n. 846).

Area: Ceylon, Deccan, trop. Himalaya, Assam, Burma, Malayan Peninsula, Andaman Islands, Malayan Archipelago.

4. **F. consociata** Bl. Bijdr. 447. var. **Murtoni** King.

Lem Dan, Klong Majum, Koh Chang Noi, on sandy or rocky ground near the sea (n. 140, 537, 697 a).

Area: Malayan Peninsula, Sumatra, Java; the variety *Murtoni* only in the Malayan Peninsula.

5. **F. glabella** Bl. Bijdr. 452.

Klong Majum, on rocks in the jungle (n. 200 l).

Area: East Himalaya, Khasia, Chittagong, Burma, Malayan Peninsula, Malayan Archipelago, South China.

6. **F. retusa** L. Mant. 129.

Koh Kahdat, sandy sea-shore (n. 573), Klong Sarlakpet.

Area: Himalaya, Khasia, Assam, Burma, Malayan Peninsula, Malayan Archipelago, South China, North Australia, New-Caledonia.

7. **F. vasculosa** Wall. Cat. 4482.

Open country near Klong Prao (n. 717 b).

Area: Burma, Malayan Peninsula, Bangka, Java, South China.

Sect. *Synoecia.*

8. **F. punctata** Thunb. Fic. 9 var. **falcata** (Miq.) King.

Jungle near Klong Munsé, a climber on trees (n. 526 c).

Area: Malayan Peninsula, Malayan Archipelago.

Sect. *Covellia.*

9. **F. hispida** L. f. Suppl. 442.

Open contry at Lem Dan (n. 219).

Area: Ceylon, India, Burma, Malayan Peninsula, Andaman Islands, Malayan Archipelago, South China, Australia.

10. **F. fistulosa** Reinw. in Bl. Bijdr. 470.

Open country near Lem Dan, riverbank in the jungle at Klong Son, a cauliflorous tree (n. 252, 395, 427, 691, 796).

Area: Khasia, Burma, Malayan Peninsula, Malayan Archipelago.

Sect. *Eusyce.*

11. **F. villosa** Bl. Bijdr. 441.

Common in the jungle near Klong Munsé, a climber on trees (n. 124, 404).

Area: Malayan Peninsula, Malayan Archipelago.

12. **F. fulva** Reinw. in Bl. Bijdr. 578.

Jungle near Lem Dan, on a riverbank (n. 623).

Area: Burma, Malayan Peninsula, Andaman Islands, Malayan Archipelago.

13. **F. pyriformis** Hook. et Arn. Bot. Beech. Voy. 216. Var. **ichnopoda** (Miq.) King.

Klong Majum, on rocks in the jungle (n. 93, 617 a).

Area: Assam, Khasia, Burma, Malayan Peninsula, South-China.

14. **F. chartacea** Wall. Cat. 4580 var. **torulosa** (Wall.) King.

Open country near Klong Prao (n. 717 c).

Area: Burma, Malayan Peninsula.

Sect. *Neomorphe.*

15. **F. variegata** Bl. Bijdr. 459.

Riverbank in the jungle near Klong Son (n. 693).

Area: Assam, Chittagong, Malayan Peninsula, Malayan Archipelago, South China.

Artocarpus Forst.

16. **A. integrifolia** L. f. suppl. 412.

Cultivated every where throughout the area explored.

Area: Deccan Peninsula, cultivated in whole South Asia.

Conocephalus Bl.

17. **C. suaveolens** Bl. Bijdr. 483.

Klong Son, on riverbank in the jungle, a tall liane.

Area: East Himmalaya, Khasia, Tenasserim, Malayan Peninsula, Malayan Archipelago, Cambodja.

Trema Lour.

18. **T. timorensis** Bl. Mus. Bot. II, 60.

Dry open country near Lem Dan (n. 303).

Area: Tenasserim, Malayan Peninsula, Malayan Islands, South China, North Australia.

19. **T. orientalis** Bl. Mus. Bot. II, 62 (incl. *T. amboinensis* Bl.).

Open country near Lem Dan (n. 243, 301, 477).

Area: Ceylon, India, Assam, Burma, Malayan Peninsula, Andaman Islands, Malayan Archipelago.

Fungi

by **E. Rostrup** — Copenhagen (*Agaricineae* by **Geo. Massee** — Kew).

Myxomycetes.

Lycogala Mich.

1. **L. Epidendron** (L.) Buxb.

On trunks of dead trees.

Area: Common almost everywhere.

Stemonitis Gled.

2. **S. fusca** Roth.

Area: Common everywhere.

Uredinaceae.

Uredo Pers.

3. **U. Fuirenae** Rostr. n. sp.

Soris hypophyllis, fuscidulis, lanceolatis, usque 1.mm. longis; uredosporis variis, subsphæroideis, obovatis v. oblongo-polyedricis, subtiliter aculeatis, longit. 20—30 μ, crassit. 14—20 μ.

In foliis Fuirenae glomeratae.

Tremellaceae.

Hirneola Fr.

4. **H. pellucida** (Jungh.) Fr.

Area: Java.

5. **H. auricularis** Fr.

On trunks.

Area: Brazil.

Calocera Fr.

6. **C. palmata** (Schum.) Fr.

On trunks.

Area: Europe, America.

Thelephoraceae.

Stereum Pers.

7. **S. hirsutum** Willd.

On trunks.

Area: Everywhere.

8. **S. ferrugineum** (Bull.) Fr.

On trunks.

Area: Europe, the West-Indies, Brazil, Ceylon.

9. **S. ochroleucum** Fr.

On trunks of felled trees.

Area: Europe, Florida, Cuba, Venezuela, Tasmania, Borneo.

10. **S. versicolor** (Swartz) Fr.

On trunks.

Area: Mexico, the West-Indies, Africa, Australia.

11. **S. Ostrea** Nees.

On trunks.

Area: Malacca, Java, Australia.

Hymenochaete Lév.

12. **H. rheicolor** (Mont.) Lév.

On dead branches.

Area: India.

Clavariaceae.

Clavaria Vaill.

13. **C. contorta** Holmskj.

On trunks.

Area: Europe, America.

Physalacria.

14. **Ph. changensis** Rostr. n. sp.

Flavo-brunnea, caespitosa, capitulo globoso, vesiculoso-inflato, membranaceo, glabro, 3—4 mm. diametro, basi circulari perforato; stipite gracili, circiter 1 ctm. longo; sporis ellipsoideis, minutis; cystidiis clavatis, 32 μ l., 12 μ cr.

On trunks.

Hydnaceae.

Hydnum L.

15. **H. conchatum** Fr.

On trunks.

Area: Oahu (Polynesia).

Polyporaceae[1]).

Boletus Dillon.

16. **B. lacunosus** Rostr. n. sp.

Pileo e pulvinato expanso, glabro, laevi, alutaceo; tubulis liberis, mediis, dilute fuscis; stipite gracili, elongato, cylindrico v. sursum attenuato, profunde alato-lacunoso, annulato; sporis ferrugineis, fusiformibus, 13—15 μ l., 6—7 μ cr. — Pileus 4—5 ctm.; stipes 10—12 ctm. long.

In a hollow tree.

17. **B. costatus** Rostr. n. sp.

Pileo dilute fusco, hemisphaerico—pulvinato, laevi, glabro, 2 ctm. lato; stipite ventricoso, utrinque attenuato, sursum profunde costato-lacunoso, inferne obsolete reticulato, 4—5 ctm. l., usque 2 ctm. crasso, basi curvato; tubulis curtis, liberis; poris minutis; sporis oblongis, ferrugineis, subtiliter striatis, 18—20 μ l., 6—8 μ cr.

Suillus Micheli.

18. **S. changensis** Rostr. n. sp.

Pileo convexo—plano, rubro, laevi, glabro, 2—3 ctm. lato; stipite gracili, cylindrico, saepe campresso, basi incurvo, crassiore; tubulis adnatis; poris mediis, sulphureis; sporis hyalinis, oblongis, 9 μ l., 4 μ cr. Carne secta cyanescente.

19. **S. velatus** Rostr. n. sp.

Pileo convexo-plano, rufo-fusco, rimoso-granuloso, 4 ctm. lato, margine velo crasso, stellatim fisso ornato; tubulis liberis; poris amplis, angulatis; sporis hyalinis, ellipsoideis, apiculatis, saepe obliquis; stipite cylindrico, gracili, laevi, 5—6 ctm. l., 0,5—1 ctm. cr.

20. **S. hygrophanus** Rostr. n. sp.

Pileo albo, hygrophano, convexo-plano, initio piloso-squamoso, dein glabro, 2—3 ctm. lato; stipite gracili, flexuoso, sursum fibroso-squamoso, 5—6 ctm. l., 2—3 ctm. cr., cartilagineo, albo, nitido; tubulis liberis; poris mediis, inaequalibus, sinuosis; sporis hyalinis, ellipsoideis, 9—10 μ l., 5 μ cr.

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[1]) As to the genus *Favolus* see the following paper by Massee (p. 367).

Polyporus Micheli.

21. **P. hypopolius** Kalchbr.
On trunks.
Area: Australia.

22. **P. fumosus** (Pers.) Fr.
Area: Everywhere.

23. **P. adustus** (Willd.) Fr.
Area: Everywhere.

24. **P. (Fomes) rugosus** Nees.
Area: Malacca, Ceylon, Guyana.

25. **P. (Fomes) amboinensis** (Lam.) Fr.
Area: Amboina, Java, Singapore.

26. **P. (Fomes) lucidus** (Leys.) Fr.
Area: Everywhere except in the arctic regions.

27. **P. (Fomes) fastuosus** Lév.
Area: Malacca.

28. **P. (Fomes) aruensis** Berk.
Area: Insula oceanica Aru.

29. **P. (Fomes) conchatus** (Pers.) Fr.
Area: Europe, America.

30. **P. (Fomes) australis** Fr.
Area: Widely spread in all tropical regions.

31. **P. (Fomes) applanatus** (Pers.) Wallr.
Area: Everywhere.

32. **P. (Fomes) endophaeus** Berk.
Area: India (Khasia).

33. **P. (Fomes) igniarius** (L.) Fr.
Area: Everywhere.

34. **P. (Fomes) scleromyces** B. et C.
Area: Cuba.

35. **P. (Fomes) sanguinarius** Kl.
Area: Borneo, Mauritius.

36. **P. (Polystictus) xanthopus** Fr.
Area: Common in tropical regions.

37. **P. (Polystictus) atripes** Rostr. n. sp.

Pileo coriaceo-papyraceo, flavo, glabro, radiatim striato, margine tenui, flexuoso-lobato, ciliato; poris minutissimis, decurrentibus; stipite centrali, longo, aterrimo, glabro. — Pileus 4—5 ctm. latus; stipes 4—5 ctm. longus, 4 mm. crassus.

38. **P. (Polystictus) pusillus** Rostr. n. sp.

Pileo papyraceo, umbilicato, obsolete zonato, laevi, glabro, ochraceo, margine crenato; poris mediis, subhexagonis, albidis; stipite centrali, atrofusco, scabro. — Pileus 0,8 ctm. latus; stipes 1,5 ctm. longus, 1 mm. crassus.

In ligno.

39. **P. (Polystictus) luteus** Blume et Nees.

Area: In all tropical regions.

40. **P. (Polystictus) lenziteus** Lév.

Area: Sumatra.

41. **P. (Polystictus) discipes** Berk.

Area: Ceylon.

42. **P. (Polystictus) sanguineus** (L.) Mey.

Area: Common in all tropical regions.

43. **P. (Polystictus) olivascens** Rostr. n. sp.

Pileo suberoso-coriaceo, horizontali, reniformi, fusco-olivaceo, zonato, adpresse sericeo; stipite brevissimo, disciformi; contextu ferrugineo; poris minutis, ferrugineis. — Pileus 1—2 ctm. latus.

Ad truncos.

44. **P. (Polystictus) minutissimus** Rostr. n. sp.

Pileis gregariis, coriaceo-membranaceis, reniformibus, albidis, obscure zonatis, striatis, ca. 2 mm. latis; stipite albo, exacte laterali, curto (0,5—1 mm.); poris rotundis, albis.

Ad ramos corticatis.

45. **P. (Polystictus) albo-luteus** Rostr. n. sp.

Pileo tenui, papyracei, reniformi, 1—2 ctm. lat., albo, nitido, concentrice striato; margine in stipitem brevem, lateralem, basi scutato-dilatatum attenuato; contextu albo; poris minutissimis, luteis.

In ramis.

46. **P. (Polystictus) tigrinus** Rostr. n. sp.

Pileo reniformi-orbiculari, ochraceo, distincte fusco-zonato, radiatim sericeo-striato; stipite laterali, aequali, verrucoso; poris me-

diis, decurrentibus, ochraceis. — Pileus ca. 3 ctm. latus, stipes 1 ctm. longus, 4 mm. crassus.

In ligno.

47. **P. (Polystictus) leonotis** Kalchbr.

Area: Australia.

48. **P. (Polystictus) funalis** Fr.

Area: India, Guinea, Brazil.

49. **P. (Polystictus) purpureo-albus** Rostr. n. sp.

Pileis imbricatis, dimidiatis, postice effusis, coriaceis, tenuibus, rugosis, glabris, fusco-purpureis, margine late albo; hymenio pallido; poris mediis, angulatis; dissepimentibus tenuibus.

Ad truncos.

50. **P. (Polystictus) changensis** Rostr. n. sp.

Pileo tenui, plano, coriaceo, reniformi, glabro, dense concentrice striato-sulcato, vernicoso-polito, dilute brunneo, postice atropurpureo, contextu pallido; hymenio cinerascente; poris mediis, exacte uniformibus. — Pileus 4—5 ctm. longus.

In ramis exsiccatis et ad truncos.

51. **P. (Polystictus) crenatoporus** Rostr. n. sp.

Pileo coriaceo, molli, tenui, sessile, albo-villoso, 1—3 ctm. longo, 0,5 ctm. lato, contextu citrino; poris mediis, irregularibus, citrinis; dissepimentibus crenatis.

Ad truncos.

52. **P. (Polystictus) hirsutus** Fr.

Area: Everywhere.

53. **P. (Polystictus) pinsitus** Fr.

Area: Widely spread in tropical regions.

54. **P. (Polystictus) chartaceus** B. et C.

Area: America.

55. **P. (Polystictus) spadiceus** Jungh.

Area: Java.

56. **P. (Polystictus) Schmidtii** Rostr. n. sp.

Pileis coriaceo-rigidis, tenuibus, imbricatis, conchatis, densissime concentrice striatis, tomentulosis, cinnamomeis, 1—2 ctm. latis; poris minutissimis, ferrugineis, contextu concolori.

Habitus fere Hymenochaetes rubiginosae.

57. **P. (Poria) carnosus** Rostr. n. sp.

Pileo carnoso, molli, tenaci, resupinato, marginato, contextu ferrugineo, margine obtuso, pallido; poris curtis, mediis, angulatis, inaequalibus, ferrugineis. — Pileus 3—4 ctm.

Ad truncos.

Lenzites Fr.

57 (bis). **L. eximia** Berk.

Ad truncos.

Laschia Fr.

58. **L. changensis** Rostr. n. sp.

Orbicularis, glabra, carnoso-gelatinosa, supra brunnea, glabra, subtus carnea, sessilis, puncto dorsi excentrico affixa, hymenio reticulato-poroso.

Pileus 1—1,5 ctm. latus.

Marasmiaceae[1]).

Schizophyllum Fr.

59. **S. commune** Fr.

Area: In omnibus regionibus orbis.

Xerotus Fr.

60. **X. changensis** Rostr. n. sp.

Pileo coriaceo, rigido, tenui, sessili, dimidiato, opaco, atro, pulverulento, radiatim sulcato, 2—3 ctm. lato, margine initio integro, dein lobato, subtus rufo, plicis radiantibus, distantibus, integris.

Ad truncos.

Perisporiaceae.

Asterina Lév.

61. **A. Pandani** Rostr. n. sp.

Maculis epiphyllis, atris, rugosis, usque 1 ctm. latis, margine fibrilloso; peritheciis membranaceis, lenticularibus; ascis ovatis, 46 μ l., 33 μ cr.; sporis ellipsoideis, 15 μ l., 13 μ cr.

In foliis Pandani.

Micropeltis Mont.

62. **M. Schmidtiana** Rostr. n. sp.

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[1]) As to the other *Agaricineae* see the following paper by Massee (p. 363).

Peritheciis dimiato-scutatis, orbicularibus, convexulis, tabacinis, epiphyllis, ambitu plano, membranaceo; ascis fasciculatis, fusiformibus, 50—52 μ l., 10—12 μ cr., paraphysibus filiformibus obvallatis, octosporis; sporidiis anguste fusoideis, hyalinis, 5—7-septatis, 20—25 μ l., 5 μ cr.

In foliis Apostasiae Lobbii.

Vizella Sacc.

63. **V. conferta** (Cooke) Sacc.

In foliis Denbrobii.

Area: Dinagepore Indiae.

Sphaeriaceae.

Hypoxylon Bull.

64. **H. rubiginosum** (Pers.) Fr.

On trunks.

Area: Everywhere.

Dothideaceae.

Phyllachora Nitschke.

65. **Ph. repens** (Corda) Sacc.

In foliis vivis.

Area: India, Natal, Cuba.

66. **Ph. Andropogonis** (Schw.) Karst. et Har.

In foliis Andropogonis Sorghi.

Area: America.

67. **Ph. incarcerata** (Berk.) Sacc.

In foliis Anonacearum.

Area: Ceylon.

Dothidella Speg.

68. **D. Pterolobii** Rostr. n. sp.

Stromatibus hypophyllis, oblongis, pulvinatis, fusco-nigris, 0,5—1 mm. longis; ascis obsoletis; sporidiis hyalinis, oblongo-clavatis, 1—septatis, 11—12 μ l., 4—5 μ cr.

In foliis Pterolobii Schmidtiani.

Excipulaceae.

Dinemasporium Lév.

69. **D. graminum** Lév.

In foliis Imperatae arundinaceae.

Area: Common in tropical regions.

Melanconiaceae.

Pestalozzia de Notaris.

70. **P. Andropogonis** Rostr. n. sp.

Maculis amphigenis, irregularibus, pallidis, nigro-purpureo-cinctis; acervulis gregariis, lenticularibus, fuscis; conidiis fusoideis, 20—22 μ l., 7—8 μ cr., 4-septatis, loculis 3 intermediis fuscis, terminalibus hyalinis, apice rostellis 2—3 patentissimis, 16—18 μ longis.

In foliis Andropogonis Sorghi.

Dematieae.

Helminthosporium Link.

71. **H. Ficuum** Rostr. n. sp.

Maculis amphigenis, cinereis, distincte limitatis, fusco-marginatis; hyphis caespitosis, longis, fuscis, nodulosis, septatis; conidiis cylindraceis, 3—septatis, rufo-fuscis, 18—20 μ l., 5—6 μ cr.

In foliis Fici retusae.

Agaricineae [1])

by **George Massee,** F. L. S.

Principal Assistant (Cryptogams), Herbarium, Royal Gardens — Kew.

The small collection of Agarics from Koh Chang, admirably preserved and accompanied by notes, thus rendering identification possible, has extended the geographical range of several species, in addition to furnishing several new forms, all belonging to existing genera. The most interesting novelty is *Favolus albidus* a species evidently allied to *Favolus sprucei* Berk., from Brazil.

Mycena.

72. **M. cuspidata** Massee n. sp.

Pileus e conico-campanulato subexpansus, umbone valde prominente praeditus; margine undulato, striatus, luteo-brunneus, centro atro-umbrino, 2—3 cm. latus; lamellae confertae fere liberae, ventricosae, pallidae; sporae 4—2,5 μ hyalinae; stipes fistulosus, aequalis, glaber, pallidus, 4—5 cm. longus.

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[1]) As to *Schizophyllum* and *Xerotus* see the preceding paper by Rostrup (p. 361).

Allied to *M. galericulata* Fr., differing in the strongly umbonate or cuspidate pileus and the smaller spores.

Koh Chang Noi, on a dead tree.

73. **M. lactea** Karst., Hattsv. I, 103; syn. *Agaricus lacteus* Pers., syn. Fung. 394.

Koh Kahdat on a dead tree.

Area: Europe, United States.

Marasmius Fr.

74. **M. discopus** Massee (sp. nov.).

Pileus convexo-expansus demum disco depresso udo striatus, luridus, margine incurvus, 1—2 cm. latus; lamellae liberae, angustae, confertae, albidae; sporae hyalinae, 5 × 3; stipes tenax, fuscus, incurvus, basi disco applanato albicante adnatus, 3—4 cm. longus.

Characterized by the coarsely striate pileus and thin, flattened disc at the base of the stem. Allied to *M. stylobates* Berk. and Curt.

Jungle near Klong Son (alt. 1000 ft.) on the ground.

75. **M. epiphyllus** Fr. Epicr. 386.

Koh Kahdat, Klong Son, on moist ground in the jungle.

Area: Europe, Asiatic Siberia, United states.

76. **M. synodicus** Kunze in Fries' Epicr. 381.

Klong Son, on moist ground in the jungle.

Area: Surinam.

Pleurotus.

77. **P. mitis** Karst., Hattsv. II, 80, syn. *Agaricus mitis*, Syn. Fung. 481.

Koh Kahdat, Klong Son, Klong Majum, on dead trees.

Area: Europe.

78. **P. scabriusculus** Berk. Journ. Linn. Soc. XIII, 157 (1873).

Lem Dan, on a dead stem of *Areca*.

Area: Australia.

79. **P. Guilfoylei** Berk., Linn. Journ. XIII, 158.

Somewhat larger than the typical form, but agreeing in all essential points.

Open dry place near Lem Dan, on stump of a tree.

Area: New S. Wales, Queensland.

Lentinus Fr.

80. **L. praerigidus** Berk. in Hook. Journ. Bot. VI, 132, pl. VIII, f. 1 (1854).

Koh Chang.

Area: India, Province of Behar, Bengal.

81. **L. exilis** Klotzsch in Berk. Exot. Fungi, no. 5, 397.

A very abundant and widely distributed species in the Old World tropics.

Koh Chang, on the stump of a tree.

Area: Central Africa, Mauritius, India, Malaya, Ceylon, Australia, Cuba.

Panus.

82. **P. luteolus** Massee (sp. nov).

Sessilis, imbricatus; pileus fere membranaceus, lentus, subreniformis, tomento flavo obductus, 3—5 cm. longus; lamellae angustissimae, confertissimae, pallidae, acie acutae; sporae hyalinae, $5 \times 3\,\mu$.

Remarkable for the very thin flesh of the pileus, and the exceedingly narrow and closely crowded gills. Allied to *P. aureofulvus* Cooke, from Perak, Malacca.

Jungle near Klong Prao, on dead trees.

83. **P. spathulatus** Massee (sp. nov.).

Caespitosus; pileus tenuis, lentus, pallidus, suborbicularis seu reniformis, margine arcte involuto, albidus, 3—5 cm. latus; lamellae confertissimae, angustissimae, acie integrae, albidae; sporae hyalinae, $4 \times 2{,}5$; stipes exacte lateralis, elongatus, cylindraceus, fibroso-lignosus, pileus concolor, 4—6 cm. longus.

Distingished from all known species by the elongated stem, and very narrow, densely crowded gills.

Jungle near Klong Son, on the ground.

84. **P. troglodytes** Fries Nov. Symb. Myc. 227.

An interesting discovery, extending the range of a species previously known only from one locality.

Jungle near Klong Munsé, on dead trees.

Area: Ins. St. Thomas.

Claudopus Fr.

85. **C. sphaerosporus** Pat.

Jungle near Klong Son, on stumps of trees.

Flammula Fr.

86. **F. sulphurea** Massee (sp. nov.)

Caespitosus. Pileus convexo-expansus, glaber, margine pellucide striatus sicco levis, laete sulphureus, 1—2 cm. latus; lamellae

distantes, decurrentes, concolores; sporae fulvidae. 6 × 4 μ; stipes e farcto cavus, glaber, sursum attenuatus, flavidus, basi fuscescens, 4—6 cm. altus.

A pretty and distinct species, characterised by the clear yellow colour of every part. Allied to *F. tilopoda* Kalchbr. and Mac-Owan, a South African species.

Jungle near Klong Son, on the ground.

87. **F. sapinea** Karsten, Hattsv. II, 410.

Syn. *Agaricus (Flammula) sapineus* Fries, Syst. Myc. I, 239; Fries, Icon. tab. 118, f. 3.

A common and widely distributed species, occurring here under the typical form.

Jungle near Lem Dan, on a dead tree.

Area: Europe, India, N. S. Wales, Queensland, N. Zealand, Ceylon, United States, Cuba, Venezuela.

Psilocybe Fr.

88. **P. spadicea** Karst. Hattsv. I, 506.

Syn. *Agaricus (Psilocybe) spadiceus* Fr. Epicr. 225.

Jungle near Klong Son, on the ground.

Area: Europe.

89. **P. agraria** Karst. Hattsv. II, 505.

Syn. *Agaricus (Psilocybe) agraria* Fr. Mon. II, 304; Fr. Icon., tab. 137, f. 1.

Jungle near Klong Son, on the ground.

Area: Western Europe.

Panaeolus.

90. **P. albellus** Massee (sp. nov.).

Pileus carnosulus, e convexo-campanulato expansus lividus dein albellus, glaber, 2—3 cm. latus; lamellae confertae, postice attenuato-adnatae, fuliginosae; sporae ellipsoideae utrinque apiculatae, atro-fuscae, 20 × 10 μ; stipes e farcto cavus, sursum attenuatus, fibrilloso-pubescens, pallidus, 7—10 cm. altus.

Most nearly allied to *P. campanulatus* L., differing in the adnate gills and larger spores.

On Buffalo dung.

91. **P. campanulatus** Berk., Outl. Fung. 175.

Syn. *Agaricus campanulatus* Linn. Suec. 2, n. 1213.

Like many other coprophilous fungi, the present species has a wide distribution. Size very variable.

On Buffalo dung.

Area: Europe, S. Africa, Ceylon, United States.

Bolbitius Fr.

92. **B. umbonatus** Massee, Eur. Fung. Flora, I, 200.

Lem Dan, on the ground amongst fallen leaves.

Coprinus Pers.

93. **C. domesticus** Fr., Epicr. 251; Icon. tab. 170, f. 3.

Syn. *Agaricus domesticus* Pers. Syn. Fung. Eur. 401.

Koh Kahdat on the ground in the jungle.

Area: Europe, United States.

Favolus[1]).

94. **F. albidus** Massee (sp. nov.).

Pileus membranaceus, lentus, albidus, glaber, convexo expansus, 1—2 cm. latus; alveoli e rotundato-subhexagoni, radiatim dispositi, albido-straminei aetate pallidi; stipes centralis, subaequalis, concolor, 1,5—2,5 cm. longus.

A very distinct and beautiful species, most nearly allied to *F. sprucei* Berk., from Brazil.

Jungle near Klong Son, on the ground.

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[1]) As to the other *Polyporaceae* see the preceding paper by Rostrup (p. 357).

CONTENT OF PRECEDING PARTS.

Part I.

JOHS. SCHMIDT: Introductory.
F. KRÄNZLIN: Orchidaceae, Apostasiaceae.

Part II.

M. FOSLIE: Corallinaceae.

Part III.

C. B. CLARKE: Cyperaceae.
E. HACKEL: Gramineae.
H. CHRIST: Pteridophyta (Selaginella auct. G. Hieronymus).
V. F. BROTHERUS: Bryales.

Part IV.

W. WEST and G. S. WEST: Fresh Water Chlorophyceae.
TH. REINBOLD: Marine Algae (Chlorophyceae, Phaeophyceae, Dictyotales, Rhodophyceae).
M. GOMONT: Myxophyceae hormogoneae.
JOHS. SCHMIDT: Peridiniales.

Part V.

C. B. CLARKE: Compositae, Umbelliferae.
JOHS. SCHMIDT: Rhizophoraceae.
OVE PAULSEN: Fagaceae.
F. K. RAVN: Loranthaceae.
EUG. WARMING: Podostemaceae.
C. H. OSTENFELD: Hydrocharitaceae, Lemnaceae, Pontederiaceae, Potamogetonaceae, Gentianaceae (Limnanthemum), Nymphaeaceae.
H. HARMS: Leguminosae.
K. SCHUMANN: Scitamineae.
A. ENGLER: Araceae.
F. STEPHANI: Hepaticae.

PRELIMINARY REPORT ON THE BOTANICAL RESULTS OF THE DANISH EXPEDITION TO SIAM (1899—1900).

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Part VII.

C. H. Ostenfeld: Marine Plankton Diatoms.
E. Östrup: Fresh-Water Diatoms.
F. Heim: Dipterocarpaceae.

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Printed by Bianco Luno.

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Part VII.

(**C. H. Ostenfeld:** Marine Plankton Diatoms. — **E. Östrup:** Fresh-water Diatoms. — **F. Heim:** Dipterocarpaceae.)

Marine Plankton Diatoms

by **C. H. Ostenfeld** — Copenhagen.

The following list of marine Plankton Diatoms is the result of an examination of the same 10 samples from which Johs. Schmidt[1]) has published the Peridiniales. All the samples were obtained from the surface of the Sea in the inner part of the Gulf of Siam and were preserved in formaline.

This is a list of the samples collected:

No. 1.	25/12 1896.	Strait between Lem Ngob and Koh Chang.
„ 2.	9/1 1900.	Between Koh Kahdat and Koh Kut.
„ 3.	11/1 1900.	S. of Koh Chang.
„ 4.	16/1 1900.	W. of Koh Chang, N. of Koh Savan.
„ 5.	17/1 1900.	W. of Koh Chang, S. of Koh Savan.
„ 6.	18/1 1900.	S. of Koh Chang.
„ 7.	27/1 1900.	North End of Koh Kut.
„ 8.	28/1 1900.	7 miles S. of Koh Kut.
„ 9.	31/1 1900.	18 miles W. of Koh Chang.
„ 10.	21/3 1900.	1—2 miles S. of Koh Kram.

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[1]) Johs. Schmidt: Peridiniales, in Flora of Koh Chang, Part IV, p. 129. Reprinted from Botanisk Tidsskrift. Vol. 24, Aug. 1901.

The sample No. 1 is rather rich, but the main part consists of detritus and the few present diatoms are partly dead and broken; the samples No. 2 to No. 7 also contain but few Diatoms and Nos. 8 and 9 nearly none, while they are rich in *Trichodesmium* and *Heliotrichum*; they are of a more oceanic character than the other samples. On the other hand the sample No. 10 (gathered in March) is very rich in Diatoms as well in quality as in quantity, and it looks to me as if the coast-water in the Gulf of Siam in the spring produces a rich plankton, just as in our more temperate waters.

With regard to Plankton type in Cleve's sense, I must admit that most of the present samples ought to be classified among „Tropical Neritic Plankton" [1]), except Nos. 8 and 9 which belong to „Desmoplankton". —

In the list the genera are arranged about as in F. Schütt: Bacillariaceae in Engler & Prantl, Natürliche Pflanzenfamilien, I, 1 b, 1896.

Behind the number of the sample I have indicated in brackets the frequency of the species by the ordinary plankton-symbols of frequency, viz.:

c means *predominant*
+ „ *rather common*
r „ *rare*
rr „ *very rare* (only a few specimens seen).

Bacillariaceae.

A. *Centricae.*

Coscinodisceae.

Hyalodiscus Ehbg.

1. **H. sp.**

A very delicate *Hyalodiscus* without any visible structure is not rare in the samples.

2 (r) — 3 (r) — 4 (rr) — 5 (rr) — 6 (rr) — 7 (rr) — 10 (rr).

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[1]) P. T. Cleve: The Seasonal Distribution of Atlantic Plankton Organisms. Göteborg. 1900, p. 24. [In the list abbreviated to „Atl. Plankt. Organisms".]

Stephanopyxis Ehbg.

2. **S. Palmeriana** (Grev.) Grun., Diat. Franz Joseph Land p. 38; A. Schmidt, Atlas d. Diat. Kunde, Pl. 130, f. 1, Pl. 123, f. 41 (f. *javanica* Grun.); Leuduger-Fortmorel, Diatomées de la Malaisie, Ann. du Jard. bot. de Buitenzorg, XI, 1893, p. 45; Otto Müller, Ber. Deutsch. Botan. Gesellsch. 1901, Bd. 19, p. 196, f. 1. *Creswellia Palmeriana* Grev., Trans. Microsc. Soc. 1865, p. 2, Pl. 1, f. 9; Cleve, Diat. f. the Sea of Java, Bih. till K. Svenska Vet. Akad. Handl. Bd. 1, 11, 1873, p. 8.

10 (rr).

Area: Neritic species, found in the Malay Archipelago, South China Sea, Arafura Sea, Australia.

Sceletonema Grev.

3. **S. costatum** (Grev.) Cleve, Diat. of the Sea of Java, 1873, p. 7: Leuduger-Fortmorel, l. c. p. 47; Van Heurck, Synopsis Pl. 91, f. 4; de Wildeman, Prodrome de la flore algologique des Indes Néerlandaises, 1897, p. 130; Lemmermann, Planktonalgen, Ergebnisse einer Reise nach dem Pacific, Abh. Nat. Verein, Bremen, XVI, 2, 1899, p. 317 and 329; Cleve, Atl. Plankton Organisms, p. 351; A Treatise of Phytoplankton, Upsala, 1897, p. 25; Pl. f. the Indian Ocean and the Malay Archipelago, p. 23, K. Sv. Vet. Akad. Handl. 35, No. 5, 1901 [1902].

1 (+) – 2 (rr) — 6 (rr).

Area: Baltic, North Sea, Coasts of British Isles, Ireland, Shetland to Westmannaö (South of Iceland). Gulf of Bengal, Malay Archipelago, Pearl Harbour at Oahu (Sandwich Islands). Certainly a neritic species of the temperate and subtropical regions of all oceans.

Coscinodiscus Ehbg.

4. **C. bengalensis** Grun., Van Heurck, Synopsis, Pl. 132, f. 9; Rattray, Coscinodiscus, Proc. Royal Soc. Edinburgh, vol. 16, 1888—89, p. 580; Cleve, Pl. f. the Ind. Ocean and the Malay Archip., p. 20.

I refer a small form with radially arranged rows of very fine markings to this species.

2 (rr) — 3 (rr).

Area: Gulf of Bengal, Malay Archipelago.

5. **C. excentricus** Ehbg., Abh. Berl. Akad. 1839, p. 146, Mikrogeologie tab. 18. f. 32, tab. 21, f. 6; Van Heurck, Synopsis, Pl. 130, f. 4, 7; Leuduger-Fortmorel, l. c. p. 44; de Wildeman, l. c. p. 143; Cleve, Atl. Plankt. Organisms, p. 318; Pl. f. the S. Atlantic and the S. Indian Ocean, Öfv. af K. Sv. Vetensk. Förhandl. 1900, No. 8 [1901], p. 930; Pl. f. the Ind. Ocean and the Malay Archip., p. 20.

2 (rr) — 6 (rr).

Area: Found in all the Oceans, mostly along the coasts.

6. **C. Janischii** A. Schmidt, Atl. d. Diat. Kunde, Pl. 64, f. 3, 4. Rattray, Coscinodiscus, p. 543 and v. *arafurensis* p. 544; Grunow, Denksch. d. Wiener Akad. d. Wissensch. 1884, p. 76; *C. arafurensis* var. nov. Castr., Challenger Report, Botany, Vol. II, 1886, p. 153, Pl. 2, f. 4; *C. craspedodiscus* Castr. ibid. Pl. 3, f. 5; *C. Janischii* Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 20.

3 (rr) — 10 (rr).

Area: Gulf of Bengal, Malay Archipelago, Arafura Sea.

7. **C. nobilis** Grun., Journ. Roy. Microsc. Soc. 1879, p. 687, Pl. 1, f. 1; Leuduger-Fortmorel, l. c. p. 45; Rattray, Coscinodiscus, p. 545; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 20 and p. 56; *C. papuanus* Castr., Challenger Report p. 154, Pl. 3, f. 3.

The form observed resembles very much *C. papuanus* Castracane l. c.; it is about 250—300 μ in diameter; and I am following Professor Cleve in regarding *C. papuanus* as a form of *C. nobilis*.

3 (+) — 10 (rr).

Area: Great Britain. Gulf of Guinea, Malay Archipelago, Arafura Sea, South China Sea.

8. **C. oculus iridis** Ehbg., Abhandl. Berl. Akad. 1839, p. 147; *C. centralis* var. nov., Castr., Challenger, Pl. 2, fig. 3.

A form which agrees very well with the that figured by Castracane l. c., was found sparingly in one of the samples.

3 (rr).

Area: Found in all Oceans.

9. **C. radiatus** Ehbg., Abhandl. Berl. Akad. 1839, p. 148, Pl. 3, f. 1 a-c.

Forms, which I refer to this species, were found rather sparingly in most of the samples.

2 (r) — 3 (rr) — 4 (rr) — 6 (rr) — 7 (rr) — 10 (rr)

Area: Found in all Oceans.

Palmeria Grev.

10. **P. Hardmaniana** Grev., Van Heurck, Treatise on the Diatomaceae 1896, p. 538, f. 286; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 22 and p. 56.

The interesting form of which I have given some figures, belongs to the genus *Palmeria* and I prefer identifying it with the only known species *P. Hardmaniana*, although the figure by Van Heurck is rather different. My specimens are very delicate, 500—650 μ long and 250—

300 μ broad, the valves are semi-lunate with very fine radiating points, hyaline central space and coarser points within the margins, but the more robust striæ which Van Heurck l. c. p. 539 mentions, are only obscure in my form. The girdle is very unequal, narrow on the straight side and very broad on the curved side, so that the whole frustule resembles a piece of an orange.

Curious is a curved fissure on the valves; in most specimens which I have seen, this fissure was a place of refuge for a little protist, probably

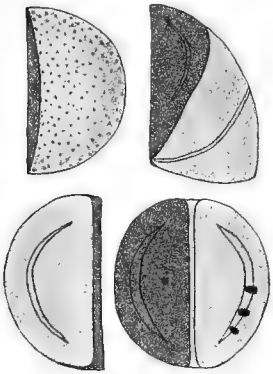


Fig. 1. *Palmeria Hardmaniana* Grev. Cells in different views ($\frac{50}{1}$).

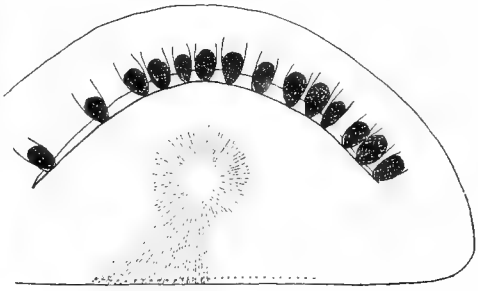


Fig. 2. *Palmeria Hardmaniana* Grev. showing the *Amphorella*'s fixed to the scale. ($\frac{200}{1}$)

an *Amphorella borealis* (Hensen) Dad., var. nov.; the small, more or less numerous, organisms were fixed to the inner side of the fissure.

Chromatophores are numerous, small, dispersed on the inner side of the frustules; the nucleus is placed close to the one valve.

Professor Cleve l. c. seems to take this large diatom as an assymmetrical form of *Coscinodiscus nobilis*, but I am quite convinced that this is not the case; on the other hand I believe, that the genus *Palmeria* is close to *Coscinodiscus*, and that Schütt in Engler & Prantl has made a mistake in placing his *Euodia* (incl. *Palmeria*) among the *Biddulphioideae*, remote from the *Discoideae*. I should prefer placing it close to the genera *Ethmodiscus* and *Coscinodiscus*.

3 (rr) — 7 (rr) — 10 (rr).

Area: Malay Archipelago, China.

Actinodisceae.

Asterolampra Ehbg.

11. **A. rotula** Grev. in Transact. Microsc. Soc. 1860, p. 111, Pl. 3, f. 5; Lemmermann, l. c. p. 317 and 319, Pl. 2, f. 35; Ostenfeld & Schmidt, Pl. f. the Red Sea etc., Vid. Medd. Nath. For. Kjøbenhavn, 1901, p. 152; Schröder, Phytoplankton des Golfes von Neapel, Mitteil. a. d. Zool. Stat. zu

Neapel, Bd. XIV, 1900, p. 22; Cleve, Atl. Plankt. Organisms, p. 283; Pl. f. the Indian Ocean and the Malay Archip. p. 17; *A. Grevillei* var. *adriatica* Grun. in Van Heurck, Synopsis, Pl. 127, f. 12.

2 (rr) — 10 (rr).

Area: Tropical Western Atlantic Ocean, Mediterranean, Gulf of Aden, Indian Ocean, Pacific Ocean near the Sandwich Islands.

Asteromphalus Ehbg.

12. **A. flabellatus** (Bréb.) Grev., Quart. Journ. Microsc. Soc. 1859, p. 160, Pl. 7, f. 4; Van Heurck, Synopsis, Pl. 127, f. 5, 6 (var. *tergestina*); Cleve, Pl. f. the Ind. Ocean and the Malay Archip., p. 17; Diat. f. the Sea of Java, 1873, p. 5; Leuduger-Fortmorel, l. c. p. 43.

7 (rr).

Area: Mediterranean; Malay Archipelago, South China and Japan Seas; in Guano from Peru and California.

Solenieae.

Corethron Castr.

13. **C. criophilum** Castr., Challenger Report, p. 85, Pl. 21, f. 12, 14, 15; Cleve, Pl. f. the S. Atl. and the S. Ind. Ocean, p. 929; Pl. f. the Ind. Ocean and the Malay Archip., p. 20; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc., p. 156; *C. hystrix* Hensen, V. Bericht der Kommiss. in Kiel 1883, Pl. 5, f. 49; Cleve, Fish. Board for Scotland, 1896, p. 298, f. 15; Atl. Plankt. Organisms, p. 315; Lemmermann, l. c. p. 318.

10 (rr).

Area: Eastern part of Atlantic Ocean from Iceland southwards, Red Sea and Gulf of Aden, Antarctic Ocean (S. Atlantic and S. Indian Ocean) 32° S.—45° S. and 6° W.—91° E., Pacific Ocean at Vancouver Island.

14. **C. pennatum** (Grun.) Ostf. ms.; *Actiniscus pennatus* Grun. in Van Heurck, Synopsis, Pl. 82 bis, f. 11, 12; *Corethron hispidum* Castracane, Challenger Report, p. 86, Pl. 21, f. 3, 5; Lemmermann, l. c. p. 380, Pl. 3, f. 37, 43—46; Cleve, Pl. f. the Ind. Ocean and the Malay Archip., p. 20; Pl. f. the S. Atl. and the S. Indian Ocean, p. 930; ? *C. Murrayanum* Castr. l. c. p. 86, Pl. 21, f. 4.

I should think that the fragment figured in Van Heurck's Synopsis as *Actiniscus pennatus*, is the same form as known as *Corethron hispidum* Castr. (incl. *C. Murrayanum* which only differs from the typical *C. hispidum* in the smooth valves), and consequently the name *pennatus* has the priority.

6 (rr).

Area: Antarctic Ocean (S. Atlantic and S. Indian Ocean), Pacific Ocean at Vancouver Island.

Lauderia Cleve.

15. **L. annulata** Cleve, Diat. f. the Sea of Java 1873, p. 8, Pl. 1, f. 7; Peragallo, Monogr. du Genre Rhizosolenia (Le Diatomiste Vol. 1, 1892), p. 105, Pl. 1, fig. 11; Castr., Challenger p. 89, Pl. VIII, f. 7; Ostenfeld & Schmidt, Pl. from the Red Sea, etc. p. 158; Leuduger-Fortmorel, l. c. p. 47; Gran, Nyt Magaz. Naturv. Kristiania, 1900, p. 109, Pl. IX, f. 1—4; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 21; non Cleve, Phytoplankton Pl. II, fig. 13—15.

1 (rr) — 3 (+) — 4 (rr) — 6 (rr) — 10 (r).

Area: Red Sea, Gulf of Bengal, Malay Archipelago, Antarctic Ocean.

Detonula (Schütt) Gran.

16. **D. delicatula** (Perag.) Gran, Nyt Magaz. Naturv. 1900, p. 112; *Lauderia delicatula* Perag., Monogr. Rhiz. p. 105, Pl. 1, f. 13; Cleve, Phytoplankton, p. 24, Pl. 2, f. 21; Schröder, Neapel p. 23, Pl. 1, f. 9a, b; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 157.

A species of *Detonula* which I refer with some hesitation to *D. delicatula*, has been found in some of the samples.

1 (rr) — 6 (rr) — 10 (rr).

Area: Tropical Atlantic Ocean, Mediterranean, Red Sea (?).

17. **D. Moseleyana** (Castr.) Gran, Nyt Magaz. Naturv. 1900, p. 113; Ostenfeld & Schmidt, Plankt. from the Red Sea, etc. p. 157; *Lauderia? Moseleyana* Castr., Challenger Report, p. 90, Pl. 24, f. 9; Monogr. Rhiz., p. 105, Pl. 1, f. 10.

2 (rr) — 3 (rr).

Area: Red Sea, Arafura Sea.

Leptocylindrus Cleve.

18. **L. danicus** Cleve, Kanonbaaden „Hauch"s Togter, Kjøbenhavn, p. 54 (1879); Bih. t. Sv. Vet. Akad. Handl. XX, 3, No. 2, p. 15, Pl. 2, f. 4, 5; Schröder, Neapel, p. 25; Cleve, Pl. f. the Red Sea, p. 1033; Pl. f. the Indian Ocean and the Malay Archip. p. 21; Atl. Plankt. Organisms p. 332.

6 (rr) — 10 (rr).

Area: Eastern temperate Atlantic Ocean from Færöes and Norway southwards to Spain, Mediterranean, Red Sea, Malay Archipelago.

Dactyliosolen Castr.

19. **D. antarcticus** Castr., Challenger Report p. 75, Pl. 9, f. 7; Peragallo, Monogr. Rhiz. p. 104, Pl. 1, fig. 7; Cleve, Atl. Plankt. Organisms

p. 323; Pl. f. the S. Atlantic and the S. Indian Ocean p. 932; Pl. f. the Indian Ocean and the Malay Archip. p. 21.

2 (rr) — 6 (r).

Area: Eastern and Northern Atlantic Ocean, Antarctic Ocean, South Indian Ocean at 42°—45° S. and 3° W. to 48° E.

20. **D. mediterraneus** Perag., Monogr. Rhiz. p. 104, Pl. 1, f. 8, 9; Schröder, Neapel p. 24; Cleve, Pl. f. the S. Atl. and S. Ind. Ocean p. 932; Pl. f. the Red Sea, Öfv. af K. Sv. Vetensk. Akad. Förhandl. 1900, No. 9 [1901], p. 1033; Atl. Plankt. Organisms p. 324; Pl. f. the Indian Ocean and the Malay Archip. p. 21; Ostenfeld, Vid. Medd. Nath. For. Kjøbenhavn, 1898, p. 428; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 157.

2 (+) — 4 (rr) — 5 (rr) — 6 (+) — 7 (rr) — 10 (rr).

Area: Temperate North Atlantic Ocean, Tropical Atlantic at Puerto Cabello, Southern Atlantic and Indian Ocean at 42°—44° S. and 3° W.—48° E., Mediterranean, Red Sea, Gulf of Aden, Gulf of Bengal, Malay Archipelago.

Lauderiopsis Ostf.

21. **L. costata** Ostf. in Ostenfeld & Schmidt, Pl. f. the Red Sea, etc., p. 158, f. 10.

This genus forms a connecting link between *Lauderia*, *Dactyliosolen* and *Guinardia*.

2 (r) — 6 (+).

Area: Red Sea.

Guinardia Perag.

22. **G. flaccida** (Castr.) Perag., Monogr. Rhiz. p. 107, Pl. 1, f. 3—5; de Wildeman, l. c. p. 122; Schröder, Neapel, p. 24; Ostenfeld & Schmidt, Pl. f. the Red Sea etc., p. 158; Cleve, Atlant. Plankt. Organisms p. 328; Pl. f. the Indian Ocean and the Malay Archip. p. 21; *Rhizosolenia? flaccida* Castr. Challenger p. 74, Pl. 29, f. 4.

3 (r) — 6 (rr) — 10 (rr).

Area: Temperate Atlantic Ocean from Norway southwards to 16° N., Mediterranean, Red Sea, Arafura Sea, Malay Archipelago.

Rhizosolenia (Ehbg.) Btw.

23. **R. alata** Btw., Micr. Journ. 1858, p. 96, Pl. 5, f. 7; Cleve, Diat. f. the Sea of Java, 1873, p. 11; Leuduger-Fortmorel, l. c. p. 36; de Wildeman, l. c. p. 123; Grunow, Novara Exp. p. 28; Peragallo, Monogr. Rhiz. p. 115, Pl. 5, f. 11: Schröder, Neapel p. 26; Ostenfeld & Schmidt, Red Sea p. 159; Cleve, Phytoplankton p. 24; Atlant. Plankt. Organisms p. 337; Red Sea p. 1034; Pl. f. the Atlant. and Indian Ocean p. 934; Pl. f. the Ind. Ocean and the Malay Archip. p. 22.

2 (rr) — 10 (rr).

Area: Atlantic Ocean from N. of Iceland to 41° S., Mediterranean, Red Sea, Indian Ocean to 33° S., Malay Archipelago, Pacific Ocean southwards to S. of New Zealand.

R. alata Btw. var. **gracillima** (Cl.) Van Heurck, Synopsis, Pl. 79, f. 8, 10; Peragallo, Monogr. Rhiz. p. 115, Pl. 5, fig. 12; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 160; Cleve, Pl. f. the Red Sea p. 1034; Atl. Plankt. Organisms, p. 342; Pl. f. the Indian Sea and the Malay Archipelago p. 23; *R. gracillima* Cleve, New Diatoms, K. Sv. Vet. Akad. Handl. Bd. 18, 5, 1881, p. 26, Pl. VI, f. 78; Phytoplankton p. 24; Schröder, Neapel, p. 26.

2 (rr) — 4 (rr) — 10 (r).

Area: Most parts of the Atlantic Ocean, Mediterranean, Red Sea, Gulf of Aden, Malay Archipelago.

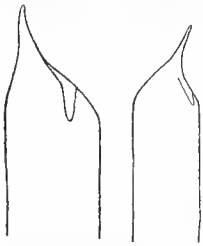


Fig. 3.
Rhizosolenia alata Btw. var. *indica* (Perag.) Ostf. Two cells with different directions of the calyptra. ($\frac{175}{1}$).

R. alata Btw. var. **indica** (Perag.) Ostf. in Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 160; *R. indica* Peragallo, Monogr. Rhiz. p. 116, Pl. 5, f. 16; *R. alata* v. *corpulenta* Cleve, Phytoplankton p. 24, Pl. 2, f. 11; Atl. Plankt. Organisms p. 340; *R. corpulenta* Cleve, Pl. of the Ind. Ocean and Malay Archip. p. 22; *R. quadrijuncta* Peragallo, Monogr. Rhiz. p. 116, Pl. 5, f. 17.

Certainly the *R. indica* and *R. quadrijuncta* of Peragallo belong to the same species and this is further identical with the var. *corpulenta* of Cleve. I have given two sketchs of the calyptræ, showing different directions of the upper part.

1 (rr) — 2 (rr) — 3 (rr) — 10 (+).

Area: Tropical and Subtropical Atlantic, Red Sea, Gulf of Aden, Indian Ocean, Malay Archipelago, Yeddo Bay.

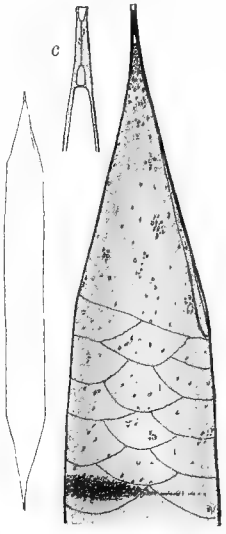


Fig. 4.
Rhizosolenia amputata Ostf. *a* a whole cell ($\frac{60}{1}$), *b* part of a cell ($\frac{200}{1}$), *c* the apex showing the form of the spine ($\frac{450}{1}$).

24. **R. amputata** Ostf., n. sp. (sect. *Squamosae* Perag.).

Frustules large, 80—100 μ broad; valves (calyptræ) long-conic; squamæ 5 in circumference; spine transversely cut off, with an excavation at the apex and a cavity in the lower part. Chromatophores numerous, small.

Allied to *R. arafurensis* Castr. (Challenger Report, p. 74, Pl. 30, f. 12; Peragallo, Monogr.

Rhiz. p. 111, Pl. 3, f. 6), from which it differs mainly in the form of the spine.

10 (r).

25. **R. calcar avis** Schultze in Müll. Arch. 1858, p. 339, Pl. 13, f. 5—10; Peragallo, Monogr. Rhiz. p. 113, Pl. 4, f. 9, 10; Cleve, Diat. f. the Sea of Java, p. 11; Atl. Plankt. Organismus, p. 339; Pl. f. the Ind. Ocean and the Malay Archip. p. 22; Schröder, Neapel, p. 26.

The type has been found in a few specimens, which are quite like the specimens from the North Sea, but commonly it is remplaced by the variety, var. *cochlea*, mentioned below.

1 (rr) — 10 (rr).

Area: Along the Atlantic coasts of Europe, Africa and America; Mediterranean, Malay Archipelago.

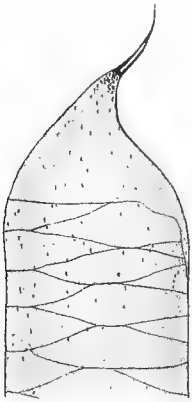


Fig. 5. *Rhizosolenia calcar avis* Schultze var. *cochlea* (Brun) Ostf. ($\frac{200}{1}$).

R. calcar avis Schultze, var. **cochlea** (Brun) Ostf. ms.; *R. cochlea* Brun, Diat. foss. et pelag. 1891, p. 43, Pl. 19, f. 9; Peragallo, Monogr. Rhiz. p. 113, Pl. 4, f. 11; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 22 and p. 56, Pl. 8, f. 12; Leuduger-Fortmorel, l. c. p. 36; de Wildeman, l. c. p. 123.

Cleve has figured a fragment of a frustule showing numerous, small chromatophores grouped in oblique or spirally twisted bands, but the rather numerous specimens which I have seen, had the small chromatophores in more or less distinct longitudinal bands. I consider it a variety of *R. calcar avis*, corresponding to the var. *indica* of *R. alata*.

2 (rr) — 3 (rr) — 6 (rr) — 10 (⊥).

Area: Indian Ocean, Malay Archipelago.

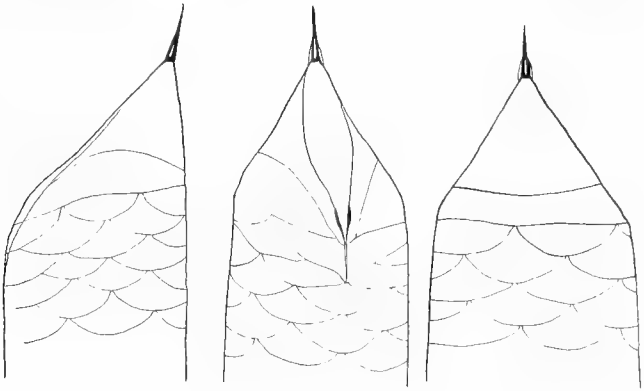


Fig. 6. *Rhizosolenia Clevei* Ostf. ($\frac{150}{1}$).

26. **R. Clevei** Ostf., n. sp. (sect. *Squamosae* Perag.).

Frustules large, 175—200 μ broad; squamæ 5 in circumference; spine as in *R. styliformis*; lines of the connection-surface with two thickened parts for the basal part of the spine; chromatophores numerous, small.

This interesting species is allied to *R. Debyana* Perag. It is the only species besides *R. styliformis* Btw., which includes the peculiar *Richelia intracellularis* Schmidt (in Ostenfeld & Schmidt, Pl. f. the Red Sea, p. 146, f. 2).

2 (rr) — 5 (rr) — 7 (+) — 10 (rr).

27. **R. cylindrus** Cleve, Phytoplankton p. 24, Pl. 2, f. 12; Atl. Plankt. Organisms p. 341; Schröder, Neapel p. 26; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 160.

I have figured two frustules of a form which I regard as *R. cylindrus* Cl., although the annulations are not quite like those figured by Cleve. The chromatophores are small.

10 (r).

Area: Tropical Atlantic Ocean, especially in its Western parts, Gulf of Naples, Gulf of Aden.

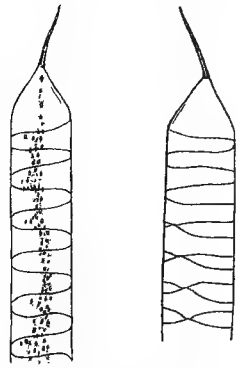


Fig. 7. *Rhizosolenia cylindrus* Cl. ($\frac{450}{1}$).

28. **R. formosa** Perag., Diat. de Villefranche p. 91, Pl. 6, f. 43, Monogr. Rhiz. p. 110, Pl. 2, f. 2; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 23; Schröder, Neapel p. 25.

3 (rr).

Area: Mediterranean, Malay Archipelago.

29. **R. hyalina** Ostf. in Ostenfeld & Schmidt, Pl. f. the Red Sea, p. 160, f. 11; *R. pellucida* Cleve, Pl. f. the Indian Ocean and the Malay Archipelago p. 23 and p. 56, Pl. 8, f. 4.

2 (r) — 3 (rr) — 10 (+).

Area: Red Sea, Gulf of Aden, Malay Archipelago.

30. **R. imbricata** Btw., Microsc. Journ. 1858, Vol. VI, p. 95, Pl. 5, f. 6; Cleve, Diat. f. the Sea of Java p. 11; Van Heurck, Synopsis Pl. 79, f. 5, 6; Peragallo, Monogr. Rhiz. p. 113, Pl. 5, f. 2, 3; Schröder, Neapel p. 26; Ostenfeld & Schmidt, Pl. f. the Red Sea etc. p. 161; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 23; *R. striata* Grev., Diat. South Pacif. III, p. 334, Pl. 3, f. 4; Peragallo, l. c. p. 114, Pl. 5, f. 1; Leuduger-Fortmorel l. c. p. 36.

1 (rr) — 2 (r) — 3 (+) — 4 (rr) — 6 (r) — 7 (rr) — 10 (+).

Area: Tropical Atlantic, Mediterranean, Red Sea, Gulf of Aden, Malay Archipelago, South-Indian and Pacific Oceans.

31. **R. robusta** Norman, Pritch. Infus. 1861, p. 866, Pl. 8, f. 42; Leuduger-Fortmorel, l. c. p. 36; Cleve, Diat. f. the Sea of Java, 1873, p. 11; Castracane, Challenger Rep., Pl. 24, f. 5; Peragallo, Monogr. Rhiz., p. 109, Pl. II, f. 1, 1 a, Pl. III, f. 1, 2; Cleve, Phytoplankton, p. 25; Atl. Plankt. Organisms, p. 345; Pl. f. the Red Sea p. 1034; Pl. f. the Indian Ocean and Malay Archip. p. 23; Schröder, Neapel p. 25; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 161.

1 (rr) — 2 (rr) — 3 (rr) — 6 (rr) — 8 (rr) — 10 (rr).

Area: Tropical Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, Pacific Ocean.

32. **R. setigera** Btw., Microsc. Journ. 1858, p. 95, Pl. 5, f. 7; Van Heurck, Synops. Pl. 78, f. 6—8; Peragallo, Monogr. Rhiz. Pl. 4, f. 15, 16, non f. 12—14; Hensen, Fünfter Ber. Komm. Deutsch. Meere in Kiel, 1887, Pl. V, f. 38 a, b, c; Cleve, Fish. Board for Scotland 1896, p. 301, f. 12; Grunow, Novara Exp. p. 28; Cleve, Diat. f. the Sea of Java p. 11; Atl. Plankt. Organisms p. 347; Pl. f. the Ind. Ocean and the Malay Archip. p. 23; Ostenfeld & Schmidt, Red Sea, p. 171; Lemmermann, l. c. p. 317; Leuduger-Fortmorel, l. c. p. 36; de Wildeman l. c. p. 123; *R. japonica* Castr., Challenger p. 72, Pl. 23, f. 7.

The specimens are rather thin and delicate, about 8—10 μ broad.

1 (r) — 2 (rr) — 6 (rr) — 7 (rr) — 10 (+).

Area: Atlantic Coasts of Europe and North of S. America, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, Japan Sea, Pacific Ocean. — Neritic species.

33. **R. Shrubsolii** Cleve, New Diatoms, 1881, p. 26; Van Heurck, Synopsis, Pl. 79, f. 11—13; Peragallo, Monogr. Rhiz. p. 114, Pl. 5, f. 8, 9; Cleve, Phytoplankton p. 25; Atl. Plankt. Organisms p. 347; Pl. f. the Red Sea, p. 1034; Pl. f. the Ind. Ocean and Malay Archip. p. 23; Schröder, Neapel p. 26; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 161; ?*R. atlantica* Peragallo, Monogr. Rhiz. p. 114, Pl. 5, f. 4—5.

2 (rr) — 6 (rr) — 10 (rr).

Area: Atlantic Ocean in the Eastern part from the Færöes southwards, Mediterranean, Red Sea, Gulf of Aden, Indian Ocean, Malay Archipelago, Yeddo Bay.

34. **R. Stolterfothii** Perag., Diat. de Villefranche, p. 90, Pl. 6, f. 44; Monogr. Rhiz. p. 108, Pl. 1, f. 17, 18; Cleve, Phytoplankton p. 25; Atl. Plankt. Organisms p. 348; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc.

p. 161; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 23; Schröder, Neapel p. 25; Lemmermann, l. c. p. 315.

2 (r) — 3 (rr) — 6 (r) — 7 (rr) — 10 (+).

Area: Northern Atlantic Ocean, especially in the North Sea and the English Channel, Mediterranean, Red Sea, Gulf of Aden, Malay Archipelago, China Sea, Yeddo Bay, Cook Strasse (S. of New Zealand). — Neritic species.

35. **R. styliformis** Btw., Micr. Journ. 1858, p. 96, Pl. 5, f. 5a, b, c, d; Van Heurck, Synopsis Pl. 78, f. 1—5, Pl. 79, f. 1, 2, 4; Peragallo, Monogr. Rhiz. p. 111, Pl. 4, f. 1—5; Grunow, Novara Exp. 1870, p. 28; Cleve, Diat. f. the Sea of Java p. 11; Atl. Plankt. Organisms p. 349; Pl. f. the S. Atl. Ocean and the S. Ind. Ocean p. 935; Pl. f. the Red Sea p. 1034; Pl. f. the Ind. Ocean and the Malay Archip.; Leuduger-Fortmorel, l. c. p. 36; Lemmermann, l. c. p. 315 and p. 317; Schröder, Neapel p. 26.

The type (about 25 μ broad) is rather common in some samples, but usually it is replaced by var. *latissima*, corresponding to the var. *indica* of *R. alata*, and var. *cochlea* of *R. calcar avis*.

10 (+).

Area: Most parts of the Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, Pacific Ocean, Antarctic Ocean.

R. styliformis Btw., var. **latissima** Btw., Microsc. Journ. Pl. 5, f. 5 c; *R. styliformis* var. *polydactyla* (Castr.) Perag., Monogr. Rhiz. p. 111, Pl. 4, f. 7; *R. polydactyla* Castr., Challenger Report p. 71, Pl. 24, f. 2; *Rh. styliformis* var. *lata* Lemmermann, l. c. p. 315 and 351.

Differs only from the main species in the size (about 60—70 μ broad).

1 (rr) — 4 (rr) — 10 (+).

Area: Antarctic Ocean, Malay Archipelago, French Pass at New Zealand.

36. **R. Temperei** Perag., Diat. Villefranche p. 91, Pl. 5, f. 40, Monogr. Rhiz. p. 110, P. 2, f. 3; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 22.

var. **acuminata** Perag., Monogr. Rhiz. p. 1, Pl. 3, f. 4; Schröder, Neapel p. 25, Pl. 1, f. 6 (f. *inaequalis*); Cleve, Atl. Plankt. Organisms p. 336; Limmerm. l. c. p. 317; *R. robusta* v. *recta* (nom. nud.) Ostenfeld, Vid. Medd. Nath. For. Kjöbenhavn, 1898, p. 427.

Only the var. *acuminata* Perag. has been found and I should think it to be a distinct

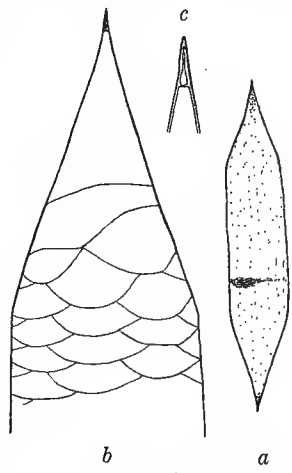


Fig. 8. *Rhizosolenia Temperei* Perag. var. *acuminata* Parag. *a* a whole cell ($\frac{60}{1}$). *b* part of a cell ($\frac{200}{1}$). *c* the apex, showing the form of the spine ($\frac{150}{1}$).

species, but I have never seen the true *R. Temperei*. I have figured a frustule and a part of it, showing the form of the spine.

3 (rr) — 10 (r).

Area: Of the main species: Mediterranean, Malay Archipelago; of the var. *acuminata*: Tropical Atlantic Ocean, Mediterranean, Pacific Ocean at Sandwichs Islands.

Chaetocereae.

Bacteriastrum Shadb.

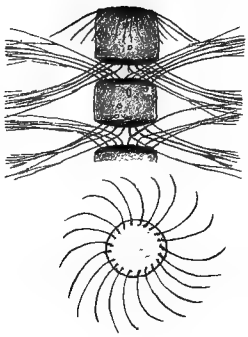


Fig. 9. *Bacteriastrum hyalinum* Laud. Part of a chain with terminal cell; beneath a terminal cell in side view, showing the terminal awns ($\frac{450}{1}$).

37. **B. hyalinum** Lauder, Trans. Micr. Soc. 1864, p. 8, Pl. 3, f. 7 a, b; Cleve, Atl. Plankt. Organisms p. 286; Pl. f. the Ind. Ocean and the Malay Archip. p. 18 and p. 54; *B. spirillum* ex parte and *B. varians* var. *princeps* Castr., Challenger pp. 83, 84, Pl. 14, f. 2, Pl. 29, f. 1, 3.

This interesting species which Lauder has described and figured in 1863, has been forgotten for long time; Cleve has now pointed out that it is a distinct species and I am of the same opinion. I think it must be the same species which Castracane in his report on Challenger-Diatoms has figured and named *B. varians* var. *princeps* and also his figure Pl. 29, f. 1 of *B. spirillum* belongs hereto. The fig. 9 illustrate this species.

1 (rr) — 3 (r) — 6 (+) — 10 (+).

Area: Malay Archipelago, South China Sea.

38. **B. varians** Lauder, Trans. Micr. Soc. 1864, p. 8, Pl. 3, f. 1—6; Cleve, Diat. f. the Sea of Java 1873, p. 8; Grunow, Novara Exp., 1870, p. 28; Leuduger-Fortmorel, l. c. p. 36; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 18; Schröder, Neapel p. 26; Van Heurck, Synopsis, Pl. 80, f. 3—5; *B. varians* et var., *B. brevispinum* et var., *B. spirillum* ex parte, *B. Wallichii*, var. *hispida* Castr., Challenger p. 82—84, Pl. 15, f. 6, 8, Pl. 19, f. 2, Pl. 23, f. 1, 3; *Actiniscus varians* Van Heurck, Synops. Pl. 82 bis, f. 10; *B. symmetricum* Leuduger-Fortmorel, l. c. p. 36, Pl. 7, f. 1.

I regard all the species described by Castracane and Leuduger-Fortmorel as belonging to the very variable *B. varians*.

1 (+) — 2 (r) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (+) — 7 (rr) — 10 (c).

Area: Mediterranean, Red Sea, Gulf of Aden, Indian Sea, Malay Archipelago, South China Sea. A nearly allied form (var. *borealis* Ostenfeld, Nyt Magazin, Kristiania, 1901, p. 293, f. 5) is common along the Coasts of Western Europe.

Chaetoceras Ehbg.

39. **C. anglicum** (Grun.) Ostf. ms.; *C.* (*furcellatus* Bail. var.) *anglicus* Grun. in Van Heurck, Syn., Pl. 82, f. 3; *C. didymus* v. *longicruris* Cleve, Phytoplankton p. 21, Pl. I, f. 11, non f. 17; Schröder, Neapel p. 27; Cleve, Atl. Plankt. Organisms p. 301; Pl. f. the Red Sea, p. 1033; Pl. f. the Indian Ocean and the Malay Archip. p. 19; *C. longicrure* Ostenfeld & Schmidt, Pl. f. the Red Sea p. 154.

There is no doubt that the figure in Van Heurck, Synopsis Pl. 82, f. 3 represents the species which has been named *longicruris* by Cleve, and consequently the older name *anglicus* must have the priority.

2 (rr) — 6 (rr) — 7 (rr) — 10 (r).

Area: Subtropical Atlantic Ocean, Mediterranean, Red Sea and Gulf of Aden, Gulf of Bengal, Malay Archipelago.

40. **C. Aurivillii** Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 18 and p. 54, P. 8, f. 10.

10 (rr).

Area: Tropical Atlantic Ocean (7° N. 53° W.), Malay Archipelago.

41. **C. breve** Schütt, Ber. d. Deutsch-Botan. Gesellsch., 1895, p. 38, f. 4 a, b; Gran, Nyt Magazin Naturv., Kristiania 1900, p. 121; Ostenfeld, ibidem 1901, p. 295, f. 6; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 18; *C. didymus* var. *hiemalis* Cleve, Phytoplankton p. 21, Pl. I, f. 18; *C. hiemalis* Cleve, K. Sv. Vet. Akad. Handl. 32, No. 8, 1900, p. 25, f. 9; Atl. Plankt. Organisms p. 304.

Professor Cleve to whom I sent my figure (fig. 10) thinks that the form belongs to the *C. breve* Schütt, and I can agree with him. It resembles striking small forms of *C. Lorenzianum* but is easily recognisable by the single chromatophore and the smooth awns.

2 (rr) — 6 (rr) — 7 (rr) — 10 (rr).

Area: Along the coasts of Europe from Westmannaö at Island southwards to the English Channel; Malay Archipelago.

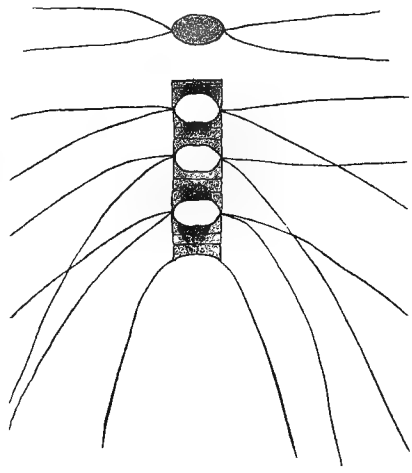


Fig. 10. *Chaetoceras breve* Schütt ($\frac{200}{1}$).

42. **C. calvum** Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 18 and p. 54, Pl. 8, f. 11.

With some hesitation I refer a form which I have seen in some of the samples to the new described *C. calvum* Cl. or to *C. tortissimum* Gran (Nyt Magaz. Naturv. Kristiania 1900, p. 122, Pl. 9, f. 25), those two species only differing in the number of chromatophores.

3 (rr) — 6 (rr) — 10 (rr).

Area: [of *C. calvum*] Malay Archipelago, [of *C. tortissimum*] coasts of the Northern part of Norway.

43. **C. clavigera** Ostf., n. sp.

Cells solitary or two together, 8—10 μ broad, mostly broader than long, awns of the one valve shorter and more clavate than those of the other valve; the thickened distal part of the awns with twisted striations and short spines. Valves elliptic. Chromatophore single, in front.

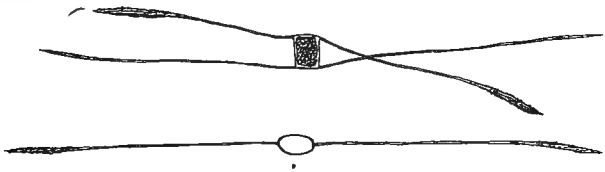


Fig. 11. *Chaetoceras clavigera* Ostf. ($\frac{450}{1}$).

This very characteristic species seems most allied to *C. simplex* Ostf. from the Caspian Sea.

6 (+).

44. **C. coarctatum** Lauder, Trans. Micr. Soc. 1864, p. 79, P. 8, f. 8; Cleve, Diat. f. the Sea of Java 1873, p. 9. Pl. II, f. 10 a, b, c; Leuduger-Fortmorel, l. c. p. 37; Cleve, Pl. f. the Red Sea p. 1032; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 153; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 18 and p. 54; *C. boreale*, v. *rudis* Cleve, Phytoplankton p. 20, Pl. I, f. 5; *C. rudis* Cleve, Atl. Plankt. Organisms p. 308.

Chromatophores numerous, small. As Cleve (Pl. f. Ind. Ocean p. 54) has stated, the chains are often set with vorticells.

2 (rr) — 3 (rr) — 4 (rr) — 6 (rr) — 7 (rr) — 8 (rr) — 10 (r).

Area: Tropical Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, Hongkong.

45. **C. compressum** Lauder, Trans. Micr. Soc. 1864, p. 78, Pl. 8, f. 6; Cleve, Diat. f. the Sea of Java 1873, p. 8; Leuduger-Fortmorel, l. c. p. 37; de Wildeman, l. c. p. 133; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 153; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 18 and p. 55; *C. Kelleri* Brun, Espèc. nouvell., Le Diatomiste II, Pl. XVII, f. 91, 92.

I regard the *C. Kelleri* Brun which was found in oysters from Japan as identical with the *C. compressum* Lauder, and I have given a figure of the coarse, tvisted awns of *C. compressum* in order to show this identity.

1 (rr) — 2 (r) — 3 (rr) — 6 (rr) — 10 (c).

Area: Red Sea, Malay Archipelago, Hongkong. — Neritic species.

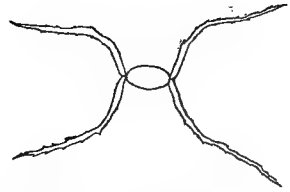


Fig. 12. *Chaetoceras compressum* Laud. Cell with twisted coarse awns, in side view ($\frac{250}{1}$).

46. **C. didymum** Ehbg. (1845); Cleve, Bih. t. Sv. Vet. Akad. Handl. Bd. 20, III, No. 2, 1894, p. 13, Pl. 1, f. 3, 4; Gran, Norske Nordhavs Expedition, Protophyta p. 16, Pl. 1, f. 8—10 and Pl. III, f. 37, 38; Cleve, Atl. Plankt. Organisms p. 301; Schröder, Neapel p. 27; *C. protuberans* Castr., Challenger p. 76, Pl. 8, f. 2, non Lauder.

10 (r).

Area: Along the Atlantic Coasts of Europe, Mediterranean, Japan Sea, Puget's Sound.

47. **C. distans** Cleve, Diat. f. the Sea of Java 1873, p. 9, Pl. II, f. 11 a, b; Leuduger-Fortmorel l. c. p. 37; de Wildeman, l. c. p. 133; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 154; Cleve, Pl. f. the Indian Ocean and the Malay Archip. 1902, p. 18 and p. 55; non Van Heurck, l. c. Pl. 82, f. 4; nec Cleve, Planktonundersökningar, Bih. t. K. Sv. Vet. Akad. Handl. B. 20, III, No. 2, 1894, p. 14, Pl. II, f. 2.

The chromatophore is solitary, the hoop rather narrow (se fig. 13).

1 (+) — 2 (rr) — 4 (rr) — 5 (rr) — 6 (rr) — 7 (rr) — 10 (+).

Area: Malay Archipelago, Red Sea.

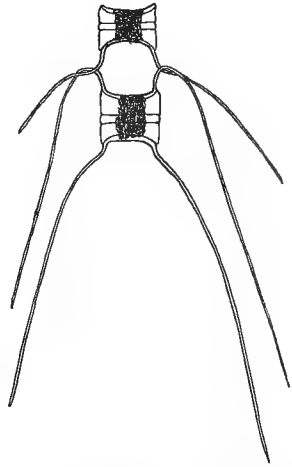


Fig. 13. *Chaetoceras distans* Cl. Chain with chromatophores.

48. **C. diversum** Cleve, Diat. f. the Sea of Java 1873, p. 9, Pl. II, f. 12; Leuduger-Fortmorel, l. c. p. 37; Van Heurck, l. c. Pl. 81, f. 4; de Wildeman, l. c. p. 133; Cleve, Atl. Plankt. Organisms, p. 302; Plankt. f. the Ind. Ocean and the Malay Archipelago p. 18; Plankt. f. the Red Sea p. 154; *C. diversum* v. *tenuis* Cleve, Phytoplankton p. 21, Pl. II, f. 2; *C. diversum* v. *mediterranea* Schröder, Phytopl. d. Golfes v. Neapel, Mitteil.

d. Zool. Stat. zu Neapel Bd. 14, 1900, p. 27, Pl. I, f. 1; ?*C. rude* Leuduger-Fortmorel, l. c. p. 37, Pl. VI, f. 1.

The chromatophore is solitary and in front.

Rather common: 1 (c) — 2 (c) — 3 (r) — 4 (rr) — 5 (rr) — 6 (+) — 7 (r) 10 (+).

Area: Tropical neritic form, noted from Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago.

49. **C. javanicum** Cleve, Diat. f. the Sea of Java 1873, p. 10, Pl. 2, f. 13; Pl. f. the Indian Ocean and the Malay Archip. p. 19 and p. 55; Leuduger-Fortmorel l. c. p. 37.

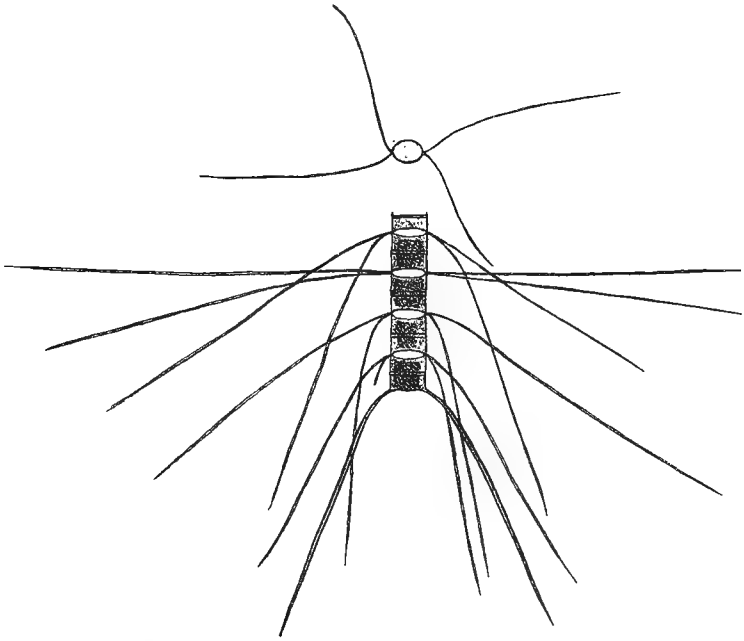


Fig. 14. *Chaetoceras javanicum* Cl. Chain in front view, cell in side view ($\frac{200}{1}$).

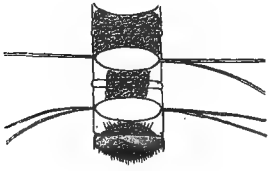


Fig. 15. *Chaetoceras javanicum* Cl. Chain with endospore in front view ($\frac{425}{1}$).

This species is, as Cleve has lately stated, nearly akin to *C. Schüttii* Cl., if not identical; I have found some spores belonging to this species and they are about as the spores of *C. Schüttii*, both valves being spiniferous. It has one chromatophore in front; the terminal awns are diverging at an acute angle and thickened; the other awns are thin and turn off towards the ends of the chains; seen from the valves they have a characteristic curvature as shown in the figure.

1 (r) — 6 (rr) — 10 (+).

Area: Malay Archipelago.

50. **C. laeve** Leud.-Fortm., l. c. p. 38, Pl. 6, f. 2.

Leuduger-Fortmorel has (in his treatise on the diatoms of the Malay Archipelago) described and figured two species of *Chaetoceras*, viz. *C. rude* and *C. laeve*. The first of those is only a form of *C. diversum* Cleve, but the latter is a distinct species of which I here give a figure; it is related to *C. diversum*, but the thickened intercalary awns are smooth and of a characteristic curvature, first being nearly parallel and then abruptly turning off at a right angle. Chromatophore a single plate in front. Breadth of the cells 9—16 μ.

1 (+) — 6 (rr) — 10 (+).

Area: Sea of Java.

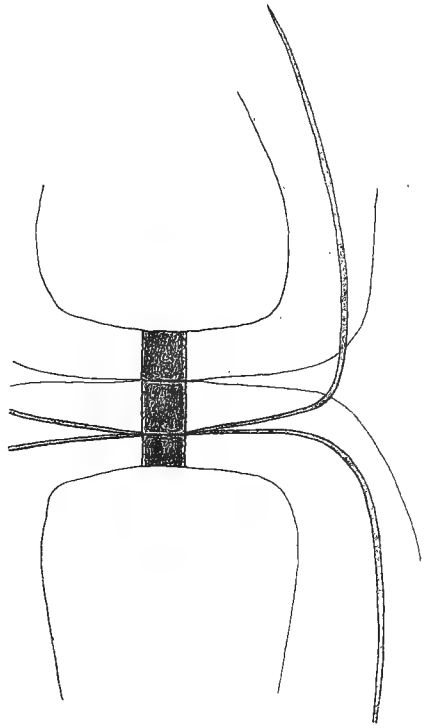


Fig. 16. *Chaetoceras laeve* Leud.-Fortm. ($\frac{450}{1}$).

51. **C. Lorenzianum** Grun., Verhandl. d. k. k. zool.-botan. Gesellsch., Wien 1863, p. 157, Pl. 14, f. 13; Cleve, Diat. f. the Sea of Java, 1873, p. 9; Leuduger-Fortmorel, l. c. p. 37; de Wildeman, l. c. p. 134; Van Heurck, Synopsis Pl. 82, f. 2; Cleve, Phytoplankton, p. 21, Pl. I, f. 13—15; Schröder, l. c. p. 29; Cleve, Pl. f. the Red Sea p. 1033; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 154; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 19; Atl. Plankt. Organisms p. 306; *C. cellulosum* Lauder, Trans. Micr. Soc. 1864, p. 78, Pl. 8, f. 12; *C. distans, forma setis evidentius punctatis* Van Heurck, Syn. P. 82, f. 4.

Rather common: 1 (+) — 2 (rr) — 3 (rr) — 6 (rr) — 10 (c).

Area: Atlantic from North Sea southwards, Mediterranean, Red Sea, Gulf of Aden, Indian Ocean, Malay Archipelago, Hongkong.

52. **C. paradoxum** Cleve, Diat. f. the Sea of Java 1873, p. 10, Pl. 3, f. 16; Pl. f. the Ind. Ocean and the Malay Archip. p. 19 and p. 55; Leuduger-Fortmorel l. c. p. 37.

2 (rr) — 10 (rr).

Area: Malay Archipelago.

53. **C. peruvianum** Btw., Microsc. Journ. 1856, p. 107, Pl. 7, f. 16—18; Cleve, Fish. Board for Scotland, 1896, p. 299, f. 7; Leuduger-Fortmorel, l. c. p. 37; Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 19; Pl. f. the S. Atlantic and the S. Indian Ocean, p. 929; Pl. f. the Red Sea p. 1033; Lemmermann l. c. p. 317.

This species is very variable; several new species have been described upon forms of it, but it seems incorrect to me to give them specific range. I should think they are to be arranged in three groups after their coarseness and size, viz.:

f. 1, *volans* (Schütt). Rather slender, awns rather thin: *C. volans* Schütt, Ber. d. Deutsch. Botan. Gesellsch. 1895, f. 20, *C. currens* Cleve, Fish. Board for Scotland, p. 299, f. 8. Arctic and northern Atlantic form.

f. 2, *typica*. Intermediate between 1 and 3; *C. peruvianum* Btw. l. c.; Cleve, l. c. p. 299, f. 7; Schröder, Neapel p. 29, Pl. 1, f. 4 (f. *gracilis*). Tropical parts of the Oceans.

f. 3, *robusta* Cleve. Coarse and with coarse awns. *C. peruvianum* v. *robustum* Cleve, Diat. f. the Sea of Java, 1873, Pl. 2, f. 8; *C. boreale?* Lauder, Transact. Microsc. Soc. Vol. 12, 1863, Pl. 7, f. 7; *C. robustum* Ostf. in Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 145; *C. curvatum* Castr., Challenger Report p. 78. Tropical and Antarctic parts of the Oceans.

f. 2: 1 (rr) — 2 (rr) — 3 (rr) — 6 (r).

f. 3: 1 (rr) — 10 (+).

Area: Arctic and Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, China Sea, Pacific Ocean, Antarctic Ocean.

54. **C. pseudocrinitum** Ostf., Nyt Magaz. Naturv., Kristiania, 1901, p. 300, f. 11; *C. crinitum* Gran, Norske Nordhavs Expedition, Protophyta 1897, p. 22, Pl. 4, f. 51, non Schütt, 1895.

This little species which I have described from Danish waters and which Gran has found on the Norwegian coasts, was also met with in the Gulf of Siam, but sparingly.

10 (rr).

Area: Limfjord, Kattegat, Coast of Norway.

55. **C. Ralfsii** Cleve, Diat. f. the Sea of Java 1873, p. 10, Pl. III, f. 15; Leuduger-Fortmorel, l. c, p. 37; de Wildeman, l. c. p. 134; Cleve, Pl. f. the Indian Ocean and the Malay Archipelago, p. 19 and p. 55; non Van Heurck, Syn., Pl. 82 bis, f. 3.

The chromatophore is solitary and in front.

2 (rr) — 6 (rr).

Area: Malay Archipelago.

56. **C. rostratum** Laud., Trans. Microsc. Soc. 1864, p. 79, Pl. 8, f. 10; Cleve, Pl. f. the Ind. Ocean and the Malay Archip. p. 19; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc., p. 155.

This species belongs to the subgenus *Phaeoceras* Gran, which has numerous small chromatophores, also in the awns.

10 (r).

Area: Red Sea, Malay Archipelago, South China Sea.

57. **C. Schmidtii** Ostf. in Ostenfeld & Schmidt, Plankt. f. the Red Sea, etc. p. 155, f. 8; ?*C. Weissflogii* Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 15 and p. 55, non Schütt.

This species which I have described from the Red Sea, occurs also in the Gulf of Siam; and I suppose that it is the same which Cleve l. c. has identified with *C. Weissflogii* with hesitation.

10 (r).

Area: Red Sea, Malay Archipelago (?).

58. **C. secundum** Cleve, Diat. f. the Sea of Java 1873, p. 10, Pl. II, f. 14 a, b; Leuduger-Fortmorel, l. c. p. 37; de Wildeman, l. c. p. 134; Van Heurck, Synops., Pl. 82, f. 5; *C. curvisetum* Cleve, Pl. f. the Ind. Ocean and the Malay Archipelago 1902, p. 18 and p. 55, non Cleve, in Kanonbaaden Hauchs Togter, Kjöbenhavn, 1889, p. 55 with fig.

Professor Cleve supposes (in his last paper (l. c. 1902, p. 55)) that the Indian *C. secundum* is the same as *C. curvisetum* from the Temperate Atlantic, but I can not enter upon this opinion, as the spores of *C. secundum* figured by Cleve himself (1873, Pl. II, f. 14 a) are rather different from the spores of *C. curvisetum* (see Gran, Protophyta, Pl. II, f. 22).

2 (rr) — 3 (r) — 4 (rr) — 5 (rr) — 6 (rr) — 10 (r).

Area: Malay Archipelago.

59. **C. siamense** Ostf. n. sp.

Chains straight, about 50 μ broad; valves circular; foramina lanceolate; hoop at least a third part of the cell; chromatophores two, close to the valves; awns all alike, rather robust, undulated; the one about in the sagittal plane, the other diverging at a nearly right angle.

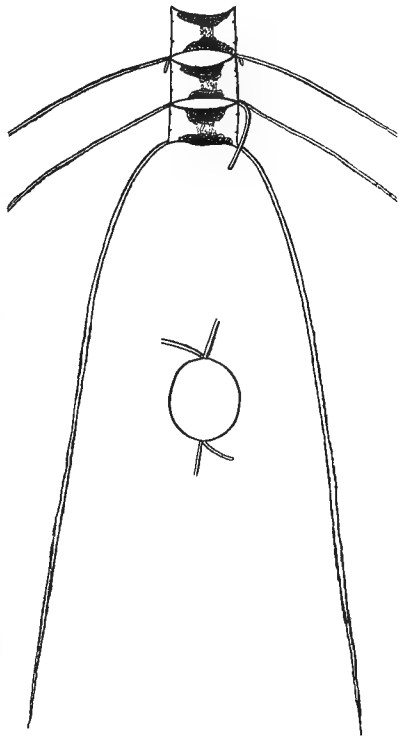


Fig. 17. *Chaetoceras siamense* Ostf., Chain in front view, cell in side view ($\frac{200}{1}$).

I have seen but few chains of this large species, which has some relations to *C. constrictum* Gran (the two chromatophores) and others to *C. teres* Cl. and *C. Weissflogii* Schütt (the form of the valves and the awns).

10 (rr).

Obs. The undulations of the awns are not well drawn in the figure.

60. **C. tetrastichon** Cleve, Phytoplankton p. 22, Pl. I, f. 7; Schröder, l. c. p. 30; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 256; Cleve, Pl. f. the Indian Ocean and the Malay Archipelago p. 19.

2 (rr).

Area: Tropical Atlantic Ocean, Naples, Red Sea, Malay Archipelago.

61. **C. Vanheurckii** Gran, Norske Nordhavs Expedition, Protophyta, p. 18; *C. Ralfsii* Van Heurck Synopsis, Pl. 82 bis, f. 3, non Cleve.

I have found a form which I identify with the *C. Vanheurckii*, described by Gran in his excellent paper on the Norwegian species of *Chaetoceras*. My figures of a part of a chain and of the spores agree

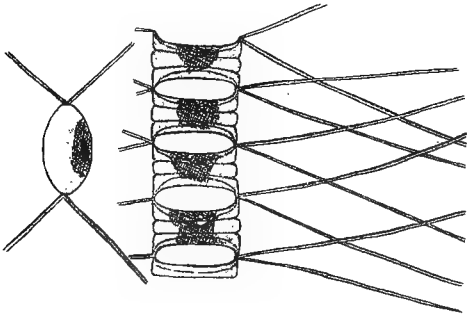


Fig. 18. *Chaetoceras Vanheurckii* Gran. Chain in front view, cell in side view ($\frac{425}{1}$).

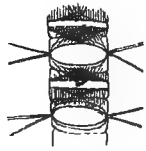


Fig. 19. *Chaetoceras Vanheurckii* Gran. Chain with endospores in front view ($\frac{225}{1}$).

rather well with the description by Gran; the chains are straight, foramina lanceolate to narrow-elliptic, hoop about a third part of the cell with constricted sutures; chromatophore one; awns straight, seen from the valve diverging at a right angle; spores about in the middle of the cells, primary valve arcuate with numerous spines, secundary valve humped with longer spines on the humpe; further both valves possess along the margins a wreath of parallel, straight apiculi.

10 (r).

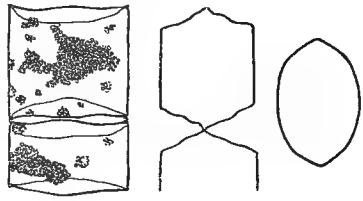
Area: Yeddo Bay.

Biddulphieae.

Schmidtiella Ostf. n. gen.

Frustules in chains. Valves broadly elliptic with undulate surface, most elevated at the sagittal plane, cohering one to another by two minute processes at the sagittal plane. Frustules in a front-view rectangular. No structure seen. Endochrome coccochromatic.

Allied to *Graya* Brun & Grove [see Van Heurck, A Treatise on the Diatomaceae p. 458, f. 187] and perhaps forming a connection between the *Chaetocereae* and the *Biddulphieae*.



a *b* *c*

Fig. 20. *Schmidtiella pelagica* Ostf. *a* chain of two cells in front view, *b* in sagittal view, *c* cell in side view ($\frac{200}{1}$).

62. **S. pelagica** Ostf. n. sp.

Characters of the genus, frustules in front view 80 μ broad, in sagittal view 40 μ broad.

I have only found one chain of this interesting diatom which I name in honour of the Danish botanist Johs. Schmidt who made those rich collections in Siam which he is publishing in the „Flora of Koh Chang".

Eucampia Ehbg.

63. **E. biconcava** (Cl.) Ostf. ms.; *Climacodium biconcavum* Cleve, Phytoplankton p. 22, Pl. 2, f. 16, 17; Atl. Plankt. Organisms p. 314; Pl. f. the Red Sea, p. 1033; Pl. f. the Indian Ocean and the Malay Archip. p. 19; *Eucampia hemiauloides* Ostf. in Ostenfeld & Schmidt, Pl. f. the Red Sea p. 157, f. 9.

According to a letter from Mr. Cleve his *Climacodium biconcavum* is identical with my *Eucampia hemiauloides*, and consequently his species-name has the priority, but as shown in my paper it must be an *Eucampia*, with the same structure as the other species of this genus.

2 (r) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (rr) — 7 (r) — 10 (rr).

Area: Tropical Atlantic Ocean, Mediterranean, Red Sea, Gulf of Aden, Malay Archipelago.

64. **E. cornuta** (Cl.) Grun. in Van Heurck, Synopsis Pl. 95 bis, f. 5; Cleve, Pl. f. the Red Sea p. 1033, Pl. f. the Indian Ocean and the Malay Archip. p. 21; (?) Atl. Plankt. Organisms p. 326; *Mölleria cornuta* Cleve, Diat f. the Sea of Java 1873, p. 7, Pl. 1, f. 6; Leuduger-Fortmorel, l. c. p. 47.

6 (rr) — 10 (r).

Area: Red Sea, Malay Archipelago; a very small form occurs in the subtropical N. Atlantic Ocean (Cleve).

65. **E. zodiacus** Ehbg., Kreideth. p. 71, Pl. 4, f. 8; Leuduger-Fortmorel, l. c. p. 40; Cleve, Diat. f. the Sea of Java p. 7; Atlant. Plankt. Organisms p. 326; Pl. f. the Ind. Ocean and the Malay Archip. p. 21.

10 (rr).

Area: Neritic species found along the coasts of West-Europe, Malay Archipelago, Yeddo Bay in Japan, Puget's Sound.

Climacodium Grun.

66. **C. Fraunfeldianum** Grun., Novara Exp. 1870, 102, Pl. I A, f. 24; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 156; Cleve, Atlant. Plankton Organisms p. 314; *C. Fraunfeldii* Cleve, Pl. f. the Red Sea, p. 1033; Cleve, Pl. f. the Ind. Ocean and the Malay Archipelago p. 19; *C. Jacobi* Cleve, Phytoplankton p. 22, Pl. 2, f. 18; *Climacidium Fraunfeldii* Van Heurck, Synopsis Pl. 106, f. 5.

2 (rr) — 3 (rr) — 7 (rr) — 10 (rr).

Area: Tropical Atlantic Ocean, Red Sea, Indian Ocean, Malay Archipelago, Pacific Ocean.

Streptotheca Cleve.

67. **S. thamensis** Cleve in Shrubsole, Journ. Quekett Microsc. Club, 1890, IV, n. s. p. 259, Pl. 13, f. 4—6; Phytoplankton p. 25, Pl. 2, f. 19; Atl. Plankt. Organisms p. 353; Van Heurck, Treatise on the Diatomaceae p. 463, f. 194; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 161; *S. maxima* Cleve, Pl. f. the Indian Ocean and the Malay Archip. p. 23 and p. 57, Pl. 8, f. 5.

I am unable to see any difference of specific value between the North Sea species and the *S. maxima* described by Cleve from the Malay Archipelago, but the details given by Cleve indicate the correctness of Van Heurck in placing the genus in the neighbourhood of *Climacodium* and *Eucampia*.

2 (r) — 3 (+) — 4 (rr) — 6 (rr).

Area: Along the coasts of West Europe, N. Atlantic Ocean (rare), Red Sea, Malay Archipelago.

Ditylium Bail.

68. **D. Sol** (Van Heurck) Leuduger-Fortmorel, l. c. p. 39; De Toni, Sylloge Algarum, Vol. II, p. 1018; Cleve, Atl. Plankt. Organisms p. 325; Pl. f. the Indian Ocean and the Malay Archip. p. 21; *Triceratium Sol* Van Heurck, Synopsis Pl. 115, f. 1 (1881); A. Schmidt, Atlas d. Diatom. Kunde Pl. 152, f. 4, 5, 7-9.

2 (r) — 3 (c) — 5 (rr) — 6 (rr) — 7 (rr).

Area: Atlantic Ocean at 10° N. 53° W., Gulf of Bengal, Malay Archipelago, China Sea.

Biddulphia Gray.

69. **B. chinensis** Grev., Trans. Microsc. Soc. 1866, p. 81, Pl. 9, f. 16; Leuduger-Fortmorel, l. c. p. 39; Cleve, Diat. f. the Sea of Java 1873, p. 6; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 152, f. 6; A. Schmidt, Atlas der Diat. Kunde Pl. 122, f. 22—24.

I have given figures of this species and of the following showing the different direction of the processes and the spines.

3 (+) — 5 (rr) — 10 (rr).

Area: Red Sea, Malay Archipelago, South China Sea.

Fig. 21. *Biddulphia chinensis* Grev. ($\frac{225}{1}$).

70. **B. mobilensis** Bail., Am. Journ. Sc. 1845, p. 336, Pl. 4, f. 24; Van Heurck, Synopsis Pl. 101, f. 4, Pl. 103, f. A; Cleve, Atlant. Plankt. Organisms, p. 288; Schröder, Neapel p. 30; *B. Baileyi* Smith, Brit. Diat. II, p. 50, Pl. 45, f. 322, Pl. 62, f. 322; Leuduger-Fortmorel, l. c. p. 38; *Denticella mobiliensis* Grun., de Wildeman, l. c. p. 127.

2 (r) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (rr).

Area: Along the Coasts of West-Europe and North-America, Mediterranean, Indian Ocean, Malay Archipelago, Pacific Ocean. Neritic species.

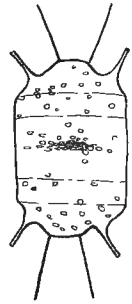


Fig. 22. *Biddulphia mobilensis* Bail. ($\frac{225}{1}$).

Cerataulina Perag.

71. **C. Bergonii** Perag., Monogr. du genre Rhizosolenia, Le Diatomiste vol. I, p. 103, Pl. 1, f. 15, 16; Schröder, Neapel p. 30 (var. *elongata*); Cleve, Bih. t. Sv. Vet. Akad. Handl. Bd. 20, 3, 1894, No. 2, p. 11, Pl. 1, f. 6; Atl. Plankt. Organisms p. 288, Pl. f. the Red Sea, p. 1032; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 152; *Zygoceros* (?) *pelagicum* Cleve, Kanonbaaden „Hauch"s Togter, Kjöbenhavn (1889), p. 54.

6 (rr) — 10 (rr).

Area: Temperate N. Atlantic Ocean, Mediterranean, Red Sea, Gulf of Aden.

72. **C. compacta** Ostf. in Ostenfeld & Schmidt, Pl. f. the Red Sea, 1901, p. 153, f. 7; *Rhizosolenia (Guinardia?) recta* Cleve, Pl. f. the Indian Ocean and the Malay Archipelago 1902, p. 23 and p. 57, Pl. VIII, f. 7 a, b.

There is no doubt that this species having two processes on each valve belongs to the genus *Cerataulina*, and Cleve has also indicated two in his figure 7 a, so that I do not understand his reasons for taking it as a *Rhizosolenia*.

2 (rr) — 3 (+).

Area: Red Sea, Malay Archipelago.

Hemiaulus Ehbg.

73. **H. chinensis** Grev. Ann. Magaz. Nat. Hist. XVI, p. 5, Pl. 5, f. 9, 1865; *H. Heibergii* Cleve, Diat. f. the Sea of Java, 1873, p. 6, Pl. 1, f. 7; Leuduger-Fortmorel, l. c. p. 41; Cleve, Pl. f. the Red Sea, p. 1033; Pl. f. the Indian Ocean and the Malay Archip. p. 21; Atl. Plankton Organisms p. 329.

Professor Cleve informs me in a letter that his *H. Heibergii* is identical with *H. chinensis* of Greville.

6 (rr) — 10 (+).

Area: Tropical Atlantic Ocean, Red Sea, Indian Ocean, Malay Archipelago, Arafura Sea, Japan and China Seas.

B. *Pennatae.*

Fragilarieae.

Thalassiothrix Cleve & Grun.

74. **T. Fraunfeldii** Grun. in Cleve & Grunow, Arctische Diatomeen, K. Sv. Vet. Akad. 17, No. 2, 1880, p. 109; de Wildeman, l. c. p. 104; Castracane, Challenger Report p. 54—55, Pl. XIV, f. 7, 8 (incl. *T. curvata* Castr., Pl. XXIV, f. 6); Schröder, Neapel p. 31; Cleve, Phytoplankton p. 25; Atl. Plankt. Organisms p. 356; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 162; Van Heurck, Synopsis Pl. 37, f. 11—15; *Asterionella Fraunfeldii* Grunow, Verh. zool.-bot. Gesellsch. Wien 1863, p. 140, Pl. 14, f. 18; Cleve, Diatoms of the Sea of Java 1873, p. 12.

I should think that all the specimens belong to the var. *javanica* Grun. in Van Heurck, l. c. f. 13.

1 (+) — 2 (r) — 3 (rr) — 6 (r) — 7 (r) — 10 (+).

Area: Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, China Sea, Japan Sea, Pacific Ocean.

75. **T. longissima** Cleve & Grunow, l. c. p. 108; Ostenfeld & Schmidt, Pl. f. the Red Sea, etc. p. 162 (f. *gracilis* Ostf.); Cleve, Phytoplankton p. 25; Atl. Plankt. Organisms p. 357; Pl. f. the S. Atlantic and the S. Indian Ocean p. 935; Pl. f. the Red Sea, p. 1035; Pl. f. the Indian Ocean

and the Malay Archip. p. 24; *Synedra Thalassiothrix* Cleve, Bih. K. Sv. Vet. Akad. Handl. 1, Nr. 13, p. 22, Pl. 4, f. 24; *Synedra* sp., Chun, Aus den Tiefen des Weltmeeres, Jena 1900, p. 206, f. 2, 3.

Most of the present specimens are very delicate (f. *gracilis* Ostf.), but also the main species has been met with.

2 (rr) — 4 (rr) — 6 (r) — 7 (rr) — 10 (+).

Area: Arctic and Northern Atlantic Ocean (especially in the Irminger Sea), Antarctic Ocean from 20° W. to 91° E., Red Sea, Gulf of Aden, Indian Ocean from c. 40° S. to 45° S., Malay Archipelago, Bering Sea. It is a bipolar species which often predominates in the samples from the Subarctic regions.

Naviculeae.

Navicula Bory.

76. **N. membranacea** Cleve, Phytoplankton 1897, p. 24, Pl. II, f. 25-28; Pl. f. the Red Sea p. 1033; Atl. Plankt. Organisms p. 333; Pl. f. the Indian Sea and the Malay Archipelago p. 22; Lemmermann l. c. p 315.

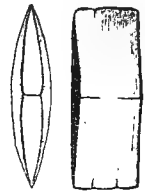


Fig. 23. *Navicula membranacea* Cl. Side view and front view ($\frac{200}{1}$).

As supplement to the figures by Cleve (Phytoplankton) I have given two figures of a frustule in valvular and in zonal view. No structure visible.

2 (rr) — 3 (rr) — 6 (rr) — 10 (rr).

Area: Subtropical Atlantic Ocean (rare), Red Sea, Malay Archipelago, Cook Strasse at New Zealand.

Nitzschieae.

Nitzschia Hass.

77. **N. seriata** Cleve, Diat. of Vega, Vega-exped. vetensk. iakttagelser Pl. 38, f. 75; Atl. Plankt. Organisms p. 335; *N. fraudulenta* Cleve, Fish. Board f. Scotland 1896, p. 300, Pl. 1, f. 11; Pl. f. the Indian Ocean and the Malay Archip. p. 22; Schröder, Neapel p. 32.

1 (rr) — 2 (rr) — 6 (rr) — 10 (rr).

Area: Arctic Ocean, Northern Atlantic Ocean southwards to Azores, Mediterranean, Malay Archipelago.

Freshwater Diatoms

by **E. Östrup** — Copenhagen.

(With plate I.)

The following list of freshwater Diatoms has resulted from the examination of 33 samples collected by the Danish expedition to Siam (1899—1900). Of these 33 samples two only contained no Diatoms; the localities of the remaining 31 samples are:

Koh Chang:	Klong Son	2	samples
„	Lem Dan	16	„
„	Klong Munsé	5	„
„	Klong Majum	2	„
„	Klong Prao	1	„
„	Klong Sarlakpet	1	„
Naval station opposite Koh Kong		1	„
Koh Samit		1	„
Lem Ngob		2	„
	Total	31	samples.

Placochromaticæ.

Caloneis Cl., Syn. I, p. 46.

1. **C. fasciata** Lgst.? tab. nostr., fig. 1.

L. 0,028 mm., B. 0,006 mm., striæ in the middle at least 25 in 0,01 mm. denser towards the apices.

Striæ radiate. The apical area dilated towards the middle and here forming a transapical fascia.

Solitary in a sample from Lem Dan.

With some doubt I have referred this small form to *Cal. fasc.* Lgst. because the striæ are more radiate and because I am not sure, that I have seen the longitudinal lines.

Area: *Cal. fasc.*: ubiquitous.

Neidium Pfitzer (1871), Cl. Syn. I, p. 67.

2. **N. affine** Ehr. var. **genuina** Cl. forma **minor.** A. S. Atl. tab. XLIX, fig. 23.

Lem Dan (7 samples).

Area: the main species: ubiquitous, f. *minor*: Spitzbergen, Europe, Australia.

3. **N. Hitchcockii** Ehr. A. S. Atl. tab. XLIX, figs. 35—36.

Klong Son, Lem Dan (7 samples).

Usually with oblique striæ, forming an angle of about 75° to the apical axis.

Area: North America, Europe, Bengal, Australia, New Zealand.

Frustulia Ag. (1824), Cl. Syn. I, p. 121.

4. **F. rhomboides** Ehr. V. H. Syn. tab. XVII, figs. 1—2.

Found in many (20) of the samples. In some of them e. g. from Klong Munsé and Lem Dan not rare.

var. **saxonica** Rabh. V. H. l. c. fig. 4.

Mixed with the main species.

Area: the main species and the var. *saxonica*: America, Europe, Asia, Australia.

Stauroneis Ehr. (1843); cnfr. Cl. Syn. I, p. 141 *Naviculæ microstigmaticæ.*

5. **Stauroneis anceps** Ehr. var. **hyalina** Br. & Perag. Hérib. Diat. Auv. tab. III, fig. 19.

Solitary in two samples from Lem Dan and Lem Ngob.

Area: Europe (fossil), Australia.

In a sample from Lem Dan I have found a *Stauroneis*, in its outward form like *St. anc.* Ehr. var. *amphicephala* Ktz. (V. H. Syn. tab. IV, fig. 5) but without any visible striation.

Cymbella Ag. (1830), Cl. Syn. I, p. 156.

6. **C. gracilis** Rabh. cnfr. A. S. Atl. tab. X, fig. 39; tab. nost., fig. 3.

Klong Prao, Klong Majum, Klong Munsé, Lem Dan.

I have figured this form because it differs somewhat from the type by its gibbous ventral margin.

Area: *Cymb. grac.*: Greenland, Europe, Tasmania, New Zealand; according to Cleve (l. c. p. 169) especially in alpine regions.

7. **C. japonica** Reichelt. Kunze Rev. III, p. 391.

Klong Prao, Klong Majum, Klong Munsé, Klong Son, Lem Dan. (7 samples).

Area: Japan.

Gomphonema Ag. (1824), Cl. Syn. I, p. 178.

8. **G. parvulum** Ktz. V. H. Syn. tab. XXV, fig. 7.

Klong Sarlakpet.

var. **micropus** Ktz. V. H. l. c. figs. 4—5.

Klong Majum, Lem Dan.

Area: the main species ubiquitous, var. *micropus*: Europe, America.

Obs. In a sample from Lem Dan I found specimens of *G. parvulum*, which are nearest to var. *subcapitata* (V. H. l. c. fig. 11), but proportionately broader. In V. H.'s figure the rate between length and breadth is 13 : 3; in the present form it is 14 : 5.

9. **G. gracile** Ehr. forma **major** V. H. Syn. tab. XXIV, fig. 12.

var. **naviculoides** (W. Sm.) Grun. V. H. l. c. figs. 13—14.

Klong Prao, Klong Munsé, Klong Son, Koh Samit, Lem Dan. (15 samples.)

Area: Europe, America, Java, New Zealand.

10. **G. entolejum** Öst. sp. nov. tab. nost. fig. 4.

L. up to 0,065 mm., B. up to 0,01 mm. Striæ 10 in 0,01 mm. Striæ short, marginal. Unilateral stigma present, but hardly visible. By its marginal striæ and consequently large area this very characteristic species reminds of *G. Brasiliense* Grun. (V. H., Syn. tab. XXV, fig. 17) and *G. Puiggarianum* Grun. (V. H., l. c. fig. 18) and perhaps it might be considered an intermediate form between those two species, provided they also possessed an unilateral stigma. But as this is discernible only with difficulty in *G. entolejum*, its presence in the two mentioned species is still conceivable.

Klong Prao, Klong Munsé, Klong Majum, Klong Sarlakpet. (5 samples).

In some of these samples not rare.

Anomoeoneis Pfitzer (1871) Cl. Syn. II, p. 5.

11. **A. brachysira** (Bréb.) Grun. V. H. Syn. tab. XII, figs. 8—9.

Klong Prao, Klong Son, Klong Munsé, Lem Dan. (9 samples).

Area: Greenland, Europe.

12. **A. exilis** (Ktz.) Grun. V. H. Syn. tab. XII, fig. 11.

Lem Dan (4 samples).

Area: Greenland, Europe.

Navicula Bory (1822).

Orthostichæ Cl. Syn. I, p. 107.

13. **N. cuspidata** Ktz. var. **lanceolata** Grun. cnfr. O. Müll. El Kab tab. XII, fig. 18; tab. nostr., fig. 2.

L. 0,04 mm., B. 0,007 mm.

Valve narrow lanceolate, attenuated towards the apices. Central pores distant. Striæ fine, at right angles to the apical axis. By slighter enlargement the striation, especially in the central part presents an irregular longitudinal undulation, nearly as in *Anomoeoneis*.

This form probably must be referred to *N. cusp.*; it is nearest to var. *lanceolata*.

Solitary in two samples from Klong Prao and Lem Dan.

Area: *Nav. cusp. lanc.:* El Kab.

14. **N. Stodderi** Greenl. var. **insignis** Grun. Cl. Syn. I, tab. III, fig. 13.

Solitary in two samples from Lem Dan.

Area: Bengal.

Mesolejæ Cl. Syn. I, p. 127.

15. **N. Pupula** Ktz. V. H. Syn. tab. XIII, figs. 15—16.

Lem Dan (7 samples).

Area: ubiquitous.

Bacillares Cl. Syn. I, p. 136.

16. **N. Pseudobacillum** Grun. V. H. Syn. tab. XIII, fig. 9.

Solitary in a sample from Lem Dan.

Area: Europe, Japan, Australia, New Zealand.

Lineolatæ Cl. Syn. II, p. 10.

17. **N. cryptocephala** Ktz. var. **exilis** Ktz. V. H. Syn. tab. VIII, fig. 2.

Lem Dan (3 samples).

Area: Europe.

18. **N. radiosa** Ktz. var. **tenella** Bréb. V. H. Syn. tab. VII, figs. 21—22.

Klong Majum, Klong Sarlakpet, Lem Dan. (5 samples).

Area: Greenland, America, Europe, Japan, Tasmania, Australia.

19. **N. cincta** Ehr. var. **siamensis** Öst. var. nov. tab. nostr., fig. 5.

L. 0,036—0,05 mm., B. 0,005—0,007 mm., striæ 20 in 0,01 mm., finely transversely lineated.

Valve narrow lanceolate, somewhat attenuated towards the apices. Striæ in the middle radiate, alternately longer and shorter, towards the apices convergent. Central area narrow.

Klong Majum, Lem Dan.

I have considered this form a variant of *N. cincta* Ehr., although it differs somewhat in its outline and in its closer striæ. Possibly it is nearer to *N. Bottnica* Grun. (V. H. Syn. tab. VII, fig. 33).

Lævistriatæ Cl. Syn. II, p. 66.

20. **N. Yarrensis** Grun. A. S. Atl. tab. XLVI, fig. 2. tab. nostr. fig. 6.

Lem Dan (5 samples).

Only in one of the samples a single specimen of this species agreeing with the figure by A. S. (l. c.) has been met with. Smaller forms agreeing tolerably well with those from V. Heurck's types No. 542 (from Yarra-Yarra, fossil) only with their apices a little more attenuated and thus reminding of the variety „*simbirskiana*" (Pant. II, tab. XII, fig 16) are much more common in the collection.

Area: Europe (Kiel), Hungary (fossil). America, Africa, Asia, Australia.

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21. **N. bicontracta** Öst. sp. nov. tab. nostr. fig. 7.

L. 0,028 mm., B. in the middle 0,0085 mm., at the constriction 0,0055 mm. Striæ 12—13 in 0,01 mm.

Valve biconstricted, with greatest breadth in the middle and with cuneate apices. Striæ radiate in the middle with a single short stria inserted, towards the apices at right angle to and nearly reaching the apical axis. Central area narrow, apices slightly curved.

The systematical place of this small species is doubtful. Perhaps it is related to a „fragliche Form" from New Yersey in A. S. Atl. tab. CCXII, fig. 2, which seems to approach to *Caloneis Egena* A. S. (Cl. Syn. I, p. 66). As I think I have seen a slight trace of a transversal lineation of the striæ, I dare not refer it to „*Pinnularia*".

Lem Ngob. Only one specimen met with.

Pinnularia Ehr. (1843), Cl. Syn. II, p. 71.

Capitatæ Cl. l. c. p. 75.

22. **P. Braunii** Grun. V. H. Syn. tab. VI, fig. 21. A. S. Atl. tab. XLV, figs. 77—78.

Naval station, Lem Dan, Lem Ngob. (9 samples).

Rather variable, especially in size. The greatest length observed by me is 0,086 mm.

Area: Europe, America, Bengal, Australia.

23. **P. interrupta** W. Sm. A. S. Atl. tab. XLV, fig. 70.

Klong Munsé.

Area: Europe, America, Asia, Australia.

24. **P. microstauron** Ehr. V. H. Syn. tab. VI, fig. 9. A. S. Atl. tab. XLIV, fig. 35.

Lem Dan, Lem Ngob.

Area: Spitzbergen, Greenland, Kamtschatka, Europe, N. America, Australia.

Divergentes Cl. l. c. p. 77.

25. **P. divergentissima** Grun. V. H. Syn. tab. VI, fig. 32.

Solitary in two samples from Lem Dan.

Area: Spitzbergen, Greenland, N. Europe, Canada, New Zealand. According to Cleve (l. c. p. 77) an arctic and alpine species.

26. **P. divergens** W. Sm. var. **elliptica** Grun. Grun., Fz. Jos. Land tab. I, fig. 19.

Solitary in a sample from Lem Dan.

Area: Fränz Joseph-Land, Greenland, Europe, America, Africa, Australia.

Tabellarieæ Cl. II, p. 81.

27. **P. stauroptera** Grun. Donk., Brit. Diat. tab. XII, fig. 3.

Klong Prao, Klong Son, Koh Samit, Lem Dan. (6 samples).

var. **interrupta** Cl. V. H. Syn. tab. VI, figs. 6—7.

Lem Dan.

Area: the main species: Europe, America, Australia. var. interrupta: Franz Josef-Land, Europe, America, New Zealand, Hawaii.

28. **P. stomatophora** Grun. var. **ornata** A. Cl. A. Cl. Lule Lappm. fig. 3.

Solitary in two samples from Lem Dan and Koh Samit.

The present form is somewhat larger than that figured by A. Cleve.

Area: Lule Lappmark.

Brevistriatæ Cl. l. c. p. 85.

29. **P. brevicostata** Cl. A. S. Atl. tab. XLIII, figs. 26—27.

Lem Dan, Koh Samit.

Area: Europe, Bengal.

30. **P. parva** (Ehr.) Grun. A. S. Atl. tab. XLIII, fig. 21.

Lem Ngob.

Area: Europe, America, Java, Australia, New Zealand.

Complexæ Cl. l. c. p. 91.

31. **P. viridis** Nitzsch. A. S. Atl. tab. XLII, fig. 14.

Lem Dan (4 samples).

var. **intermedia** Cl. A. S. Atl. tab. XLII, fig. 9.

Lem Dan.

Area: the main species ubiquitous. var. *intermedia*: Europe, Congo, Java, Australia.

32. **Pinnularia** sp. tab. nostr., fig. 8.

L. 0,049 mm., B. 0,01 mm. Striæ 10 in 0,01 mm.

Valve rectilinear with rounded apices. Terminal fissures comma-shaped. Apical area narrow. Striæ parallel, at right angles to the apical axis, absent in the middle, so that a transapical area arises.

As I have seen but one specimen of this small form, I dare not regard it as a distinct species. It seems to be nearest to *Pinn. macilenta* (Ehr.) Cl.

Amphora Ehr. (1840). Cl. Syn. II, p. 99.

33. **A. acutiuscula** Ktz. V. H. Syn. tab. I, fig. 18.

Solitary in a sample from Lem Dan.

Area: Greenland, Spitzbergen, Europe, Madeira, New Zealand, Samoa.

Achnanthes Cl. Syn. II, p. 163.

Actinoneis Cl. l. c. p. 185.

34. **A. oblongella** Öst. nov. sp. tab. nostr., fig. 9.

L. 0,057 mm., B. 0,006 mm.

Epitheca: apical area narrow, 10 striæ in 0,01 mm., finely transversely lineated. Hypotheca: striæ very fine, slightly curved. Central area narrow.

Hypotheca of this small species highly reminds of *Navicula Rotœana* Grun. var. *oblongella* Grun. (V. H., Syn. tab. XIV, fig. 21). But as I have seen both valves in situ, I am quite sure it is an *Achnanthes*.

Klong Majum.

In the same sample where *Ach. oblongella* occurs I found a small form, which I have figured in tab. nostr., fig. 10.

Valve oblong elliptical, L. 0,018 mm., B. 0,007 mm., striæ 10 in 0,01 mm., somewhat shortened so that an apical area arises. In specimens mounted in styrax it was impossible to see any raphe, but in a dry specimen I could catch a glimpse of a such one with distant central pores. As to the structure of the valve all the specimens examined were identical. Thus I dare not decide if the present form is an *Achnanthes* or a *Navicula*.

Microneis Cl. l. c. II, p. 187.

35. **A. minutissima** Ktz. V. H. Syn. tab. XXVII, figs. 37—38.

Klong Majum, Klong Munsé, Lem Dan. (4 samples).

var. **cryptocephala** Grun. V. H. l. c. figs. 41—44.

Klong Prao, Klong Munsé, Lem Dan.

Area: the main species: Greenland, Europa, Mongolia. var. *cryptocephala* according to Cleve (l. c. p. 188) Finland. I have found it in the Færö Islands and in Denmark.

36. **A. microcephala** Ktz. V. H. Syn. tab. XXVII, figs. 20—23.

Klong Majum.
Area: Europe, Bandong.

37. **A. linearis** W. Sm. V. H. Syn. tab. XXVII, figs. 31—32.

Klong Majum, Klong Munsé, Lem Dan. (5 samples.)

— — — var. **pusilla** Grun. V. H. l. c. figs. 33—34.

Klong Majum.
Area: the main species: Europe, var. *pusilla*: also in Greenland.

38. **A. exilis** Ktz. V. H. Syn. tab. XXVII, figs. 16—19.

Klong Majum (two samples).
Area: Europe, Abyssinia.

39. **A. affinis** Grun. V. H. Syn. tab. XXVII, figs. 39—40.

Klong Majum, Klong Munsé.
Area: Europe, America, Tasmania.

Achnanthidium Cl. l. c. p. 191.

40. **A. rostrata** Öst. n. sp. tab. nostr., fig. 11.

L. 0,012 mm., B. 0,006 mm. Striæ 10 in 0,01 mm. The outline of both valve identical: elliptical with rostrate apices. Epitheca with an unilateral horseshoe-shaped mark, Hypotheca: central pores approximate, unilateral central area.

This small species is obviously nearest to *A. lanceolata* (Bréb.) Grun. var. *dubia* Grun. (V. H. Syn. tab. XXVII, figs. 12—13).

Klong Sarlakpet.

41. **A. baccata** Leud.-Fortm. Cl. Syn. II, tab. III, fig. 3. Leud.-Fortm. Ceylon tab. I, fig. 5.

In a slide from Klong Prao I found a specimen thus situated, that it was quite agreeing with the figure by L.-F. quoted above, which is referred with some doubt to *A. baccata* by P. T. Cleve (l. c. p. 195).

Klong Prao, Klong Majum, Klong Sarlakpet, only in samples labelled: „in waterfall".
Area: Ceylon.

Epithemia Bréb. (1838). V. H. Traité p. 294.

42. **E. Argus** (Ehr.) Ktz. var.

Klong Prao, Klong Majum. Rare.

As the present form differs from the type by its pronounced curvation I have figured it in tab. nostr., fig. 12.

Area: the main species: Europe, Java.

43. **E. gibberula** (Ehr.?) Ktz. var. **producta** Grun. V. H. Syn. tab. XXXII, fig. 12.

Solitary in a sample from Lem Dan.

Area: the main species, Europe, America, Java. var. *producta*: according to de Toni (Syll. p. 786) *„cum specie hinc et inde“*

Eunotia Ehr. (1837). V. H. Traité p. 298.

44. **E. major** (W. Sm.) Rabh. var. **octoundulata** Grun. Grun. Banka, tab. I, fig. 8.

Lem Dan (two samples).
Area: Banca.

45. **E. parallela** Ehr. Grun. Banka tab. I, fig. 3 a.

Lem Dan.

forma **angustior** V. H. Syn. tab. XXXIV, fig. 16.

Lem Dan.
Area: Greenland, Europe, America, Banca.

46. **E. pectinalis** (Ktz.) Rabh. var. **stricta** Rabh. V. H. Syn. tab. XXXIII, fig. 18.

Lem Dan (3 samples).

var.? **minor** (Ktz.) Rabh. V. H. l. c. figs. 20—21.

Klong Son, Lem Dan (5 samples).

forma **curta.** V. H. l. c. fig. 15.

Lem Dan.
Area: Europe, America.

var. **undulata** (Ralfs) Rabh. in Grun. Banka, p. 4, tab. I, figs. 5 a—e.

Lem Dan (11 samples).

I found forms agreeing with the figures by Grunow quoted above and with W. Sm. Syn. tab. XXXIII, fig. 281 a, but not with V. H. Syn. tab. XXXIII, fig. 17.

Area: England, Banca.

47. **E. prærupta** Ehr. var. **bidens** Grun. cnfr. V. H. Syn. tab. XXXIV, fig. 20.

Lem Ngob.

Only one small specimen observed (L. 0,04 mm.), in its shape quite agreeing with the quoted fig. by V. H., but I was not able to see any sculpture on its striæ.

Area: Type arctic and alpine.

48. **E. robusta** Ralfs var. **bigibba** Öst. var. nov. tab. nost., fig. 13.

L. 0,06 mm., striæ along the ventral margin 10 in number in 0,01 mm., towards the apices closer, finely transversely lineated. Terminal nodi somewhat removed from the apices.

Klong Majum, Klong Munsé. (3 samples).

With hesitation I regard this form as a variant of *E. robusta.* It is not identical with *E. rob. Papilio,* nor with *E. Diodon* as far as I can judge.

49. **E. Diodon** Ehr. forma **minor** V. H. Syn. tab. XXXIII, fig. 5.

Lem Dan.

Area: the main species: Europe.

50. **E. lunaris** (Ehr.) Grun. var.? **alpina** (Nægeli) Grun. V. H. Syn. tab. XXXV, fig. 5. Grun. Banka tab. I, fig. 9.

Klong Munsé, Klong Son, Koh Samit, Lem Dan. (6 samples.)

Area: Europe, India, Java, Banca.

51. **E. Camelus** Ehr. **genuina** Grun. Grun. Banka tab. I, figs. 6 a and b.

var. **denticulata** Grun. Grun. l. c. fig. 6 d.

Lem Dan (7 samples).

Area: Europe, America, Banca.

52. **E. costata** Öst. nov. sp. tab. nostr., fig. 14.

L. up to 0,09 mm., B. up to 0,007 mm., costæ 5 in 0,01 mm. Valve arcuate with parallel dorsal- and ventral margin, terminal nodi on the ventral side, a little removed from the rounded apices. Costæ prominent forming denticuli on the dorsal margin. The frustule rectangular with finely striated connecting zone.

Klong Prao, Klong Majum, Klong Munsé, Klong Son, Koh Samit, Lem Dan. (8 samples). Not common in any sample.

Desmogonium Ehr. (1848). Grun. Banka p. 5.

53. **D. Rabenhorstianum** Grun. Grun. Banka tab. I, fig. 1.

Lem Dan (3 samples).

Area: China, Banca.

var **crassa** Öst. var. nov. tab. nostr., fig. 15.

L. 0,1 mm., B. 0,008 mm. Striæ 14—16 in 0,01 mm. Denticuli 7—8 in 0,01 mm.

Naval Station, Lem Dan (3 samples).

Shorter and broader than the type. Apices somewhat inflated.

Synedra Ehr. (1831). V. H. Traité p. 307.

54. **S. Ulna** (Nitzsch) Ehr. V. H. Syn. tab. XXXVIII, figs. 9, 12 and 14.

Klong Prao, Klong Majum, Klong Munsé, Klong Sarlakpet, Lem Dan. (7 samples).

In some of the samples not rare.

Varies somewhat (but with connecting forms), usually the apices are more capitate than figured by V. H. l. c.

Area: Europe, America, Java.

In a sample from Klong Prao there occurs a smaller, slightly curved form (L. 0,074 mm., B. 0,005 mm., striæ 9 in 0,01 mm.) with unilateral central area which is nearest to var. *amphirhynchus* (V. H. l. c. fig. 5). I have figured it in tab. nostr., fig. 16.

Surirella Turpin (1827). V. H. Traité p. 368.

55. **S. linearis** W. Sar. var. **constricta** W. Sm.? cnfr. A. S. Atl. tab. XXIII, fig. 8.

L. 0,09 mm., B. in the middle 0,014 mm., costæ 2—3 in 0,01 mm.

Klong Munsé, Lem Dan. Rare.

As the present form differs somewhat from the above fig. by A. S. I have figured it in tab. nostr., fig. 17.

Area: the main species scattered, usually in alpine and subalpine regions: var. *constricta: cum specie passim* (de Toni Syll. p. 568).

56. **S. angusta** Ktz.? A. S. Atl. tab. XXIII, fig. 40.

Klong Prao, Klong Majum.

This form agrees with the figure by A. S. which has been referred by him with some doubt to *S. angusta*.

Area: Europe.

57. **S. siamensis** Öst. nov. sp. tab. nostr., fig. 18.

L. 0,026 mm., B. 0,01 mm., costæ 4 in 0,01 mm. Valve oval, costæ alternant, reaching the apical axis, striæ fine.

Solitary in a sample from Lem Dan.

This *Surirella* seems to me, in spite of its small size, to approach most closely to *S. bifrons* Ktz.

Hantzschia Grun. (1877). V. H. Traité p. 380.

58. **H. amphioxys** (Ehr.) Grun. V. H. Syn. tab. LVI, fig. 1.

Solitary in a sample from Lem Dan.
Area: Ubiquitous.

Nitzschia Hassal (1845). V. H. Traité p. 382.

Tryblionella (W. Sm.) Grun. V. H. l. c. p. 384.

59. **N. Tryblionella** Hantzsch. var. **Lewidensis** W. Sm. V. H. Syn. tab. LVII, fig. 16.

Lem Dan (3 samples).
Area: Europe.

Scalares V. H. l. c. p. 391.

60. **N. scalaris** W. Sm. cnfr. V. H. Syn. tab. LX, figs. 14—15.

Lem Dan (5 samples). In two of the samples not rare.

Area: Europe, Australia.

The size of the present form agrees with Grunow's var. *minor* (Cl. & Grun. arct. Diat p. 83) found in Delaware river and in lagoons at Samoa.

Obtusæ V. H. l. c. p. 397.

61. **N. obtusa** W. Sm. var. **nana** Grun. V. H. Syn. tab. LXVII, fig. 3.

Lem Dan (4 samples).

Area: the main species: Europe, America, Japan; var. *nana* only in Haverfordwest (England) cnfr. V. H.'s types No. 399.

Lanceolatæ V. H. l. c. p. 400.

62. **N. Palea** (Ktz.) W. Sm. forma **major.** V. H. Syn. tab. LXIX, fig. 22 e.

var. **minuta** Bleisch. V. H. l. c. fig. 23.

var. **tenuirostris** Grun. V. H. l. c. fig. 31.

var. **debilis** (Ktz.) Grun. V. H. l. c. figs. 28—29.

Lem Dan (4 samples), Koh Samit.

Area: the main species: Greenland, Europe, Abyssinia, Japan.

63. **N. intermedia** Hantzsch. V. H. Syn. tab. LXIX, fig. 10.

Koh Samit.

Area: Europe.

Nitschiella Rabenh. 1864. V. H. Traité p. 404.

64. **N. longissima** (Bréb.) Ralfs. V. H. Syn. tab. LXX, fig. 8.

Lem Dan. A fragment only.

Area: Greenland, Europe.

Coccochromaticæ.

Fragilaria Lyngbye (1819). V. H. Traité p. 323.

65. **F. siamensis** Öst. sp. nov. tab. nostr., fig. 19.

L. 0,05—0,08 mm., B. in the middle 0,003—0,0035 mm., striæ 20 in 0,01 mm. Valve constricted in the middle and before the capitate apices. Striæ parallel, obscure, absent in the apices. I am not able to see any pseudoraphe.

This characteristic form occurs in chains as *Diatoma* and *Grammatophora.* The endochrom is granulary.

Klong Munsé, Klong Son, Lem Dan. (5 samples).

Denticula Ktz. (1844). V. H. Traité p. 351.

67. **D. Van Heurckii** Brun. Brun. esp. nouv. tab. XIII, fig. 8 and tab. XIV, fig. 10.

Solitary in a sample from Lem Dan.

Area: Java.

Cyclotella Ktz. (1833). V. H. Traité p. 445.

68. **C. Meneghiniana** Ktz. A. S. Atl. tab. CCXXII, fig. 25.

Solitary in a sample from Lem Dan.

Area: Europe.

Coscinodiscus Ehr. (1838). V. H. Traité p. 525.

69. **C. lacustris** Grun. var. **australiensis** Grun. Grun. Fz. Joseph-L. tab. IV, fig. 31.

Lem Dan.

Area: China, Australia.

The material examined by me is not particularly rich neither in individuals nor in species and a few samples only make an exception from this. More important genera are: *Frustulia, Gomphonema, Eunotia,* in some samples also *Synedra.*

In samples from inland waterfalls in Koh Chang I especially found small *Achnanthes* and *Cymbella gracilis* var., then *Synedræ* and *Eunotiæ.*

In samples from riverbeds or pools *Anomoeoneis exilis* is predominant.

The samples from ricefields at Lem Dan are distinguished by containing some forms usually belonging to brackish water viz. *Navicula Yarrensis*, *Nitzschia scalaris* var., *Nitzschia Tryblionella* var. and *Coscinodiscus lacustris australiensis.* The two *Nitzschia* however may also be met with in freshwater. Also two marine forms have been found in the same samples viz. *Amphora acutiuscula* and *Nitzschiella longissima.* As the shallow ricefields at Lem Dan are situated close upon the seacoast it is fairly explicable that such forms belonging to brackish water (and even a few marine forms) occur in the freshwater collections, but on the other hand is the presence of *Achnanthes baccata*, which I have only seen in samples from waterfalls, more difficult to understand. This species is pre-

viously known only from Ceylon where Leuduger-Fortmorel has found it in a sample „recueillie . . . . sur l'ancre d'un navire mouillé, par huit brasses d'eau, à Colombo, sur les côtes de Ceylan". Certainly there is nothing to prevent that, at Colombo it might have been carried out into the sea with freshwater; however the whole habit of this species does not at all agree with *Achnantheae* from freshwater, but much more with marine forms such as *Ach. brevipes.* Perhaps the examination of the marine Diatoms collected by the Danish Expedition will prove that it also occurs in the Gulf of Siam, but its presence in elevated inland waterfalls is nevertheless very strange.

As to the general character of the flora so far as we can judge from the present samples of freshwater Diatoms, we must say that it is less pronounced by the present than by the wanting forms. Most of the species observed occur scattered round the world, a few have previously been recorded only from more adjacent localities e. g. *Navicula Stodderi* (Bengal), *Stauroneis anceps hyalina* (Australia), *Cymbella japonica* (Japan), *Eunotia major octo-undulata* (Banca), *Desmogonium Rabenhorstianum* (Banca and China), *Denticula Van Heurckii* (Japan) but none of those species occurs in such a quantity that it might be said to characterize the collection in its entirety. The following genera are however either very sparingly represented or they occur in not typical species: *Cymbella, Epithemia, Cyclotella, Surirella, Fragilaria, Denticula* and wanting are: *Pleurosigma, Rhoicosphenia, Cymatopleura, Tabellaria, Diatoma, Meridion, Melosira.*

Dipterocarpaceae

by **F. Heim** — Paris.

Pour ne pas rompre l'homogénéité d'allure de la publication, consacrée à la flore de Koh-Chang, nous nous sommes imposé de ne pas faire intervenir, dans la détermination des types de cette famille, les caractères d'ordre anatomo-histologique. Nous donnerons, dans un travail ultérieur, la diagnose anatomo-histologique des espèces nouvelles, et préciserons certains points de la structure des espèces déjà connues, mais que nous avons pu étudier, d'une manière particulièrement favorable, sur les échantillons en alcool, rapportés par M. Schmidt.

Dipterocarpus Gaertn. f.

Sect. *Sphaerales* Dyer.

1. **D. Schmidtii** Heim sp. nov.

Rami novelli, petioli, ramulique floriferi, pilis brevibus, sericeis, applicatis, fusco-griseis obtecti; eisdem pilis paginae margina apice ciliata, nervus medius supra nervique secundarii subtus vestiti. Rami adulti, glabri, nigrescentes, sparsim cinerescentes, lenticellis parvis, longitudinaliter linearibus, vix conspicuis.

Stipulae mox caducae. Petioli longi (long. 20—25 mm.), supra non canaliculati. Folia, coriacea, in sicco fusco-pallida, obovata, basi cuneato — attenuata, apice obtusa, vel brevissime apiculata, nec nitida, margine leviter undulata (90—100 mm. long., 40—55 mm. lat.) nervo medio supra vix prominulo, nervis secundariis (12—14 utrinque) subtus prominulis, margine arcuatis, nervis tertiariis, transversalibus, tenuiter villosis, vix prominulis.

Racemi 5—6 floriferi. Flores magni, subsessiles; calycis tubus coriaceus, infundibuliformis (14 mm. long. — 11 mm. maxim. lat.), laciniis: 2 majoribus linearibus, tubum aequantibus (12 mm. long. — 3 mm. lat.), 3 brevibus (3 mm. long.) reflexis; corollae tubus subcylindricus, apice subglobose dilatatus (10 mm. long. — 12 mm. max. lat.), lobis latis (32 mm. long. — 12 mm. lat.); antheris angustatis (5 mm. long. — 0,6 mm. lat.), connectivo subulato, antheram aequante.

Fructus immaturus, stellato-pilosus, turbinatus, alarum nervis vix prominulis. Fructus maturus, sphaericus (diam. 14—18 mm.), laevis, glaucus, apice pruinosus, calycis lobis 2 accrescentibus, coriaceis, glabris, parum inaequalibus, linearibus-oblongis, e basi brevissime angustatis, apice paulum attenuato-rotundatis (130—133 mm. long., larg. 20 mm.), nervis primariis 3, subtus prominulis, ditissime ramosis, calycis lobis 3 non accrescentibus, aequalibus, obtusis (10 mm. long., 6—7 mm. lat.).

A spec. affin.: *Dipterocarpo turbinato* Gaertn. f. differt foliis brevioribus, e basi cuneiformibus, nervis secundariis, numerosioribus, pilosis nec scabris, fructu sphaerico nec ellipsoïdeo, nervisque alarum lateralibus vix conspicuis.

Jungle near Lem Dan, a very tall tree with bare stem (n° 518 a).

2. **D. angustialatus** Heim sp. nov.

Rami novelli compressi, puberulo-grisei. Rami adulti mox glabri, fusco-grisei, multis lenticellis punctulati. Stipulae gemmae acutae, angustae, fulvo-pilosae. Petioli longi, supra minute canaliculati, pilis fulvis, adpressis, obtecti (25—40 mm. long.).

Folia chartacea, in sicco fusca, obovato-oblonga, basi cuneato-attenuata, apice attenuata, breviter acuminata (130—160 mm. long. — 60—80 mm. larg.), margine leviter undulata nec nitida, in pagina superiore pilis adpressis fulvis fugacibus, praecipue in nervo medio et margine, ciliata, in pagina inferiore eisdem pilis nervus medius, nervi secundarii (utrinque 12—15) prominuli, margine arcuati dense, nervique tertiarii transversales, sparsim obtecti.

Racemi, glabrescentes, nigrescentes, 5-floriferi. Flores?

Fructus maturus sphaericus, apice paulum turbinatus, laevis, apice leviter pruinosus (diam. 20 mm.), calycis lobis majoribus accrescentibus 3, chartaceis, glabris, aequalibus, longis, linearibus, angustis, basi vix attenuatis, apice paulum attenuato-rotundatis (140 mm. long., 45 mm. larg.), nervis primariis 3, utrinque prominulis, ditissime ramosis, calycis lobis non accrescentibus 3, subaequalibus, obtusis (40—43 mm. long., 7—9 mm. larg.).

Spec. affin. *Dipterocarpo vestito* Wall., cujus fructus ignotus, differt praecipue fulvo-pubescentia nec stellato-canescentia.

Jungle near Klong Son, a tall tree (n° 686 a). The native name of this tree is „ton yang".

Sect. *Alati* Dyer.

3. **D. alatus** Roxb. Hort. Beng. (1814) 42. Fl. Ind. II, 614.

Jungle near Klong Sarlakpet (n° 742).

Area: Pegu, Tenasserim, Siam, Cambodia, Cochinchina.

4. **D. parvifolius** Heim. sp. nov.

Rami novelli compressi, fulvi, dense tomentosi. Rami adulti mox glabri, nigrescentes, rugosi, lenticellis non conspicuis. Stipulae

mox caducae, gemmæ breves, conicae, fulvo-villosae. Petioli sat breves (10—12 mm. long.), fulvo-villosi, supra minute canaliculati. Folia chartacea, in sicco ochracea nec nitida, ovata, basi plus minus attenuata, apice brevissime acuminata (45—75 mm. long., 32—40 mm. larg.), in margine minime undulata, in pagina superiore glabra, in pagina inferiori stellato-velutina; nervus medius supra vix prominulus, nervus medius nervique secundarii (utrinque 9—10), margine arcuati, infra paulum prominuli; nervi tertiarii sub-transversales.

Racemi fulvo-sericeo dense tomentosi, 3—4 floriferi. Flores?

Fructus maturus subsphaericus (diam. 10—13 mm.), tenuissime granulosus, pruinosus, ad angulos costis sub-aliformibus, angustis (1—2 mm. lat.), calycis alis 2, chartaceis, glabris, subaequalibus, oblongis, e basi paullulum angustatis, apice rotundatis (60—70 mm. long. — 18—20 mm. lat.), nervis primariis 4, utrinque prominulis, ditissime ramosis; calycis lobis non auctis 3, aequalibus (5 mm. long. — 6 mm. lat.) obtusis, 1 nonnunquam paulum accrescente (30 mm. long. — 10 mm. larg.).

Species *Dipt. glanduloso* Thw., *incano* Roxb., praecipue *artocarpifolio* Pierre, *insularique* Hance affinis; a *glanduloso*, ramulis 4—5 floriferis calycisque alis latioribus; ab *incano* foliis basi attenuatis nec rotundatis vel subcordatis, ramulisque pauciflor.; ab *insulari* foliis fructusque alis multo brevioribus, calycis fructiferi tubo non piloso sat distincta.

Jungle near Lem Dan, a moderate sized tree (n° 620 a).

Anisoptera Korth.

5. **A. Cochinchinensis** Pierre. (in Lanessan — Pl. utiles colon. franç. (1886) 298. — Flor. forest. Cochinch. fasc. 15 (1890), t. 235 A).

Area: Cochinchina.

Lem Dan, Klong Prao in the jungle (nos 225, 405, 713 a). The Siamese name of this tree is *„ton tabāk"*.

6. **A. marginatoïdes** Heim sp. nov.

Rami, racemi, flores? Folia coriacea, supra glabra, subtus tenuiter villosa, ovata, e basi rotundata, apice abrupte brevissimeque acuminata (140 mm. long. — 75 mm. lat.); costa supra concava, subtus proeminens, nervi secundarii (utrinque 20—24) subtus prominuli, margine arcuati, nervi tertiarii transversales. — Fructus (immaturus, sterilis) breviter pedicellatus, receptaculo sub-hemisphaerico (diam. 6 mm.), tenuiter punctulato-villoso; stamina persistentia, filamento brevi (0,3 mm. long.), antherarum loculis inaequalibus (in st. major. 1 mm., in minor. 0,7 mm. anther. long.) connectivo longe aristato (in st. major. 2 mm., in st. min. 1,5 mm. long.); stylopodio breve, ovoïdeo (4 mm. long. — 1,5 mm. lat.) stylo tridentato; calycis alis 2 papyraceis subglabris, linearibus, basi valde angustatis, apice ovato-rotundatis (70—75 mm. long. — 10 mm. max. lat.), nervis primariis utrinque prominulis, alis minoribus, non auctis, 3 brevibus, triangulare-acutissimis (8 mm. long. — 1,5 mm. lat.).

Species *Anisopterae marginatae* Korth. affinis; foliorum nervis secundariis numerorioribus, pagina villosa, antheris brevioribus, aristâ longiore differt.

Jungle at Klong Munsé, a tall tree (n° 508 C).

Shorea Roxb.

Sect. *Eushorea* Pierre.

7. **S. obtusa** Wall. (List. (1828) n° 966).

Var. **Koh-changensis** Heim var. nov.

Foliae pagina inferior non cinerea sed glabra, in axilla nervorum secundariorum pauciorum glandulae nullae; fructus obsphaericus nec lanceolatus, basi alarum omnino tectus.

Klong Sarlakpet in the jungle near the sea, a very tall tree (No. 726 C).

Area of type: Birmania, Cambodia.

8. **S. robusta** Goertn. f. (Fruct. III (1805), 48, t. 186).

Var. **Schmidtii** Heim. Var. nov.

Fructum solum vidi, valde majorem (27 mm. long.) quam in typo, cotyledone placentar. multilobulato. Forsitan potius *S. vulgari* Pierre. cujus fructus ignotus, referenda.

Jungle at Klong Son (n° 508 e).

Area of type: Cochinchina.

Sect. *Hopeoïdes* Heim.

9. **S. hypochra** Hance (Journ. of Bot. XIV (1876), 242).

Klong Munsé, Klong Son, in the jungle (Nos 279, 508 d, 818).

Area: Cochinchina.

10. **S. Henryana** Pierre. (in Lanessan — Pl. utiles colon. franç. 1886, 302. — Flor. forest. Cochinch. fasc. 15 (1890), t. 229).

Var. **rigida** Heim var. nov.

Folia rigida, glabra. Sepala petalaque breviora. Stamina 20 nec 25, connectivo non ciliato.

Jungle near Lem Dan, a small tree.

Area of type: Cochinchina.

Pentacme A. DC.

11. **P. suavis** A. DC. (Prodr. XVI, pars 2 (1864), 526).

Var. **laevis** Pierre (Flor. forest. Cochinch. fasc. 15 (1890), t. 225).

Klong Prao, on rocks in the jungle (No. 706 a).

Area: Birmania, regnum Siamicum, Cochinchina.

Var. **obtusifolia** Heim var. nov.

Flores? Rami novelli, foliaeque glabri; folia minora, basi apiceque obtusa vel ob-cordata, papyracea. Fructus immaturus, basi alarum longiorum omnino inclusus.

Klong Majum, alt. 700 ft., on rocks in the jungle; a small tree (No. 595).

Hopea Roxb.

Sect. *Euhopea.*

12. **H. Schmidtii** Heim sp. nov.

Rami, racemi, flores? Folia (in specimine unica) papyracea, glabra, in sicco pallida, ovata, e basi attenuata, apice abrupte breviterque acuminata (100 mm. long. — 50 mm. lat.), costa supra tenuiter concava, subtus velutino-villosa, nervi secundarii (utrinque 19) tenuiter prominuli, arcuati, demum intramarginales, nervi tertiarii transversales, ditissime ramosi.

Fructus maturus, ovoïdeus (13—14 mm. long. — 8—9 mm. lat.), calycis basi inclusus, apice liber. Pericarpium crustaceum; calycis alae 2 magnae, glabrae, nitidae, aequales, lineares, arcuatæ, basi laeviter angustatae, apice rotundatae, nervis primariis (7—9) utrinque tenuiter prominulis, nervis tertiariis transversalibus tenuiter ramosis; calycis lobi non aucti 3, breves, subaequales, ovato-rotundati (60 mm. long. — 50 mm. lat.); embryo ovoïdeus, carnosus (20 mm. long. — 21 mm. lat.), cotyledonibus inaequalibus; cotyl. exteriore, emarginato, profunde bilobato, cotyl. placentar. duplo brevioris, lobis liberis.

Jungle near Klong Son (No. 508 a).

Sect. *Dryobalanoïdes* Miq.

13. **H. siamensis** Heim nov. sp.

Rami, ramuli, folia, flores? Fructus (maturus) parvissimus, breviter pedicellatus (1 mm. long.), ovoïdeo-conicus (7 mm. long. — 5 mm. lat.), acumine brevissimo (1 mm.), acuto, stylopodio vix conspicuo, glaberrimus, calycis lobis basi inclusus, apice liber; alis 2 laeviter inaequalibus (36—38 mm. long. — 7—8 mm. lat.), attenuatis, apice rotundatis, glabris, nervis primariis vix conspicuis: 7; calycis labis non auctis, ovato-rotundatis, brevibus (5 mm. long. — 5 mm. lat.), cotyledonibus carnosis, cotyl. exteriore apice emarginato, convexo-concavo, cotyl. placentar. profunde bilobato, triangulare-pyramidato, radicula fere inclusa.

Species *H. Treubii* Heim affinis; ab hac specie fructus exiguitate sat distincta.

Jungle near Klong Son (No. 508 c).

Sect. *Hancea* Heim.

14. **H. avellanea** Heim nov. sp.

Rami novelli compressi, cinereo-nigrescentes, glabri. Folia parva, glaberrima, in sicco avellanea, chartacea, margine revoluta, ovato-

lanceolata (45—55 mm. long. — 15—26 mm. lat.), acumine breve spatulato (4—6 mm. long.); petiolus brevis (4—5 mm. long.), supra minute canaliculatus; costa supra tenuiter concava, subtus valde proeminens; nervi secundarii numerosissimi, supra vix conspicui, subtus alteri prominuli, arcuati, demum intramarginales, alteri alternantes, paralleli, vix conspicui, nervi tertiarii transversales, non bene conspicui. Racemi tenuissimi, ut videtur multifloriferi. Flores? Fructus maturus (in specimine unicus) parvissimus (7 mm. long. — 5 mm. lat.), breviter pedicellatus (1,5 mm.), breviter ovoïdeo-acuminatus (1 mm.), stylopodio nullo, basi calycis omnino inclusus, alis 2 aequalibus, glabris nec nitidis, basi valde attenuatis, apice attenuato-rotundatis (33 mm. long. — 6 mm. lat.), calycis lobis non auctis 3: 1 subaliforme (7 mm. long.), 2 brevibus, ovatis (5 mm. long. — 4 mm. lat.). Pericarpium crustaceum. Embryo (immaturus) *Hanceae,* cotyledonibus valde inaequalibus, radicula exserta.

Species *H. griseæ* Brandis affinis; ab hac specie petioli laminaeque exiguitate sat distincta.

Klong Munsé, branches and fruit shot down from a very tall tree in the jungle (No. 420).

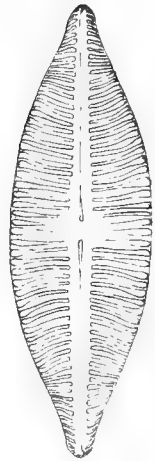

1


3


2


4


5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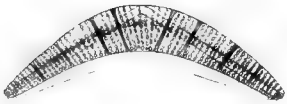
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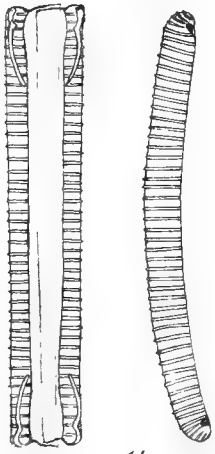
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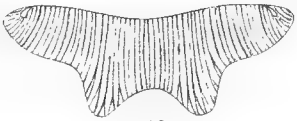
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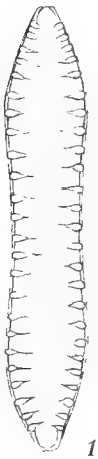
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16



19

CONTENT OF PRECEDING PARTS.

Part I.

JOHS. SCHMIDT: Introductory.
F. KRÄNZLIN: Orchidaceae, Apostasiaceae.

Part II.

M. FOSLIE: Corallinaceae.

Part III.

C. B. CLARKE: Cyperaceae.
E. HACKEL: Gramineae.
H. CHRIST: Pteridophyta (Selaginella auct. G. Hieronymus).
V. F. BROTHERUS: Bryales.

Part IV.

W. WEST and G. S. WEST: Fresh Water Chlorophyceae.
TH. REINBOLD: Marine Algae (Chlorophyceae, Phaeophyceae, Dictyotales, Rhodophyceae).
M. GOMONT: Myxophyceae hormogoneae.
JOHS. SCHMIDT: Peridiniales.

Part V.

C. B. CLARKE: Compositae, Umbelliferae.
JOHS. SCHMIDT: Rhizophoraceae.
OVE PAULSEN: Fagaceae.
F. K. RAVN: Loranthaceae.
EUG. WARMING: Podostemaceae.
C. H. OSTENFELD: Hydrocharitaceae, Lemnaceae, Pontederiaceae, Potamogetonaceae, Gentianaceae (Limnanthemum), Nymphaeaceae.
H. HARMS: Leguminosae.
K. SCHUMANN: Scitamineae.
A. ENGLER: Araceae.
F. STEPHANI: Hepaticae.

Part VI.

K. SCHUMANN: Rubiaceae.
C. B. CLARKE: Lythraceae, Melastomaceae, Scrophulariaceae, Acanthaceae.
O. WARBURG: Urticaceae.
E. ROSTRUP and G. MASSEE: Fungi.

PRELIMINARY REPORT ON THE BOTANICAL RESULTS OF THE DANISH EXPEDITION TO SIAM (1899—1900).

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Part VIII.

E. Östrup: Marine Diatoms.
C. H. Ostenfeld: Gymnospermae, Pandanaceae, Smilaceae, Commelynaceae, Amaryllidaceae, Taccaceae, Dioscoreaceae.
V. A. Poulsen: Eriocaulaceae.
Johs. Schmidt: Combretaceae.
Carl Mez: Myrsinaceae.
H. Hallier: Convolvulaceae.
C. B. Clarke: Verbenaceae, Labiatae.

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Marine Diatoms[1].

by **E. Östrup** — Copenhagen.

With Plate 1 and 2.

The following list of marine Diatoms has resulted from the examination of 74 samples collected by the Danish expedition to Siam (1899—1900).

The localities of these samples are:

Koh Kahdat	in the	text	abbreviated	to	K Kt	42	samples.
Lem Ngob	„	„	„	„	L N	9	„
Koh Kam	„	„	„	„	K Km	3	„
Koh Mesan	„	„	„	„	K Mn	2	„
Between Koh Mesan and Cap Liant	„	„	„	„	K Mn—C Lt	4	„
Between Koh Mesan and Koh Chuen	„	„	„	„	K Mn—K Cn	1	„

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[1]) When in the following list the genera have been arranged as in F. Schütt: Bacillariaceae (Engler & Prantl: Nat. Pflanzenfam. I, 1896, p. 55 ff.), this has been made according to the wish of the editor of „Flora of Koh Chang". As to the Marine Plankton Diatoms see the paper by C. H. Ostenfeld in „Flora of Koh Chang", Part VII, reprinted from Bot. Tidsskr. Vol. 25, 1902.

Koh Chang	in the	text	abbreviated	to	K Cg	1	sample.
Between Koh Chang and Koh Lom	„	„	„	„	K Cg—K Lm	1	„
Koh Chuen	„	„	„	„	K Cn	1	„
Koh Chick	„	„	„	„	K Ck	1	„
Koh Sakait	„	„	„	„	K S	1	„
Koh Chang Noi	„	„	„	„	K Cg N	1	„
Tung Kaben	„	„	„	„	T K	1	„
Without habitat (sine loco)	„	„	„	„	s. l.	6	„
					Total	74	samples.

Bacillariaceae.

A. *Centricae.*

Coscinodisceae.

Melosira Ag.

Podosira Ehb.

1. **M. Montagnei** Ktz. V. H. Syn. tab. LXXXIV, figs. 11—12.

K Cg, K Km, K Kt, K Mn—C Lt, s. l. (12 samples).

Area: Atlantic coasts of Europe, Mediterranean, West India, Samarang.

Paralia Heib.

2. **P. sulcata** (Ehb.) Cl. var. **coronata** (Ehr.) Grun. V. H. Syn. t. XCI, fig. 17.

K Km, K Kt, K Mn—C Lt, L N (10 samples).

Area: the main species ubiquitous. The var. *coronata*: Java, Tahiti.

Hyalodiscus Ehb.

3. **H. stelliger** Bail. V. H. Syn. tab. LXXXIV, fig. 1.

K Km, K Kt, K Mn—C Lt (3 samples).

Area: The coasts of Europe, Delaware, Sierra Leone, China, Bengal, Java, Tahiti.

Cyclotella Ktz.

4. **C. striata** W. Sm. var. **Stylorum** Bright. forma *minuta* V. H. Syn. tab. XCIII, fig. 5.

KKt, TK, s. l. (5 samples).

Area: Labuan, Bengal, Sierra Leone.
forma *minuta*: Sierra Leone.

5. **C. transsylvanica** Pant. var. **disseminato-punctata** Pant. Pant. Ung. III, tab. XXXV, fig. 511. Tab. nostr. I, fig. 2.

Diam. 0,016 mm.

Valve circular. Marginal striæ 7 in 0,01 mm. Inframarginal puncta so arranged that they form sectors separated by structureless interstices on the elevated part of the valve; on the depressed part they are more irregularly dispersed.

LN (2 samples; only two specimens met with).

Area: Köpecz (fossil).

Coscinodiscus Ehb.

6. **C. cocconeiformis** A. S. var. **tenuior** A. S. A. S. Atl. tab. LVIII, fig. 27.

Found only in a sample from KKm.

Area: Leton Bank (A. S.).

7. **C. denarius** A. S. A. S. Atl. tab. LVII, figs. 19—21.

KKm, KCn, KMn—CLt (6 samples).

Area: Campeachy Bank, Sansego, Madagascar, Antarctic Ocean.

8. **C. excentricus** Ehb. V. H. Syn. tab. CXXX, fig. 4.

KKt (5 samples).

Area: ubiquitous.

9. **C. lineatus** Ehb. V. H. Syn. tab. CXXXI, fig. 3.

Found only in a sample from LN.

Area: ubiquitous.

10. **C. minor** Ehb. A. S. Atl. tab. LVIII, figs. 39—40.

KMn—CLt (1 sample).

Area: ubiquitous.

11. **C. nitidus** Greg. var. **sparsa** Ratt. A. S. Atl. tab. LVIII, fig. 17.

KKm, KKt, KMn—CLt, LN (5 samples).

Area: the main species: ubiquitous.
var. *sparsa*: Campeachy Bank.

12. **C. nodulifer** Janisch. A. S. Atl. tab. LIX, figs. 21—23.

KKm, KKt, KCn, KMn—CLt, LN (17 samples).

Area: dispersed, especially in the southern Seas.

13. **C. subconcavus** Grun. A. S. Atl. tab. LIX, figs. 12—13.

KKm, KKt, TK, s. l. (4 samples).

Area: Simbirsk (foss.), Java.

Actinodisceae.

Schuettia de Toni.

14. **S. annulata** (Wall.) de Toni var. **minor** Grun. V. H. Syn. tab. CXXIV fig. 13.

Solitary in two samples from KKt and LN.

Area: Mer du Sud (Grunow in V. H. Syn. l. c.).

Actinoptychus Ehb.

15. **A. vulgaris** Schum. var. **australis** Grun. V. H. Syn. tab. CXXI. fig. 8.

Solitary in a sample from KKt.

Area: Northern Australia.

— — var. **tropica** Brun. Le Diat. 1893, tab. XXIV, fig. 4.

Area: Indian Ocean.

16. **A. moronensis** (Grev.) Cl. var. **guttata** Øst. n. var. Tab. nostr. I, fig. 1, cfr. Grev. Trans. Micr. XIV, N. S., tab. XI, fig. 14.

Diameter 0,069 mm.

This form must surely be considered a variety of *A. moron.*, of which it partakes the very peculiar radiating structure of the processiferous sectors. On the other hand the sectors without processes do not possess the deltoid depression mentioned and figured by Grevlle, but are spotted on a ground of decussate striæ.

KKt (only one specimen met with).

Area: *A. moron.* Moravian Tegel, where it becomes somewhat larger (up to 0,26 mm.) and sometimes is more flattened and slightly hexagonal (Cleve Mor. Tegel P. 172). Moron deposit (Greville l. c.).

Eupodisceae.

Actinocyclus Ehb.

17. **A. australis** Grun. V. H. Syn. tab. CVXV, fig. 7.

Solitary in a sample from TK.

Area: Pacific.

18. **A. moniliformis** Ralfs. Hantzsch Ost. Archip. tab. VI A, fig. 9.

Solitary in a sample from KKt.

Among the many figures of *A. monilif.* quoted by Rattray (Actinoc. P. 182) only the above by Hantzsch corresponds exactly to the form met with by me.

Area: ubiquitous.

19. **A. crassus** V. H. Syn. tab. CXXIV, figs. 6 & 8.

KKm. KKt, LN (4 samples).

Area: England, Ireland, Belgium, Denmark.

NB. Rattray (Actinoc. p. 154) gives this species under *A. subcrassus* Ratt., as he means that W. Smith's *A. (Eupodiscus) crassus* (W. Sm. Syn. I, tab. IV, fig. 41) cannot be identical with the species figured by van Heurck l. c. and referred by him to *A. (Eupodiscus) crassus* W. Sm. In his Traité des Diat. p. 524—25 van Heurck however points out that the form figured by him agrees with original specimens of *A. (Eupodiscus) crassus* signed by W. Smith himself. *A. (Eupodiscus) crassus* W. Sm. is referred by Rattray (l. c. p. 173) to the widely distributed *Act. Ehrenbergii* Ralfs.

20. **A. subocellatus** (Grun.) Ratt. A. S. Atl. tab. LVII, fig. 31.

Solitary in a sample from KKt.

Resembles with regard to the striation more *Coscinodiscus curvatulus* Grun. var *latius striata* Ratt. A. S. l. c. fig. 30, but the pseudonodule are very evident.

Area: Bolivian Guano, Cape of Good Hope, Kerguelen Island, Table Bay, dredgings off Vancouver Island and off Heard Island.

Probably it is the same form that Cleve (Ind. Ocean & Mal. Archip. p. 32) quotes from Java sub *A. Coscinodiscus curvatulus* Grun.

21. **A. subtilis** Ralfs forma **subtilissima**. Cfr. V. H. Syn. tab. CXXIV, fig. 7.

Surface convex, diam. c. 0,13 mm., rows towards the centrum 16 in 0,01 mm.

KKt (17 samples).

Area: the main species ubiquitous.

Dr. Henri Van Heurck, wo has been kind enough to compare the present form with typical *A. subt.* from his rich collections, says that it differs: „1) par sa forme notablement plus bombé, 2) par sa grande minceur et sa fragilité, 3) par sa striation infinement plus fine. Ce serait donc une forma subtilissima ou une espèce nouvelle très proche du subtilissima que j'en ferais"; but Dr. Van Heurck adds „n'ayant vu qu'une seule valve, je ne voudrais pas porter une jugement absolu, avant de faire cela il faudrait voir et comparer un certain nombre de valves"

According to Rattray (Actin. p. 188) the size of the typical species is 0,0498 mm.—0.0757 mm.; the present form is nearly twice as large, but Dr. H. Van Heurck has sent me some photographical copies of an *Actinoc. subt.* from Sandwich Islands which had the same size; further Dr. Van Heurck tells me that he has specimens from the same place which are „encore notablement plus grandes".

Auliscus Ehb.

22. **A. cælatus** Bail. var. **latecostata** A. S. Leud. Fortm. Ceyl. t. VII, fig. 66.

KKt, KCn, KMn—CLt (4 samples).

Area: Campeachy Bay, Bass Strait, Yokohama, Holothurians Java.

23. **A. reticulatus** Grev. A. S. Atl. tab. XXX, fig. 4.

Solitary in a sample from KKt.

Area: Peru, Holothurians California, Zanzibar, Amboina, Bass Strait.

Heliopelta sp. A fragment only which could not be determined, met with in one sample from KKm.

Chaetocereae.

Bacteriastrum Shad.

24. **B. varians** L. V. H. Syn. tab. LXXX, figs. 3—5.

KKm, KM—CLt, KS, TK (5 samples).

Occurs generally only as fragments.

Area: Mediterranean, Red Sea, Guli of Aden. Indian Sea, Malay Archipelago, South China Sea (C. H. Ostenfeld: Marine Plankton Diatoms in „Flora of Koh Chang" Part VII, p. 232, reprinted from Bot. Tidsskr. Vol. 25, Aug. 1902).

Chaetoceras Ehb.

25. **C. diversum** Cl. Leud. Fortm. la Mal. tab. VI, fig. 1 (*Ch. rude* L. F.).

Solitary in a sample from KKm.

Area: Atlantic Ocean, Mediterranean, Indian Ocean, Malay Archipelago (Ostenfeld l. c. p. 235 (17)).

26. **C. læve** Leud. Fortm. L. F. la Mal. tab. VI, fig. 2.

Solitary in a sample from KKt.

Area: Sea of Java (Ostenfeld l. c. p. 237 (19)).

27. **C. Lorenzianum** Grun. Grun. Wien. Aka. 1863, tab. XIV, fig. 13.

Occurs as fragments in two samples from KKt.

Area: Atlantic from North Sea southwards, Mediterranean, Red Sea, Gulf of Aden, Malay Archipelago, Hongkong (Ostenfeld l. c. p. 237 (19)).

Biddulphieae.

Triceratium Ehb.

28. **T. bicorne** Cl. A. S. Atl. tab. LXXVIII, figs. 24—25.

KKm, KKt (4 samples).

Area: St. Bartholomew, California, Madagascar, Java.

29. **T. circulare** Grun. forma **IV—appendiculata** V. H. Syn. tab. CVIII, fig. 10.

KKt (3 samples).

Area: Barbadoes.

30. **T. dubium** Bright. A. S. Atl. tab. LXXVIII, figs. 34—35.

KCn, KKt, KMn—CLt (22 samples).

Area: Campeachy Bay, Madagascar, Algoa Bay, Malay Archipelago, Sandwich Islands.

31. **T. orbiculatum** Shad. Jan & Rabh. Hond. tab, II, fig. 5.

Only found in a sample without habitat.

Area: Honduras, Port Natal, Malay Archipelago.

32. **T. punctatum** Bright. forma **trigona minuta** V. H. Syn. tab. CIX, fig. 10.

KKt (3 samples).

Area: Seychelles.

33. **T. scitulum** Bright. A. S. Atl. tab. LXXXIII, fig. 11.

KKm, KMn—CLt (2 samples).

Area: Gulf of Mexico, Campeachy Bay, Malay Archipelago.

— — forma **qvadrata** A. S. Atl. tab. LXXXIV, figs 5—6.

KKm (2 samples).

Area: Campeachy Bay; Singapore.

34. **T. Shadboltianum** Grev. A. S. Atl. tab. LXXX, figs. 18—19.

Found only in a sample from KKt.

Area: Samoa, Tahiti.

This species is (Ind. Oc. & Malay Archip. p. 32) referred by Cleve to *Tric. orbiculatum* Shadb.

35. **T. (Amphitetras) parvulum** Jan. & Rabh. Jan & Rabh. Hond. tab. I, fig. 4.

KKt (2 samples).

Area: Honduras.

36. **Triceratium** sp. Tab. nostr. I, fig. 4.

Triangular with a single prominent central spine. Distance between the angles 0,047 mm., striæ counted along the margin 14 in 0,01 mm. radiated and composed of puncta.

Solitary in a sample labelled: „Off Tung Kaben".

I think this form is nearly allied to *Triceratium (Odontella discigera* var.?) *Californicum* Grun. in V. H. Syn. tab. CVIII, fig. 11 (from Dépôt de Santa Monica).

Biddulphia Gray.

37. **B. aurita** Lyngbye. V. H. Syn. tab. CXCVIII, fig. 4.

KKt (2 samples).

Area: Atlantic coasts of America and Europe, Arctic Ocean, Madagascar, Java.

38. **B. membranacea** Cl. Leud. Fortm. Afr. occ. tab. VII, fig. 1 & 4.

KCn, KKt (3 samples).

Area: Ile St. Thome (Leud. Fortm.), Honolulu, Ceylon, Malay Archipelago.

39. **B. minutissima** Grev. Grev. South. Pacif. tab. VI, fig. 14.

Solitary in a sample from KKt.

Area: Zanzibar. In a dredging off the island of Arran (Greville).

40. **B. pulchella** Gray. V. H. Syn. tab. CXCVII, figs. 1—3.

KKm, KKt, KMn—CLt (17 samples).

Area: probably ubiquitous.

41. **B. reticulata** Roper. V. H. Syn. tab. CII, figs. 1—2. A. S. Atl. Tab. LXXVIII, fig. 22.

KKt, KMn—CLt (6 samples).

Area: Ceylon, Natal, Honduras, Madagascar, Malay Archipelago, Tahiti, Samoa, Hawaii.

— — forma **trigona.** V. H. l. c. fig. 3.

Only found in a sample without habitat.

Area: Madagascar, Java.

42. **B. Tuomeyi** (Bail.) Roper. V. H. Syn. tab. CXCVIII, figs. 1—2.

KKm, KKt, KMn—CLt (5 samples).

Area: Campeachy Bay, Campeachy Bank, Mediterranean, Mazatlan, Valparaiso, Nankoori, Madagascar, King Mill Island, Malay Archipelago.

Isthmia Ag.

43. **I. nervosa** Ktz. W. Sm. Syn. tab. XLVII.

Solitary in a sample from KKt.

Area: Sct. Francisco, Honduras, Europe, Arctic Ocean, Madagascar, Kerguelen.

Hemiaulus Ehb.

44. **H. Heibergii** Cl. Cl. Diat. Java. tab. I, fig. 4.

KKm, KKt (2 samples).

Area: Japan. China, Indian Ocean, Arafura, Malay Archipelago, Tropical Atlantic.

Terpsinoë Ehb.

45. **T. americana** Ralfs. A. S. Atl. tab. CC, fig. 9.

Solitary in a sample from KCg.

Area: Venice, Florida, Neuse River, Cape of Good Hope, Yokohama. Australia, Samoa.

Rutilaroideae.

Rutilaria Grev.

46. **R. recens** Cl. Cl. New. Diat. tab. IV, fig. 57 a & b. V. H. Syn. tab. CV, fig. 9. Tab. nostr. 1, fig. 5.

KKm, KMn—CLt, KS (5 samples).

Area: Galepagos.

As it may be seen of my figure compared with those quoted above by Cleve and Van Heurck the present form is somewhat more elegant. Cleve (l. c. p. 19) figures and mentions some „strongly marked puncta", which are not very conspicuous in Van Heurck's figure and that I have not seen in my specimens. Van Heurck thinks that the somewhat unsymmetrical sculpture shown in his figure „ferait croire à une Euodiée". Cleve whose figures do not show any unsymmetrical sculpture however points out that his *Rutilaria recens* is „very allied to the genus *Cymatosira* Grun., of which the only known species *C. Lorenziana* Grun. has also marginal bristles". As my form do not possess „strongly marked puncta", i. e. the character which should entitle its affinity to *Rutilaria*, and as it does not show an unsymmetrical sculpture, I am most inclined to think it allied to *Cymatosira* Grun.

B. *Pennatae.*

Tabellarieae.

Rhabdonema Ktz.

47. **R. adriaticum** Ktz. V. H. Syn. tab. LIV, figs. 11—13.

Common in the samples (25) from KKt.

Area: ubiquitous.

Striatella Ag.

48. **S. hyalina** (Jan. & Rabenh.) Rabenh. Jan. & Rabenh. Hondur. tab. II, fig. 13.

KKt (1 sample).

Area: Honduras.

49. **S. delicatula** (Ktz.) Grun. var. **gibbosa** Östr. n. var. Tab. nostr. I, fig. 13.

L. 0,01 mm., b. 0,004 mm. Striae very fine. Valve gibbous in the middle.

Found only in two samples from KKt., but this very small hyaline form may easily be overlooked.

Area: the main species: probably widely distributed.

Climacosira Grun.

50. **C. mirifica** (W. Sm.) Grun. Jan. & Rab. Hond. tab. II, fig. 19.

KKt (6 samples).

Area: Brezil, West Indies, Red Sea, Mauritius, Madagascar, Malay Archipelago, Samoa, Tahiti, Hawaii.

Grammatophora Ehb.

51. **G. marina** (Lyngb.) Ktz. var. **undulata** Ehb. Perag. Diat. de Fr. tab. LXXXVII, fig. 24.

KKm, KKt (6 samples).

Area: the coasts of Europe and America, Madagascar, Ceylon, East Indian Archipelago, Tahiti.

The present form corresponds exactly to the above figurs by Peragallo but is more closely striate (20—22 str. in 0,01 mm.).

52. **G. oceanica** Ehb. var. **macilenta** W. Sm. Perag. Diat. de Fr. tab. LXXXVII, figs. 15—17.

KKm, KKt, KMn—CLt, LN (14 samples).

Area: the main species: Europe, Cape Horn, Borneo, Ceylon.
var. *macilenta*: in aqvis marinis ad oras Europae passim (de Toni). Madagascar, Java, Samoa, Tahiti, Hawaii.

Denticula Ktz.

53. **D. subtilis** Grun. V. H. Syn. tab. XLIX, figs. 10—12.

LN (1 sample).

Area: England.

Meridioneae.

Opephora Petit.

54. **O. pacifica** (Grun.) Petit. Grun. Wien. Akad. 1862. tab. V, fig. 19.

Solitary in a sample from KKt.

Area: in mari pacifico boreali (Grun.), Labuan (Cleve), Samoa, Hawaii.

Trachysphenia Petit.

55. **T. australis** H. L. Sm. var.? **Aucklandica** Grun. V. H. Syn. tab. XXXVII, fig. 1.

Solitary in a sample from KKt.

Area: Royal Sound, Kerguelens Land, Borneo, Labuan, Port Jackson.

Licmophora Ag.

56. **L. flabellata** (Carm.) Ag. V. H. Syn. tab. XLVI, figs. 2—3.

KKt, KMn—CLt (3 samples).

Area: the coasts of Europe, Ceylon, Malay Archipelago, Hawaii.

In a sample from KMn—CLt I have found a *Licmophora*, in shape and striation agreeing with *L. Aurivillii* Cl. (Ind. Oc. & Mal. Archip. p. 58, fig. 2 but only 0,13 mm. long (*L. Aurivillii* is 0,8 mm. long).

57. **L. gracilis** (Ehb.) Grun. V. H. Syn. tab. XLVI, fig. 13.

KKt (2 samples).

Area: Europe.

58. **L. Jürgensi** Ag. var. **intermedia** Grun. V. H. Syn. tab. XLVI, fig. 9.

Found only in a sample without habitat.

Area: Europe, Guadeloupe.

59. **L. Remulus** Grun. V. H. Syn. tab. XLVI, fig. 4.

Found only in a sample from LN.

Area: Adriatic, Honduras, Mauritius.

Climacosphenia Ehb.

60. **C. elongata** Bail. Perag. Diat. de Fr. tab. LXXXVI, figs. 3—4. Hantzsch Ost. Arch. tab. V, fig. 1 (*C. indica*).

KKt, LN (25 samples).

Area: widely distributed, as far as I know, along the coast of the Southern Seas.

De Toni (Syll. p. 739—741) gives four species of this genus, but Grunow certainly is right when he says (Novara Exp. p. 5): „Die Unter-

scheidung aller Climacosphenia-Arten ist überhaupt höchst prekär". In settling the above „area" I therefore paid for the localities of all the four species. The area of *C. elongata* Bail. is given by de Toni (l. c. p. 740) thus: „in mari rubro frequens in primis ad Laurencias et in mari atlantico ad oras Americæ borealis et Brasiliæ: ad algas ex insulis Canariensibus et ex insula Guadelupa".

Euphyllodium Shadbolt.

61. **E. spathulatum** Shadbolt. Tab. nostr. I, figs. 3a—c.

L. up to 0,1 mm., max. breadth up to 0,05 mm. The ribs counted at the median line, above 6, in the middle 4,4, below 3 in 0,01 mm. Between the ribs square alveoli 6 in 0,01 mm. The frustule cuneiform.

KKt (22 samples), KCg—KLm (1 sample), s. l. (2 samples).

Area: Mediterranean, Adriatic, the coasts of England and America borealis, Ile San Thome, Madagascar, Funafuti, Malay Archipelago, Ceylon, Nankoori, Samoa, Hawaii.

I think that *E. spathulatum* is identical with *Podocystis australica* Witt (de Toni p. 602) and *P. africana* Leud. Fortm. (L. F. Afr. occid. p. 31, tab. VI, fig. 2). According to de Toni both *P. africana* and *P. australica* are small forms, their maximal length being 0,04 mm. The present form is larger, and thus it agrees well with the figure by Grunow in Wien. Akad. 1862, tab. X, fig. 13 which (measured on the figure) shows the dimensions L. c. 0,1 mm., B. 0,05 mm. The form from Nankoori (Grun. Novara Exp. tab. 1 A, fig. 9) is still somewhat larger and by Leud. Fortm. (l. c. p. 31) the dimensions of *E. spath.* are given as L. 0,16 mm., B. 0,09 mm. and of *P. africana* as L. 0,29 mm., B. 0,11 mm. However must be added, that the figures of Leud. Fortm. shows less dimensions.

Fragilarieae.

Plagiogramma Grev.

62. **P. Atomus** Grev. Grev. South Pacific. tab. XIII, fig. 9. A. S. Atl. tab. CCXI, fig. 20.

KKt (2 samples).

Area: Woodlark Islands, Ceylon, Java.

63. **P. decussatum** Grev. A. S. Atl. tab. LXXVI, figs. 28—29.

Found only in a sample from KKt.

Area: Virginian Islands, St. Helena, Sharks Bay, Madagascar, Zanzibar, Labuan, Ceylon, Java.

64. **P. Gregorianum** Grev. A. S. Atl. tab. CCIX, fig. 35.

KKt; LN (5 samples).

Area: Greenland, Europe, Honduras, Ceylon, Samoa.

65. **P. labuense** Cl. Cl. Vega Exp. tab. XXXVII, fig. 62.

Solitary in a sample from KKt.

Area: Borneo.

66. **P. polygibbum** Cl. & Grove. Leud. Fortm. Ceylon tab. IX, fig. 90.

Solitary in a sample from KKt.

Area: Macassar Street, Ceylon, Malay Archipelago.

67. **P. pulchellum** Grev. Grev. Mic. Journ. 1859, tab. X, figs. 4—6.

KKt, KKm, KMn—CLt (4 samples).

Area: Nassau, New Providence, Jamaica, Californian Guano, Borneo, Ceylon.

68. **P. Robertsianum** Grev. Trans. Mic. Soc. XI, N.S., tab. I, fig. 1—2.

L. 0,03 mm., b. 0,0072 mm. Striæ more than 20 in 0,01 mm. very delicate. I am not able to see any longitudinal striation.

Solitary in a sample from KKt.

Area: Port Stephen, New South Wales.

This *Plagiogramma* of which I have seen but a single specimen agrees in its whole habit well with the above quoted figure by Greville, but it is much more closely striate. As I have not been able to see any longitudinal striation, I dare not refer it to *P. interruptum* (Greg.) Ralfs var. *adriatica* Grun. (Cl. Vega Exp. tab. XXXVII, fig. 61), the species to which it comes nearest by its more delicate striation but from which it differs by its breadth.

Area for *P. int. adriat.*: Adriatic, Borneo.

69. **P. pygmæum** Grev. Grev. Micr. Journ. 1859, tab. X, fig. 11.

KKt (4 samples).

Area: Nassau, New Providence, Cap of good Hope, Red Sea, Ceylon.

70. **P. Seychellarum** Grun. Cl. Vega Exp. tab. XXXVII, fig. 59.

KKm (1 sample).

Area: Seychelles, Labuan, Borneo.

71. **P. sumatrense** Leud. Fortm. Leud. Fortm. la Mal. tab. II, fig. 12.

Solitary in a sample from KKt.

Area: Sumatra.

72. **P. tenuistriatum** Cl. Cl. Vega Exp. tab. XXXVII, fig. 63.

Solitary in a sample from KKt.

Area: Borneo.

73. **P. tesselatum** Grev. Grev. Micr. Jour. 1859, tab. X, fig. 7.

KKt, KMn--CLt (4 samples).

Area: Borneo, between Aden and Bab el Mandeb, Californian Guano.

Raphoneis Ehb.

74. **R. amphiceros** Ehb. Cl. Vega Exp. tab. XXVII, fig. 52 a. V. H. Syn. tab. XXXVI, fig. 20 (var. *rhombica*).

KKm, KKt (6 samples).

Area: on the coasts of Europe, Rio Grande, „in Virginia et Marylandia" (Ehb. sec. de Toni), Borneo.

— — var. **cruciata** Cl. Jan. & Rabh. Hond. tab. I, fig. 5. V. H. Syn. tab. CXVI, fig. 16.

KKt, LN (11 samples).

Area: Honduras, Seychelles, Java, Samoa.

75. **R. bilineata** Cl. & Grun. Cl. Vega Exp. tab. XXXVII, fig. 55 b.

KKt (9 samples).

Area: Borneo, Ceylon, Java.

The specimens examined by me are often rather small and comparatively broad (L. 0,015 mm., b. 0,008 mm.) and the apices less protracted. It thus gets a certain resemblance to *Gephyria* sp. in *Castracane* (Chall. Exp. tab. XXV, fig. 19) and to *Gephyria Castracanei* Leud. Fortm. (la Mal. tab. II, fig. 8).

In a sample labelled „Off Koh Kam" I found a *Raphoneis*, of which I have (tab. I, fig. 6) given a figure. Probably it is *R. bilineata* Cl. & Grun. var. *contracta* Grun. (cnfr. Cl. Vega Exp. p. 499).

76. **R. marginulata** Cl. & Grun. Cl. Vega Exp. tab. XXXVII, fig. 57.

KKt, LN (2 samples).

Area: Seychelles, Borneo.

Dimerogramma Ralfs.

77. **Dimerogramma fulvum** Greg. Perag. Diat de Fr. tab. LXXX, figs. 17—18.

KKt (1 sample).

Area: on the coasts of Europe, Mediterranean, Adriatic.

Glyphodesmis Grev.

78. **G. siamensis** Östr. n. sp. Tab. nostr. I, fig. 9.

L. 0,059 mm., b. 0,013 mm. Costæ 6,5 in 0,01 mm. alternating with double rows of puncta. Valve lanceolate, the pseudoraphe in the middle extended to a lancetlike area, on the apices a blank oval elevated spot.

Solitary in a sample from LN.

I suppose this form to be a *Glyphodesmis* in spite of its double row of puncta; perhaps it is allied to *Glyph. eximia* Grev. (Micr. Jour. II, tab. IV, fig. 9).

G. siamensis forma **minor**. Tab. nostr. I, fig. 8.

L. 0,023 mm., b. 0,01 mm. Costæ 7 in 0,01 mm.

Solitary in a sample from KKt.

Synedra Ehb.

79. **S. affinis** Ktz. var. Cnfr. V. H. Syn. tab. XLI, fig. 15 B.

The present variant has the same shape as the figure by V. Heurck quoted above, but only 11—12 striæ in 0,01 mm.

KKm, KKt, KCg (3 samples).

Area: the main species probably ubiquitous.

80. **S. cuneata** Grun. Perag. Diat. de Fr. tab. LXXVIII, figs. 1—2.

KMn—CLt, s. l. (2 samples).

Area: Banyuls, Honduras, Ceylon, Java.

81. **S. formosa** Hantzsch. Hantzsch Ost. tab. V, fig. 3.

KKt, KCg—KL, LN (11 samples).

Area: Madagascar, East India Archipelago.

82. **S. fulgens** Grev. V. H. Syn. tab. XLIII, figs. 1—2.

KKt (2 samples).

Area: Europe, Borneo.

— — var. **gigantea** Lob. Perag. Diat. de Fr. tab. LXXIX, fig. 6.

Found only in a sample from KKt.

Area: Adriatic.

83. **S. Hennedyana** Greg. V. H. Syn. tab. XLII, fig. 3.

KKt, KMn—CLt (6 samples).

Area: the coast of Europe, Ceylon, Malay Archipelago, Hawaii.

84. **S. lævigata** Grun. Grun. New Diat. Hond. tab. I, fig. 3.

KKm, KKt, KCg (14 samples).

— — var. **hyalina** Grun. Grun. l. c. fig. 5.

Scattered among the main species.

Area: Honduras, Mauritius, Samoa, Ceylon.

NB. In a sample from KCg I have found a *Synedra*, probably a variety of *S. lævigata*, in its outline agreeing with *Syn. affinis gracilis* V. H. Syn. tab. XLI, fig. 15 B. L. 0,2 mm., b. 0,005 mm., in the middle a little broader. Apices slightly capitate. Striæ very fine.

85. **S. superba** (Ktz.) Grun. Perag. Diat. de Fr. tab. LXXIX, fig. 7.

Found only in a sample from LN.

Area: Europe.

86. **S. undulata** Bail. V. H. Syn. tab. XLII, fig. 2.

Found only in a sample from K Kt.

Area: the coasts of N. America, Europe, Red Sea, Ceylon, Hawaii.

Thalassiothrix Cl. & Gr.

87. **Th. Frauenfeldi** Grun. V. H. Syn. tab. XXXVII, figs. 11—12.

Only found in a sample from T K.

Area: Atlantic Ocean, Mediterranean, Red Sea, Indian Ocean, Malay Archipelago, China Sea, Pacific Ocean (Ostenfeld).

Asterionella Hass.

88. **A. notata** Grun. V. H. Syn. tab. LII, fig. 3.

K Kt, s. l. (3 samples).

Area: Honduras, Barbadoes, Adriatic.

Achnanthoideae.

Achnanthes Bory.

89. **A. angustata** Grev. Cl. Vega Exp. tab. XXXV, fig. 2.

K CN, K Kt, L N (6 samples).

Area: Californian guano, Ceylon, Samoa.

Occurs sometimes somewhat smaller.

90. **A. brevipes** Ag. var. **intermedia** Ktz. = *A. subsessilis* Ktz. Perag. Diat. de Fr. tab. I, figs. 19—21.

Found only in a sample from L N.

Area: in algis marinis passim (de Toni).

91. **A. javanica** Grun. var. **rhombica** Grun. Tab. nostr. I, figs. 15 & 16.

K Kt, L N, s. l. (4 samples).

Area: Java, China, Madagascar.

As certainly belonging to *A. jav.* var. *rhomb.* I refer my fig. 15 in shape agreeing with the figure by Petit in Diat. prov. de Madagascar fig. 8. My fig. 16 (Epitheca) shows two longitudinal lines and a blank spot at each end of the valve on the same side of pseudoraphe. In *Achn. Bengalensis* Grun. such spots are characteristic according to Cl. Syn. II, p. 196, but here the fact is that „at each end of the valve is a small blank spot on both sides of the area". I have seen a similar valve in connection with a hypotheca showing a conspicuous bifid stauros in the same slide from which my figure is drawn. I suppose that this valve, in spite of the longitudinal lines being remoted from the margin is an epitheca of *A. javanica* which then possess similar „blank spots", though

only one at each end of the valve and both situated on the same side of pseudoraphe.

Area of *A. Bengal*: Bengal.

92. **A. mammalis** Castr. Cl. Syn. II, tab. III, figs. 13—14. Tab. nostr. I, fig. 14.

LN (2 samples).

Area: Galapagos, Madagascar, Macassar Strait, Malay Archipelago.

I have figured a hypotheca of this species being somewhat irregular in its outline because this hypotheca makes it still more probable that Greville's *Stauroneis obesa* Trans. Bot. Soc. V, VIII, tab. III, fig. 12 is identical with *A. mam.* Cast. (cnfr. Cl. Syn. II, p. 187).

93. **A. longipes** Ag. forma **minor decussata** Perag. Diat. de Fr. tab. I, figs. 7—9.

KKt, KM—CLt (7 samples).

Area: the main species: the coasts of Europe, Canarian Islands, Java, Sct. Paul Islands. f. *min. decuss.*: Nice (Peragallo).

Cyclophora Castr.

94. **C. siamensis** Östr. n. sp. Tab. nostr. I, fig. 12.

L. 0,075 mm., b. greatest 0,007 mm., at the constriction 0,0065 mm. Striæ not seen. Epitheca linear with slightly capitate apices. Hypotheca like epitheca but contracted in the middle. Terminal nodi very small, situated out in apices.

The present form reminds a good deal *Cycl.* n. sp in V. H.'s Traité des Diat. p. 237, fig. 35, especially in the fact that the terminal nodi are situated out in the apices; further it do not possess a perforation in the central part like *Cyc. tenuis* Cast. in Perag.'s Diat. de Fr. tab. I, figs. 27—32, the species to which it is nearest in size.

Area: *C. tenuis* Cast.: Banyuls, Philippines. *C.* sp. in V. H. Traité: Labuan.

Cocconeis Ehb.

95. **C. apiculata** A. S. A. S. Atl. tab. CXCVIII, figs. 31—32.

KKt, LN (2 samples).

According to the description of the figure by A. S. quoted above *C. apic.* A. S. is regarded by Grove as identical with *C. robusta* Leud.-Fortm. Ceylon I, fig. I, which figure however P. T. Cleve — with doubt — refers to *Achnanthes Lorenziana* Grun. (Cl. Syn. II, p. 186—187).

Area: *C. apiculata*: Cape of Good Hope. *C. robusta*: Ceylon.

96. **C. dirupta** Greg. var. **Fulgur** Brun. Brun Esp. nouv. tab. XVIII, fig. 3.

Found only in a sample from KKm.

Area: Mogador, Cabenda, Magelhans Strait.

C. dirupta Greg. var. **Sigma** Pant. A. S. Atl. tab. CXCVI, fig. 11.

Found only in a sample from KMn.

Area: Ceylon.

97. **C. gibbocalyx** Brun. Brun Esp. nouv. tab. XVIII, fig. 4 a.

Solitary in a sample from KKt. Only epitheca met with.

Area: West Indies, Zanzibar, Mauritius, Manilla, Indian Ocean, Galapagos, Madagascar.

98. **C. heteroidea** Hantzsch. Hantzsch Ost. Arch. tab. VI A, fig. 10. A. S. Atl. tab. CXCVI, figs. 31—37.

KKt (16 samples).

Area: West Indies, Colon, Honduras, Seychelles, Madagascar, Mauritius, Nicobar Islands, Singapore, Java, Japan, China, Sandwich Islands, Samoa.

In two samples (KKt & KMn—CLt) I found a *Cocconeis* identical with a species from Hokkaido in A. S. Atl. tab. CXCV, fig. 19, which probably is to be regarded as nearly allied to *C. heteroidea* Hantzsch var. *curvirotunda* Temp. & Brun.

99. **C. insignis** Janisch. A. S. Atl. tab. CXCVII, fig. 3.

Solitary in a sample without habitat.

Area: Gazelle Expedition.

100. **C. pellucida** Hantzsch. Hantzsch Ost. Arch. tab. VI, fig. 11.

KKt (1 sample).

Area: Behring Island, Madagascar, Nicobar Island, Singapore, Java, Sumatra, Samoa, Tahiti, Hawaii, Pacific Ocean, New Zealand.

101. **C. pinnata** Greg. Perag. Diat. d. Fr. tab. II, fig. 12.

Found only in a sample from KM—CLt.

Area: Arctic Ocean, North Sea, Mediterranean, Adriatic, Madagascar, Seychelles, Island of Rhea.

102. **C. pseudomarginata** Greg. V. H. Syn. tab. XXIX, figs. 20—21

KKt, KM—CLt, LN, s. l. (7 samples).

Area: Seems to be ubiquitous.

— — var. **intermedia** Grun. A. S. Atl. tab. CXCIV, fig. 1.

Found only in a sample without habitat.

Area: dispersed among the main species.

103. **C. qvarnerensis** Grun. A. S. Atl. tab. CXCII, figs. 20—21

Found only in a sample from KKt.

Area: Arctic Ocean, North Sea, Mediterranean, Adriatic.

104. **C. Scutellum** Ehb. var. **parva** Grun. Perag. Diat. de Fr. tab. IV, fig. 3.

KKt, LN, s. l. (15 samples).

Area: the main species: ubiquitous. var. *parva*: Baltic, East Cape, Adriatic (Cleve), North Sea, Belgium, North coast of France, Gulf of Gascony, Rousillon.

105. **C. (Orthoneis) aspera** Perag. Perag. Diat. d. Fr. p. 29, tab. V, fig. 13.

KKm, KKt (5 samples).

The striæ along the raphe mentioned and figured by Peragallo l. c. are not so conspicuous in my specimens as in the figure by Peragallo quoted above; but otherwise, i. e. as to the striæ and the character of raphe, they agree well with this figure.

Area: Villefranche („très rare" Perag.), Madagascar, Samoa.

106. **C. (Orthon.) binotata** Grun. Perag. Diat. de Fr. tab. V, fig. 2.

KKm, KKt, KMn—CLt, KCg—KKm, LN, s. l. (22 samples).

Area: the coasts of Europe, West Indies, Madeira, Red Sea, Nicobar Islands, Island of Rhea, Madagascar, Cape of good Hope, Malay Archipelago, Australia, Tahiti.

107. **C. (Orthon.) Clevei** Grun. V. H. Syn. tab. XXVIII, fig. 4.

Found only in a sample from KKt.

Area: Barbadoes, Seychelles, Mauritius, Madagascar, Indian Ocean, Samoa.

108. **C. (Orthon.) fimbriata** Btw. Perag. Diat. de Fr., tab. V, figs. 3—4.

KKm, KKt, KM—CLt, LN (15 samples).

Area: Honduras, Brezil, Mediterranean, Adriatic, Madagascar, Sumbava, Japan, China, Australia, Samoa, Tahiti, Hawaii.

109. **C. (Orthon.) Horwathiana** Grun. A. S. Atlas tab. CLXXXVIII, fig. 41.

KKt (2 samples).

Area: Honduras, Villefranche, Red Sea, Madagascar, Java, Bali Sound, Samoa, Tahiti.

Naviculoideae.

Navicula Bory.

Pinnularieæ.

110. **N. (Pinnularia) bistriata** Leud.-Fortm. Perag. Diat. de Fr. tab. XI, fig. 14.

Solitary in a sample from KKt.

Area: Mediterranean, Ceylon, Labuan.

111. **N. balatonis** Pant. Pant. Bac. d. Balatonsees tab. III. fig. 64. Tab. nostr. I, fig. 7.

L. 0,043 mm., B. 0,004 mm. Striæ 10 in 0,01 mm.

Solitary in a sample from LN.

Area: Balaton See.

Differs by the somewhat more linear apical area and by a proportionally less breadth from the species figured by Pant.

112 **N. (Pinn.) Farcimen** Östr. n. sp. Tab. nostr. I, fig. 10.

L. 0,039 mm., b. 0,009 mm. Striæ 11 in 0,01 mm. Valve linear with rounded apices. Striæ in the middle slightly radiant toward the apices at a right angle to the apical axis. Apical area narrow in the middle widened into a little circular area. Terminal nodi situated on the apices. Raphe rectilinear.

KKt, LN (2 samples).

In spite of its more open striation I think this species must be referred to the section *parallelistriatæ* of Cleve; then it is nearest to *P. sublinearis* Grun. or *Pinn. leptosoma* Grun., what the small terminal nodi also seem to suggest. In the sample from KKt occurs a shorter and comparatively broader form. L. 0,027 mm., b. 0,01 mm.

113. **N. (Pinn.) qvadratarea** A. S. var. **Söderlundi** Cl. Perag. Diat. de Fr. tab. XI, fig. 10.

Solitary in a sample from KM—CLt.

Area: Davis Strait, Banyuls, Balearic Islands, Tahiti.

114. **N. retusa** Bréb. var. **subretusa** V. H. Cnfr. A. S. Atl. tab. XLVI, fig. 75 & Perag. Diat. de Fr. tab. XIII, figs. 7—8.

KKt, LN, s. l. (9 samples).

In its outline the form found by me agrees well with the figures quoted above; however as I have not been able to see any transversal striation of the ribs, I dared not refer it to *Nav. cancellata* Donk. With Peragallo's *Nav. retusa* Bréb. (Perag. l. c. fig. 11) characteristic by its broad apical area it has nothing to do.

Area: *N. cancellata* ubiquitous, the var. *retusa* seems to be a northern form; *subretusa*: Belgium.

115. **N. (Caloneis) blanda** A. S. A. S. N. S. D. tab. II, fig. 27. Perag. Diat. de Fr. tab. XIV, fig. 3.

KKm, KKt, s. l. (3 samples).

Area: North Sea, Black Sea, Manche Chaussy, Seychelles, Labuan, Billiton, Tahiti.

116. **N. (Calon.) Powelli** Lewis. Perag. Diat. de Fr. tab. XIV, fig. 6.

KKt (2 samples).

Area: Quincy Mass., Long Island Sound, Baleares.

N. (Calon.) Powelli var. **Vidovichi** Grun. Grun. Wien. Akad. 1863, tab. XIII, fig. 4.

Solitary in a sample without habitat.

Area: S. America, Adriatic, Sumatra.

— — var. **Bartholomei** Cl. A. S. Atl. tab. CLX, fig. 9.

Found only in a sample from KKt.

Area: West Indies, Porto Seguro, Bahia.

117. **N. (Calon.) siamensis** Östr. n. sp. Tab. nostr. I. fig. 11.

L. 0,04 mm., B. 0,016 mm. Striæ 7,4 in 0,01 mm.

Linear elliptic with cuneate apices. Apical area broad, not dilated in the middle. Striæ divided in two nearly equal parts by a hyaline line parallel to the margin.

Only found in a sample from KKt.

This species surely is near to the form from Campeachy Bay figured in A. S. Atlas tab. CCXII, fig. 16 (from Campeachy Bay) which is referred by Cleve to *Nav. (Calon.) sectilis* A. S.

In tab. nostr. II, fig. 19 I have figured a fragment of a form, which certainly must also be referred to the form circle of *Nav. (Calon.) Powelli.* L. 0,09 mm, b. 0,024 mm, striæ 7,4 in 0,01 mm. on the middle somewhat shortened and thus forming a central area in which two lunulæ are present.

Found in a sample from KKt.

118. **N. (Calon.) disticha** A. S. Tab. nostr. II, fig. 17. Cnfr. A. S. Atl. tab. CCXII, fig. 13.

L. 0,043 mm., b. 0,01 mm. Striæ 9—10 in 0,01 mm. not punctate.

Solitary in a sample from KKt.

Area: Zanzibar (Gründler in A. S. Atl.).

This form is near to *N. (Cal.) blanda* A. S., about which Cleve says (Syn. I, p. 62) that the striæ are „not distinctly punctate". As A. S. howewer in the text of his Atlas tab. CCXII says about *Nav. blanda*, that he has always found his striæ punctate and just for that purpose separated *N. disticha* from *N. blanda*, I thought it most correct to refer the present form to *N. disticha* A. S.

Radiosæ.

119. **N. crucifera** Grun. var.? **capitata** Östr. Tab. nostr. II, fig. 18.

L. 0,031 mm., b. 0,012 mm. Striæ 10 in 0,01 mm. finely transversely lineated.

Valve elliptical with almost parallel margins, rostrate-capitate. Striæ in the middle slightly radiant, at the ends transversal, wanting in the apices. Apical area narrow, in the middle extended to a rhombical central area.

KKt (2 samples).

With great hesitation I refer this species to *Nav. crucif.* Grun., from wich it differs by its form and its closer striation. Perhaps it ought to be considered a separate species.

120. **N. digito-radiata** Greg. var., cnfr. V. H. Syn. tab. VII, fig. 6.

L. 0,026 mm., b. 0,01 mm. Striæ 11 in 0,01 mm. finely transversely lineated.

KKt (1 sample).

In outline and habit this form exactly agrees with V. H.'s figure quoted above of *N. Reinhardtii* Grun., but as the striæ are finely transversely lineate I think to refer it to *N. dig. rad.*

Area: *N. digit.*: Arctic Sea, Europe, Caspi Sea. *N. Reinh.*: Europe, Trinidad.

121. **N. (Alloioneis) mediterranea** Brun & Cl. var.? **scaligera** Perag. Perag. Diat. de Fr. tab. XI, fig. 20.

Solitary in a sample from TK.

Area: Neapel (Perag.).

This present form differs from Peragallo's species in being a little more closely striated. 5 striæ in 0,01 mm.

122. **N. peregrina** Ehb. var. **Menisculus** Schum. V. H. Syn. tab. VIII, figs. 23—24.

LN (1 sample).

Area: Europe, Baltic, Argentina.

123. **N. Zostereti** Grun. A. S. Atl. tab. XLVII, figs. 42—44.

KKm, KKt, KMn, TK (14 samples), Samoa.

Area: Arctic Ocean, Brazil, Adriatic, Madagascar, Bab el Mandeb, Ceylon, Labuan, Java, China, Japan, Sandwich Islands, Samoa.

Didymæ.

124. **N. (Diploneis) Bombus** Ehb. A. S. N. S. D. tab. I, fig. 1.

KKt LN (3 samples).

Area: probably ubiquitous.

In a sample from KKt I have found it but only 0,024 mm. long.

125. **N. (Dipl.) chersonnensis** Grun. Perag. Diat. de Fr. tab. XIX, fig. 9.

KCn, KKt, KMn—CLt, LN (12 samples).

Area: very videly distributed (Cleve).

126. **N. (Dipl.) Crabro** Ehb. Perag. Diat. de Fr. tab. XV. fig. 1.

KCn, KKt (3 samples).

N. (Dipl.) Crabro var. **multicostata** Grun. A. S. Atl. tab. XI, figs. 15—16.

KKt (4 samples).

— — var. **separabilis** A. S. A. S. Atl. tab. XI, figs. 5—6.

KKt, KCgN, KMn—CLt (14 samples).

Area: *Nav. Crabro* and its numerous variants probably are spread everywhere; however — cnfr. Cleve: Syn. I, p. 100—102 — they seem to prefer the warmer Seas.

127. **N. (Dipl.) Entomon** (Ehr.) A. S. A. S. Atl. tab. XIII, fig. 38.

KKt, s. l. (2 samples).

Area: probably ubiquitous.

128. **N. (Dipl.) Gemmatula** Grun. var. **Grunowi** Cl. A. S. Atl. tab. XII, fig. 61 (*N. lacrimans*).

KKt, LN (2 samples).

Area: Campeachy Bay, Baleares, Re dSea, Mauritius, Tamatava, Sumatra, Yokohama, Samoa.

129. **N. (Dipl.) interrupta** Ktz. V. H. Syn. tab. IX, figs. 7—8. A. S. Atl. tab. XII, figs. 9 & 11.

LN, KKt (2 samples).

Area: ubiquitous.

130. **N. (Dipl.) vacillans** A. S. forma *a*. A. S. Atl. tab. VIII, fig. 61.

KKt (1 sample).

Area: California, Campeachy Bay, Cape Horn, Cape of good Hope, Rodriguez, Ceylon, Japan, Sandwich Islands.

— — var.? **minuta** Grun. V. H. Syn. tab. IX, fig. 9.

KKm (1 sample).

Area: Belgium.

131. **N. (Dipl.) Weissflogi** A. S. A. S. Atl. tab. XII, figs. 26—32.

KKm, KKt, KCgN, KMn—CLt (11 samples).

Area: seems to be widely distributed, especially in the warmer Seas.

132. **N. (Dipl.) splendida** Greg. Perag. Diat. de Fr. tab. XVIII, fig. 16.

Found only in a sample from KKt.

Area: ubiquitous.

— — var. **Puella** A. S. A. S. Atl. tab. LXIX, fig. 15.

Found only in a sample from KKt.

Area: California, Campeachy Bay, North Sea, Sorrento.

Ellipticæ.

133. **N. (Diploneis) advena** A. S. var. **parca.** A. S. Atl. tab. VIII, figs. 20—22.

Found only in a sample from K Kt.

Area: Campeachy Bay, North Sea, Creswell, Samoa.

134. **N. (Dipl.) aestiva** Donk. forma *α*. Perag. Diat. de Fr. tab. XX, fig. 12.

KKt (1 sample).

Area: Normandie, Colon, Singapore, Manilla.

— — — forma *β*. Perag. l. c. fig. 13.

KKt (1 sample).

Area: West coast of Sweden, Normandie, Sumatra.

135. **N. (Dipl.) Cynthia** A. S. A. S. Atl. tab. VIII, fig. 41.

LN (1 sample).

Area: coasts of Ireland, West Indies, Red Sea.

The present form is rather small (L. 0,036), but does not belong to Cleve's forma *minuta* (Cl. Syn. I, p. 82).

136. **N. (Dipl.) fusca** Greg. Perag. Diat. de Fr. tab. XX. fig. 6.

Found only in a sample from KKt.

Area: North Sea; Balearic Islands, Sumatra, Java.

137. **N. (Dipl.) litoralis** Donk. var. **subtilis** A. S. Perag. Diat. de Fr. tab. XX, fig. 11.

Found only in a sample from K Kt.

Area: Arctic Ocean, Arctic America, West Indies, Adriatic. Port Jackson, Java, Tahiti.

138. **N. (Dipl.) major** Cl. V. H. Syn. Suppl. B, fig. 23.

KKt (4 samples).

Area: Colon, Europe, Madagascar, Macassar, Sumatra, China, Japan, Australia.

139. **N. (Dipl.) nitescens** Greg. A. S. Atl. tab. VII, figs. 33 & 38 and tab. VIII, fig. 14.

KKm, KKt, LN (6 samples).

Area: Campeachy Bay, Colon, Europe. Seychelles, Madagascar, Java, Sumbava, Singapore, Australia, Sandwich Islands, Samoa, Tahiti.

140. **N. (Dipl.) notabilis** Grev. forma **genuina.** A. S. Atl. tab. VIII, figs. 46—47.

— — — forma **expleta.** A. S. l. c. fig. 49.

KKt, LN (7 samples).

Area: Brazil, West Indies, Europe, Red Sea, Madagascar, Cape of good Hope, Java, Borneo, Sandwich Islands, Samoa.

141. **N. (Dipl.) Papula** A. S. A. S. Atl. tab. VII, fig. 45.

KKt (2 samples).

Area: Campeachy Bay, Samoa.

142. **N. (Dipl.) ocellata** Öst. n. sp. Tab. nostr. II, fig. 20.

L. 0,037 mm., b. 0,0175 mm. Costæ 7,5 in 0,01 mm. not alternating with puncta.

Valve elliptic with flattened apices. Lateral areas rather large, with a row of puncta, which are only conspicuous in the middle.

Solitary in a sample from LN.

As I have not been able to see alveoli between the costæ I dared not determine this species as a variant of *N. (Dipl.) notabilis*, which it is always nearest in its whole habit.

143. **N. (Dipl.) Smithi** Bréb. A. S. Atl. tab. VII, fig. 17. Perag. Diat. de Fr. tab. XX, fig. 4.

KKt (2 samples).

Area: Arctic Sea, Campeachy Bay, Colon, Europe, Seychelles, Madagascar, Java, Tasmania, New Zealand, Samoa.

144. **N. (Dipl.) suborbicularis** Greg. A. S. Atl. tab. VIII, fig. 2.

KKt (4 samples).

Area: probably ubiquitous.

In a sample from KKt I found a *Nav. (Diploneis)* agreeing with A. S. Atl. tab. VII, fig. 15 (from Campeachy Bay), about which Cleve (Syn. I, p. 96) says that it „seems to belong to *Diploneis borealis* Grun.".

Lyratæ.

145. **N. abrupta** Greg. V. H. Syn. tab. X, fig. 4.

KKt, (4 samples).

Area: ubiquitous.

In one of the samples from KKt I found a form more particularly agreeing with *Nav. spectabilis* Greg., var. *Rattrayi* Pant., which is considered by Peragallo (Diat. de Fr. p. 132, tab. 21, fig. 38) a variant of *Nav. abrupta* Greg.

146. **N. clavata** Greg. A. S. N. S. D. tab. I, fig. 33.

KKt, KCgN (3 samples).

Area: ubiquitous.

— — var. **indica** Grev. Jan. Gaz. Exp. tab. XV, fig. 15.

Found only in a sample without habitat.

Area: Honduras, Manilla, Cebu, Macassar, Ceylon, Sumbava (Cleve).

147. **N. forcipata** Grev. var. **nummularia** Grev. A. S. Atl. tab. LXX, fig. 38. Perag. Diat. de Fr. tab. XXI, fig. 31.

LN (2 samples).

Area: Californian Guano, Florida, Adriatic, Bab el Mandeb, Madagascar, Cape of good Hope, Java.

— — var. **suborbicularis** Grun. Perag. Diat. de Fr. tab. XXI, fig. 32.

KKt (2 samples).

Area: Spitzbergen, North Sea, Baleares, Seychelles, Java, Zulu Sea, Galapagos.

148. **N. Lyra** Ehb.

Among the numerous variants of this form I have found:

N. Lyra Ehb. forma **typica.** Perag. Diat. de Fr. tab. XXII, fig. 3. A. S. Atl. tab. II, fig. 25.

— — var. **dilatata** A. S. A. S. Atl. l. c. fig. 26.

— — var. **elliptica** A. S. V. H. Syn. tab. X, fig. 2. A. S. tab. III, fig. 12.

— — var. **intermedia** Perag. Perag. Diat. de Fr., tab. XXIII, fig. 11.

— — var. **producta** Pant. Perag. l. c. tab. XXII, fig. 13.

— — var. **subcarinata** Grun. A. S. l. c. tab. II, fig. 5.

— — var. **spec.?** A. S. Atl. tab. III, fig. 12 (from Java).

KKm, KKt, KCgN, LN (18 samples).

Area: *Nav. Lyra*: with varieties widely distributed, the var. *subcarinata*: Indian Sea, Samoa, Tahiti.

149. **N. spectabilis** Greg. var. **emarginata** Cl. Jan. Gaz. Exp. tab. XV, fig. 22.

KKt (1 sample).

Area: Campeachy Bay, Sierra Leone, Japan.

150. **N. mediopartita** Grove var. Tab. nostr. II, fig. 21. Cnfr. A. S. Atl. tab. CCIV, fig. 16.

L. 0,045 mm., b. 0.019 mm. Striæ 22 in 0,01 mm.

Valve lanceolate with somewhat protracted apices. Two lines forming a lyrate figure and nearly parallel to the margin are present. Marginal part conspicuously striated; on the inner part between the lines and raphe the striæ are closer and more difficult to see. Narrow transapical area.

KKt (2 samples).

Area: *N. mediop.*: Oamaru (Grunow).

According to Cleve (Description of plates) this form perhaps ought to be referred to *Nav. fallax* Cl. or to *Mastogloia*. I must add that the present form has no resemblance to the figure of *Nav. fallax* Cl. (Syn. I, tab. V, fig. 24) and that I have seen no loculi in it.

151. **N. (Pseudoamphiprora) decora** Grev. = **Stauroneis decora** Grev. Tab. nostr. II, fig. 22. Cnfr. Grev. Tran. Micr. Soc. Edin. VIII, tab. III, fig. 11.

L. 0,067 mm., b. 0,0126 mm. Striæ at least 25 in 0,01 mm., conspicuous only at the margin outside the longitudinal lines.

KKt (2 samples).

Area: New Caledonia.

The present form is shorter and proportionally more slender than Greville's. Cleve supposes that *Stauron. decor.* Grev. probably must be referred to *Pseudoamphiprora*, a subgenus in its systematic position between *N. Lyratæ* and *Caloneis* (Cl. Syn. I, p. 70 & 72).

Hennedyeæ.

152. **N. Hennedyi** W. Sm. var. **furcata** Perag. Perag. Diat. de Fr. tab. XXIV, fig. 17.

— — var. **nebulosa** Greg. Perag. l. c. tab. XXV, fig. 11.

KKt (3 samples).

Area: the main species ubiquitous.
var. *furcata*: Banyuls, Naple (Perag).
var. *nebulosa*: Cape Horn, Florida, Europe, Morocco, Madagascar, Ceylon, Galapagos.

Perstriatæ.

153. **N. brasiliensis** Grun. A. S. Atl. tab. VI, figs. 23—25.

KKt, LN, TK (6 samples).

Area. Eastern Coast of America, Bab el Mandeb, Zanzibar, Madagascar, the Seas S. and E. of Asia, New Caledonia, Samoa, Sandwich Islands.

154. **N. sublyrata** Grun. Cl. Vega Exp. tab. XXXV, fig. 17.

Solitary in a sample from KKt.

Area: North America, Labuan.

Johnsonieæ.

155. **N. Scopulorum** Bréb. Perag. Diat. de Fr. tab. VIII, fig. 29.

KKm, TK (2 samples).

Area: Arctic Oceans, Brazil, Europe, Sumatra, Borneo, Japan.

NB. Somewhat unsymmetrical as figured in the figure by Peragallo quoted above. In a few specimens I have seen a narrow stauros caused by the wanting of striæ in the middle.

Nav. Scopulorum Bréb. in *craticular state* = *Climaconeis Lorenzii* Grun. (Wien. Akad. 1862, tab. VIII, fig. 7) I have met with in a sample from TK. It has hitherto been found in Honduras, Adriatic, Java, Queensland and New Caledonia.

Seriantes.

156. **N. bipunctata** Grun.? Tab. nostr. II, fig. 30. Cnfr. V. H. Syn. tab. XIII, fig. 7.

L. 0,044 mm., b. 0,0072 mm. Striæ very fine.

Valve linear with sligthly undulate margins, attenuated towards the rounded apices. Striæ at a right angle to sagittal axis, apical area narrow, in the middle a stauros by want of striæ. Central pores very evident.

Found only in a sample from LN.

Owing to the very conspicuous central pores and the slightly undulate outline I have referred this form to *N. bipunctata* Grun., which it resembles in its whole habit; however I have not been able to recognize the longitudinal striation of the figure quoted above.

Area: no locality has been given.

Lineares.

157. **N. (Caloneis) Liber** W. Sm. var. **linearis** Grun. A. S. Atl. tab. L, figs. 38 & 40.

KKm, KKt, KMn—CLt, LN (8 samples).

Area: seems to be widely distributed.

— — var. **bicuneata** Grun. A. S. l. c., figs. 22—24.

KKt 2 (samples).

Area: Colon, Porto Seguro, North Sea, Seychelles, Sumatra, Samoa.

In a sample from LN I found a form agreeing with A. S. Atl. tab. L, fig. 36 (from Sorrento), which is referred by A. S. with doubt to *Nav. maxima* = *Nav. (Calon.) Liber* W. Sm. *genuina* Cleve.

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158. **N. (Caloneis?) egena** A. S. A. S. Atl. tab. CCXII, fig. 1.

Solitary in a sample without habitat.

Area: Campeachy Bay.

Schizonema.

159. **N. (Schizonema) Smithii** Ag. V. H. Syn. tab. XV, fig. 33.

KKt, LN (2 samples).

Area: Europe, Black Sea, Caspian Sea, East Cape, Tasmania.

Stauroneis Ehb.

160. **N. (Stauroneis) africana** Cl. Cl. New r. Diat. tab. III, fig. 15.

Solitary in a sample from KKt.

Area: South Africa, Ceylon.

161. **N. (Staur.) anceps** Ehb. var. **hyalina** Br. & Perag. Hérib. Diat. d'Auv. tab. III, fig. 19.

Solitary in a sample from KKt.

Area: Europe (fossil), Australia.

Libellus Cl.

162. **N. (Libellus) hamulifera** Grun. Cl. Syn. I, tab. III, figs. 17 & 19.

KKm, KKt (2 samples).

Area: Barbadoes, Mediterranean, Adriatic, Black Sea, Ceylon, Java.

Dictyoneis Cl.

163. **N. (Dictyoneis) marginata** Lewis var. **intermedia** Cl. A. S. Atl. tab. CLX, figs. 34—35.

Found only in a sample from KMn—CLt.

Area: Madagascar, Japan, Malay Archipelago.

Trachyneis Cl.

164. **N. (Trachyneis) aspera** Ehb.

Of the numerous variants of this form I have found:

var. **contermina** A. S. A. S. Atl. tab. XLVIII, figs. 17—18.

Proportionately broad (L. 0,032 mm., B. 0,011 mm.), stauros not reaching the margin.

var. **genuina** Cl. V. H. Syn. tab. X, fig. 13.

var. **pulchella** W. Sm. A. S. l. c. fig. 6.

var. **vulgaris** Cl. A. S. l. c. fig. 5.

Among the variants stated above the var. *pulchella* is most common.

KKm, KKt, KMn—CLt (15 samples).

Area: var. *contermina*: Japan, Cape Horn.

var. *genuina*: North Sea, Singapore, Amboina, Sydney, Samoa, Tahiti, Hawaii, Pacific Ocean.

var. *pulchella*: North Sea, Philippines, Samoa, Sandwich Islands, Malay Archipelago.

var. *vulgaris*: Arctic America, North Sea, Madagascar, Cape of good Hope, New Zealand, Samoa, New Caledonia, Malay Archipelago, Galapagos.

165. **N. (Trachyn.) velata** A. S. A. S.. Atl. tab. XLVIII, fig. 36.

KKm, KKt, KMn—CLt (7 samples).

Area: Cape Horn, Cape of good Hope, Madagascar, Mauritius, Ceylon, King Georges Sound, Sumatra, Java, China, Japan, Sandwich Islands, New Caledonia.

In a sample from KCgN I have found a *Nav. (Trachyneis)* exactly corresponding to the „fragliche Form" from North Celebes figured by A. S. in Atl. tab. XLVIII, fig. 31.

Cymatoneis Cl.

166. **C. sulcata** Grev. A. S. Atl. tab. CCXII, fig. 44.

Found only in a sample from KKt.

Area: Widely spread in warmer Seas.

Van Heurckia Bréb.

167. **V. H. siamensis** Östr. n. sp. Tab. nostr. II, fig. 26.

L. 0,074 mm., b. 0,009 mm.

Valve linear elliptical with rounded apices. Raphe strongly asymmetric, enclosed between two silicious ribs, terminating in a outwards reflexed point. Striæ very fine, parallel. I am not able to see any longitudinal striation.

KKm, TK (2 samples).

This species surely is near to *Van Heurckia vulgaris* Thw. var. *asymmetrica* Cl. (Cl. Syn. I, p. 122, tab. V, fig. 29), but as it is characteristic by its shape, the very asymmetrical raphe and the exceedingly fine sculpture, I preferred to regard it as a separate species.

Area of *V. H. vulg.* var. *asymmetrica* Cl., which is recorded as „brackish". Sierra Leone, Cameroon, Tasmania, Newark, N. Yers. fossil (Champlain epoch).

168. **N. subglabra** Östr. n. sp. Tab. nostr. II, figs. 23 & 24.

L. 0,059 mm., b. 0,016 mm. (fig. 23). L. 0,056 mm., b. 0,013 mm. (fig. 24). Striæ inconspicuous. Valve rhombic-lanceolate. Central pores distant, terminal nodi distant from the apices.

With Zeiss Apoch. no. 2 and oblique illumination I think I have seen a striation at a right angle to the apical axis; with moderate power the valve gets a chagreen-like appearance. In its central part the valve shows like a tendence to a cicatrice-like figure, which is very conspicuous in other specimens, as I have figured it in my fig. 24. The latter form is somewhat smaller but otherwise on the whole agreeing with the former, so that I have no doubt that they belong to the same species, perhaps as hypotheca and epitheca. Moreover they occur both in the same sample — from TK — and only in this.

I am uncertain as to the systematic position of this species.

Pleurosigma

169. **P. australe** Grun. Perag. Diat de Fr. tab. XXXII, figs. 7—8.

Found only in a sample from KKm.

Area: Baleares, Between Aden and Bab el Mandeb, Sumatra, Java, Ceylon, Labuan.

170. **P. diminutum** Grun. Perag. Pleuros. tab. VI, fig. 31.

Found only in a sample from TK.
Area: Baleares, Adriatic.

171. **P. elongatum** W. Sm. W. Sm. Syn. tab. XX, fig. 199.

KKm, KKt (3 samples).

Area: Arctic Oceans, Atlantic coasts of America, Europe, Caspian Sea, Java, Sumatra, China, Tahiti.

172. **P. formosum** W. Sm. W. Sm. Syn. tab. XX, fig. 195.

KKt, KMn—CLt, LN (10 samples).

Area: Arctic Oceans, West Indies, Europe, Red Sea, Madagascar, Java, China, Ceylon, Labuan, Tahiti, Hawaii, Pacific Ocean, Galapagos.

173. **P. Grovei** Cl. Perag. Pleuros. tab. VIII, fig. 1.

Solitary in a sample from TK.
Area: Malay Archipelago.

I have only found one moreover not complete specimen which differred form the typical form in being proportionately broader and in its more open striation. L. 0,43 mm., b. 0,051 mm., transversal striæ 7,4 in 0,01 mm., longitudinal striæ 11,1 in 0,01 mm.

174. **P. naviculaceum** Bréb. Cast. Chall. Exp. tab. XXIX, fig. 14 (*P. japonicum* Cast.).

KKm (2 samples).
Area: North Sea, Mediterranean, Ceylon, Labuan, Java.

175. **P. Normanni** Ralfs. V. H. Syn. tab. XVIII, fig. 9.

Found only in a sample from KKm.

Area: Arctic Oceans, Atlantic coasts of America, Europe, Madagascar, Red Sea, Java, Sumatra.

176. **P. Nubecula** W. Sm. var. **intermedia** W. Sm. Perag. Pleuros. tab. V, figs. 27—28.

KKt, KCg—KLm (8 samples).
Area: North Sea, Mediterranean, Port Jackson, Rio Grande.

— — — var. **subrecta** Cl. Perag. Pleuros. tab. V, fig. 30.

KKt (3 samples).
Area: Arctic Oceans, Baleares.

177. **P. obscurum** W. Sm. W. Sm. Syn. tab. XX, fig. 206.

Found only in a sample from LN.

Area: England, Baleares, Ceylon, Java.

178. **P. rigidum** W. Sm. W. Sm. Syn. tab. XX, fig. 198.

KKm, KKt, KMn—CLt (3 samples).

Area: Magelhaens Strait, West Indies, Colon, Europe, Red Sea, Madagascar, Borneo, Samoa, Tahiti.

179. **P. scalproides** Rabh. var. **eximia** Thw. V. H. Syn. tab. XXI, fig. 2.

Solitary in a sample from LN.

Area: Europe, the coasts of America, Demerara, Bengal.

180. **P. speciosum** W. Sm. W. Sm. Syn. tab. XX, fig. 197.

KKt (2 samples).

Area: Barbadoes, Europe, Red Sea, China, Java, Sumatra, Labuan, Port Jackson.

— — — var. **mediterranea** Grun. Perag. Pleuros. tab. II, fig. 5.

Found only in a sample from KKt.

Area: Mediterranean, Seychelles, Java.

— — — var. **pulchra** Grun. Perag. Pleuros. tab. I, fig. 8.

KKt (2 samples).

Area: North Sea, Red Sea, Java, Sumatra.

Scoliopleura Grun.

181. **S. siamensis** Östr. n. sp. Tab. nostr. II, fig. 27.

L. 0,036 mm., b. 0,0075 mm.

Valve linear with somewhat cuneate apices. Striæ very fine at right angles to apical axis. In the middle a very slight stauros. Central pores approximated. Terminal nodi inconspicuous. Raphe towards the apices turned in contrary direction, no longitudinal lines visible.

Solitary in a sample from KKm.

Tropidoneis Cl.

182. **T. elegans** W. Sm. Perag. Diat. d. Fr. tab. XLI, figs. 2—3.

KKm (2 samples).

Area: North Sea, Europe, Mediterranean, Adriatic, Between Aden and Bab el Mandeb.

183. **T. lepidoptera** Grun. Perag. Diat. de Fr. tab. XXXIX, figs. 8—9.

KKm, KKt, KCg—KLm (7 samples).

Area: Colon, Barbadoes, Cape Horn, Europe, Madagascar, Macassar, King Georges Sound, Sumatra, Port Jackson, Ceylon, Samoa, Galapagos.

184. **T. maxima** Greg. var. **subalata** Cl. Perag. Diat. de Fr. tab. XL, fig. 6.

Found only in a sample from KKt.

Area: Villefranche, Macassar Strait.

Amphiprora Ehb.

185. **A. gigantea** Grun. var. **sulcata** O'M. Perag. Diat. de France. tab. XXXVIII, fig. 3.

Found only in a sample from KKm.

Area: Jamaica, Le Croisic, Banyuls, Baleares, Seychelles, Cape of good Hope, Sumatra.

Rhoicosigma Grun.

186. **R. compactum** Grev. Perag. Pleuros. tab. X, figs. 5 & 7—8.

KKm, KKt, KMn—CLt (5 samples).

Area: Honduras, West Indies, Europe, Red Sea, Port Jackson, Philippines Java, Sumatra, Samoa, Tahiti, Galapagos.

Mastogloia Thw.

187. **M. affinis** Cl. Cl. Le Diat. I, tab. XXIII, fig. 19.

Found only in a sample from KKt.

Area: Galapagos.

188. **M. affirmata** Leud. Fortm. A. S. Atl. tab. CLXXXVIII, fig. 19.

KKt (3 samples).

Area: Rodriguez, Ceylon, Philippines, Java.

189. **M. angulata** Lewis. A. S. Atlas tab. CLXXXVII, figs. 9—11. Perag. Diat. de Fr. tab. V, fig. 16.

KKt (3 samples).

Area: Honduras, Atlantic coasts of N. America, Mediterranean, Adriatic, Black Sea, Red Sea, Billiton, Australia.

190. **M. apiculata** W. Sm. A. S. Atl. tab. CLXXXV, fig. 43, 2nd fig. & tab. CLXXXVII, fig. 40.

Found only in a sample from KKt.

Area: Europe, China, Borneo.

191. **M. bahamensis** Cl. A. S. Atl. tab. CLXXXVIII, fig. 20.
KKm, KKt, KMn—CLt (6 samples).
Area: Bahama.

192. **M. baltica** Grun. V. H. Syn. tab. IV, fig. 24.
KKm, KKt (3 samples).
Area: Baltic, South Africa.

193. **M. Brauni** Grun. V. H. Syn. tab. IV, figs. 21—22.
Found only in a sample from KCg.
Area: Pensacola, Cape May, Spitsbergen, Europe, Black Sea, Caspian Sea, Red Sea.

194. **M. chersonensis** A. S. A. S. Atl. tab. CLXXXVI, figs. 31—32.
KKt (2 samples).
Area: Adriatic.

195. **M. Citrus** Cl. A. S. Atl. tab. CLXXXVII, figs. 16—19.
KKt, KCn, KCg—KLm (9 samples).
Area: Vera Cruz, Jamaica, Adriatic, Labuan, Sandwich Islands.

196. **M. erythræa** Grun. Perag. Diat. de Fr. tab. VI, fig. 18.
KKt, KMn (2 samples).
Area: Honduras, Bahama, Mediterranean, Adria, Black Sea, Red Sea.

— — — var. **interrupta** Hantzsch. Hantzsch Ost. Arch. tab. VI A, fig. 5.
KKt, s. l. (2 samples).
Area: East Indies, Nicobar.

197. **M. exigua** Lewis. Perag. Diat. de Fr. tab. VI, fig. 29 (fig. dextra).
KKt (2 samples).
Area: Behrings Island, Europe, Atlantic Coast of America, Samoa.

198. **M. inæqvalis** Cl. Cl. Syn. II, tab. II, fig. 15.
KKt, LN (6 samples).
Area: Rodriguez, Java, Australia.
Abundant in a sample from LN.

199. **M. Jelenecki** Grun. var.? Tab. nostr. II, fig. 25. Cnfr. A. S. Atl. tab. CLXXXVII, figs. 48—49 and Cl. Syn. II, tab. II, fig. 18 (var. *marina*).

L. 0,062 mm., b. 0,0175 mm. Striæ c. 25 in 0,01 mm., loculi 3—4 in 0,01 mm., those near apices larger than the other.

Found only in a sample from KKm.

Area: the main species: West Indies, Brazil, Mediterranean, Seychelles, Madagascar, Java, Sumbava, Manilla, China.
var *marina*: Honduras, Manilla, Java, Philippines.

200. **M. Kjellmani** Cl. Cl. Vega Exp. tab. XXXV, fig. 6.
Found only in a sample from KKm.
Area: Labuan.

201. **M. labuensis** Cl. Cl. Vega Exp. tab. XXXV, fig. 5.
KKt (14 samples).
Area: Philippines, Labuan, Billiton.
M. labuensis surely is very closely related to *M. apiculata*.

202. **M. lemniscata** Leud. Fortm. A. S. Atlas tab. CLXXXVI, figs. 14—15.
KKm, KKt, LN (5 samples).
Area: Colon, Ceylon, Sumbava, Manilla, Java, Macassar, Japan, Carpentaria Bay.

203. **M. Mac Donaldi** Grev. Perag. Diat. de Fr. tab. VI, fig. 14.
KKm, KKt, KMn—CLt (5 samples).
Area: Mediterranean, Adriatic, Philippines, Java, Australia.

204. **M. marginulata** Grun. A. S. Atl. tab. CLXXXVI, fig. 30.
KKt (2 samples).
Area: Chile, Honduras, Adriatic, Java, Samoa, Tahiti, New Zealand.

205. **M. pusilla** Grun. Perag. Diat. de Fr. tab. VI, fig. 36.
KKt, s l. (3 samples).
Area: Adriatic, Caspian Sea.

206. **M. qvinqvecostata** Grun. A. S. Atl. tab. CLXXXVI, figs. 1—7 & tab. CLXXXVII, fig. 1.
KKm, KKt, KMn—CLt, KCg—KLm, TK (12 samples).
Area: Mediterranean, Adriatic, Cape of good Hope, Sumbava, Madagascar, Ceylon, Labuan, Nicobar, Java, Samoa, Tahiti.

— — var. **elongata** Leud. Fortm. A. S. Atl. tab. CLXXXVI, fig. 12.
Found only in a sample from KKt.
Area: Madagascar, Ceylon.

207. **M. qvadrinotata** sp. nov. Tab. nostr. II, fig. 33.
L. 0,018 mm., b. 0,007 mm. Striæ 18—20 in 0,01 mm.
Valve elliptical with very slightly cuneate apices. Striæ parallel composed of punctae, apical area narrow. In the middle a stauros owing to the want of striæ. In every quarter of the valve two

marginal loculi, which are difficult to see, as this small form is very hyaline. The specimens in which I could not see the four pair of loculi otherwise agree in shape and structure with those where the loculi are visible.

KKt, LN, TK, KCg—KSm (4 samples).

208. **M. rhombica** Cl. Cl. Vega Exp. tab. XXXV, fig. 9.

Found only in a sample from KCn.

Area: Labuan.

209. **M. Smithi** Thw. var. **amphicephala** Grun. A. S. Atl. tab. CLXXXV, figs. 13—14 = *M. capitata* Grev. Cnfr. Cl. Syn. II, p. 152.

KKm.

Area: England, Baltic, Scotland, Morocco, Calcutta (*M. capitata* of Greville).

210. **M. parvula** Östr. n. sp. Tab. nostr. II, fig. 35.

L. 0,021 mm., b. 0,009 mm. Striæ 20 in 0,01 mm., loculi 5—6 in 0,01 mm. Valve elliptical with short rostrate apices. Apical area narrow but present.

KKt (2 samples).

This small species reminds somewhat of *M. Smithi* Thw. var. *conifera* Brun. (Perag. Diat. de Fr. tab. VI, fig. 41), but owing to the narrow central area it ought to be considered a separate species.

211. **M.** sp. Tab. nostr. II, fig. 36. Cnfr. A. S. Atl. tab. CLXXXVII, fig. 41.

L. 0,061 mm., b. 0,02 mm. Striæ 16—17 in 0,01 mm. towards the apices slightly curved, loculi 10—11 in 0,01 mm. Raphe slightly undulated, narrow transapical area.

KKt (1 sample).

The form figured by A. S. (from Baltschick) is referred to *M. elegans* Lewis in the description of plates, but the present form does not agree with any of the figures referred by Cl. Syn. II, P. 154 to *Mast. elegans.*

212. **M.** sp. Tab. nostr. II, fig. 32.

L. 0,066 mm., b. 0,028 mm. Striæ 8—9 in 0,01 mm., loculi 4 in 0,01 mm.?

Valve lanceolate with somewhat rostrate apices. Median line straight. Apical area very narrow. Striæ composed of punctae forming decussate lines. Loculi difficult to see. In one specimen I have seen them near the apex, to which they reach.

KKt, s. l. (2 samples).

I think this species is nearest to *M. asperula* Grun. (Cl. Le Diat. I, tab. IX, fig. 12), but I have preferred not to state it as a separate species, as I have only seen specimens either without or with incomplete loculiferous rim.

Area of *M. asp.*: Baleares, Seychelles, Java, Cebu.

Gomphoneminae.

Rhoicosphenia Grun.

213. **R. tenuissima** Östr. n. sp. Tab. nostr. II, fig. 28.

L. 0,02—0,03 mm., b. 0,002 mm. Striæ at least 25 in 0,01 mm. Valve clavate. In the middle a structureless area seems to be present, which with lower enlargement resembles a stauros. In epitheca the striæ are conspicuous, but in hypotheca I have not been able to see any striation.

KKt (1 sample).

This small species is exceedingly delicate and hyaline and therefore it is easily overlooked.

Cymbellinae.

Amphora Ehb.

214. **Amphora acuta** Greg. Perag. Diat de Fr. tab. XLIX, fig. 26.

Found only in a sample from KKt.

Area: Arctic Ocean, Europe. Mediterranean, Morocco, Cape Horn, Magelhan's Strait, Ceylon, China.

— — var. **arcuata** A. S. Perag. l. c., fig. 28.

KKm, KKt, KMn—CLt (3 samples).

Area: Gulf of Mexico, Mediterranean, Seychelles, Macassar, Mazatlan, Samoa.

215. **A. angusta** (Greg.) Cl. Perag. Diat. de Fr. tab. L, fig. 37.

KKt (7 samples).

Area: Arctic Ocean, Europe, America.

— — var. **ventricosa** Greg. Perag. l. c. fig. 39.

KKt (2 samples).

Area: Arctic Ocean, Europe, Bab el Mandeb, Monterey.

216. **A. bigibba** Grun. A. S. Atl. tab. XXV, figs. 66 and 74—76.

KKt, KMn—CLt (6 samples).

Area: the coasts of America, Baleares, Adria, Cape of good Hope, Japan, Celebes, Ceylon, Java, Galapagos.

217. **A. costata** W. Sm. A. S. Atl. tab. XXV, fig. 30.

Found only in a sample from KKt.

Area: New Haven, Pensacola, Colon, Porto Seguro, Campeachy Bay, North Sea, Mediterranean, Adriatic, Galapagos.

218. **A. crassa** Greg. A. S. tab. XXVIII, figs. 31—32.

KKt (4 samples).

Area: Arctic Oceans, Cape Horn, Mediterranean, Aden, Sumatra, Java, Ceylon, China.

219. **A. egregia** (Ehr.?) A. S. A. S. Atl. tab. XXVIII, fig. 18.

Found only in a sample from KKt.

Area: Campeachy Bay, West Indies, Cape Horn, Mediterranean, Madagascar, Seychelles, Ceylon, Malay Archipelago, China, Samoa, Galapagos.

220. **A. exigua** Greg. Perag. Diat. de Fr. tab. L, figs. 30—31.

KKt (5 samples).

Area: Arctic America, West Indies, Europe, Sandwich Islands, Tahiti.

221. **A. gigantea** Grun. var. **fusca** Cl. Perag. Diat. d. Fr. tab. XLV, fig. 8.

Found only in a sample from KKt.

Area: Gulf of Mexico, Bahia, Mediterranean, Red Sea, Ceylon, Malay Archipelago, Galapagos.

222. **A. Græffei** (Grun.) Cl. A. S. Atl. tab. XXV, fig. 40.

KKt (2 samples).

Area: Mediterranean, Zanzibar, Malay Archipelago, China, Samoa, Galapagos.

223. **A. Gründleri** Grun. A. S. Atl. tab. XXVIII, fig. 26.

KKt, s. l. (2 samples).

Area: Campeachy Bay, Gulf of Mexico, Mediterranean, Ceylon, Malay Archipelago, Manilla, Galapagos.

224. **A. lævis** Greg. var. **lævissima** Greg. A. S. Atl. tab. XXVI, figs. 13—14.

KKt (5 samples).

Area: Kara, Finmark, Scotland, England, Mediterranean.

225. **A. obtusiuscula** Grun. A. S. Atl. tab. XXV, fig. 7.

KKt (3 samples).

Area: Samoa.

The present specimens exactly agree with the figure by A. S. quoted above. I am sure I have seen the fine lines and further I have been able to see the very fine transversal striæ (at least 25 in 0,01 mm.), so that I am sure that this species really is an *Amphora* (compare Cl. Syn. II, p. 141).

226. **A. obtusa** Greg. A. S. Atl. tab. XL, figs. 5—7.

KKt, KCn, KMn—CLt (14 samples).

Area: America, Europe, Red Sea, Madagascar, Malay Archipelago, the Eastern coasts of Asia.

227. **A. Oculus** A. S. var. **Farcimen** A. S. A. S. Atl. tab. XXVII, fig. 56.

Found only in a sample from KKt.

Area: Campeachy Bay, Seychelles, Samoa, Galapagos.

228. **A. ostrearea** Bréb. **typica.** Temp. & Brun. Jap. tab. IX, fig. 16 = A. Petiti.

Found only in a sample from KKt.

Area: Europe, Sumatra, Billiton, Labuan, Japan, China.

— — var. **vitrea** Cl. A. S. tab. XXVI, fig. 25.

KKt (4 samples).

Area: Arctic Oceans, West Indies, Labuan, Japan, New Caledonia.

In a sample from KKm I found a small *Amphora* measuring l. 0,028 mm., b. 0,003 mm., striæ 15 in 0,01 mm. In its shape it exactly agrees with the species figured by A. S. Atl. tab. XXVI, fig. 16 which Cleve (Syn. II, p. 129) regards as identical with *Amph. ostrearea* Bréb. var. *vitrea* Cl.

229. **A. proboscidea** (Greg.?) Cl. Cl. Syn. II, tab. III, figs. 19—21.

Solitary in a sample from LN.

Area: Portoseguro, Bahia, Java, Bali Sound.

The form found by me is more capitate than figured by Cleve and resembles in that respect *A. Kittoni* L. Fortm. L. Fortm. Ceylon tab. I, fig. 7.

230. **A. Proteus** Greg. A. S. Atl. tab. XXVII, fig. 3.

KKm, KKt, s. l. (6 samples).

Area: probably ubiquitous.

231. **A. rhombica** Kitton. Perag. Diat. de Fr. tab. L, fig. 4.

Found only in a sample from KKt.

Area: Colon, Mediterranean, Island of Rhea, Sumbava, Sumatra, Macassar, China, Java.

232. **A. spectabilis** Greg. A. S. Atl. tab. XL, figs. 18—19.

KKt (2 samples).

Area: Davis Strait, West Indies, North Sea, Mediterranean, Seychelles, Madagascar, Ceylon, Borneo, Macassar, Java, China, Samoa.

233. **A. Terroris** Ehr. A. S. Atl. tab. XXV, figs. 17—19, 33, 34—36.

KKt (3 samples).

Area: probably ubiquitous.

In two samples from KKt I found a form agreeing with *A. monilifera* Greg.? in A. S. Atl. Tab. XXV, fig. 32 (from Java). As to this form Cleve (Syn. II, p. 122) says that it „probably is a frustule of *A. costata* or *Terroris* in the state of division".

234. **A. turgida** Greg. A. S. Atl. tab. XXV, figs. 24—25.

KKm, KKt, LN, s. l. (9 samples).

Area: Europe, Red Sea, Java, Madagascar, Macassar, Labuan, New Zealand.

Epithemia Bréb.

235. **E. Musculus** Ktz. Perag. Diat. de Fr. tab. LXXVII, fig. 6—10.

KKm. KKt, KMn—CLt, LN, s. l. (10 samples).

— — var. **gibberula** Ktz. Perag. l. c. figs. 18—22.

Mixed with the main species.

Area: the main species: Europe (de Toni), Rio Grande, Java, Samoa.
var. *gibberula*: America, Europe, Java.

Nitzschieae.

Bacillaria Gmel.

236. **B. paradoxa** Gmel. V. H. Syn. tab. LXI, fig. 6 = *Nitzschia paradoxa* Grun.

KKt (2 samples).

Area: Cape Horn, Europe, Madagascar, Java.

Nitzschia Hassal.

Panduriformes Grun.

237. **N. constricta** (Greg.) Grun. var. **bombiformis** Grun. V. H. Syn. tab. LVIII, fig. 9.

L. 0,042 mm., b. 0,016 mm., at the constriction 0,012 mm. Striæ 11 in 0,01 mm.

Solitary in a sample without habitat.

The present form probably is identical with Grunow's „kleine etwas weniger eingeschnürte Form bei Yokohama" (Cl. & Grun. Arc. Diat. p. 71).

238. **N. panduriformis** Greg. V. H. Syn. tab. LVIII, fig. 1. Perag. Diat. de Fr. tab. LXX, fig. 5.

KKm, KKt, KCn, KMn—CLt, LN (12 samples).

— — var. **minor** Grun. V. H. l. c. fig. 4.

Mixed with the main species.

Area: Cape Horn, Europe, East Indies, Malay Archipelago, Samoa, Tahiti, Hawaii.

N. panduriformis Greg. var. **interrupta** Östr. n. var. Tab. nostr. II, fig. 29.

L. 0,038 mm., b. 0,018 mm., at the constriction 0,014 mm. Carinal puncta 11 in 0,01 mm. Striæ 22 in 0,01 mm.

The longitudinal plication is not of equal height through its whole length but lower near the apices and in the middle so that two lateral elevated spots arise giving this form a very characteristical appearance. The decussate striation is only conspicuous on the elevated parts.

KKt, KCgN, KMn—CLt (3 samples).

Apiculatæ Grun.

239. **N. marginulata** Grun. V. H. Syn. tab. LVIII, fig. 13.

KKm, KKt (2 samples).

Area: Kara, Europe, Between Aden and Bab el Mandeb, Malay Archipelago, Borneo, Samoa.

— — var. **didyma** Grun. V. H. l. c. fig. 14. Perag. Diat. de Fr. tab. LXX, fig. 16.

KKt, KMn KMn—CLt (4 samples).

The specimens met with have a length of c. 0,04 mm. and are very finely striated; I therefore suppose, that they belong to Grunow's forma *minuta* (Cl. & Grun. Arct. Diat. p. 73).

Area: var. *didyma*: widely distributed.
forma *minuta*: Tonga Islands, Samoa, Antilles (Grunow l. c.).

Pseudo-Tryblionella Grun.

240. **N. acuta** Cl. Cl. West Ind. tab. III, fig. 20.

Found only in a sample without habitat.

Area: Antilles, Tonga Islands, Samoa.

The present form is a little more rounded at the apices than shown in Cleve's figure.

241. **N. alata** Leud. Fortm. Leud. Fortm. La Mal. tab. II, fig. 11.

KKm (2 samples).

Area: Java.

Bilobatæ Grun.

242. **N. bilobata** W. Sm. var. **minor** Grun. V. H. Syn. tab. LX, fig. 2.

LN (1 sample).

Area: Brazil, Europe, Society Islands.

243. **N. Jelinecki** Grun. Perag. Diat. de Fr. tab. LIX, fig. 19.

KKt, s. l. (2 samples).

Area: East India, Malay Archipelago.

In two samples (KKt & s. l.) I found a *Nitzschia*, exactly agreeing with *N. formica* Hantzsch (H. Ost. Archip. tab. VI A, fig. 8).

In Cl. & Grun. Arc. Diat. p. 74 Grunow points out that the figure

of *N. formica* Htz. shows a narrow smooth longitudinal line and that it perhaps is therefore not identical with *N. Jelen.* Grun., which has a longitudinal plication. The specimens examined by me have a sharp plication along which the striæ pass, but with moderate magnifying power the striation along the plication is not always easy to see, it therefore is possible that this striation has escaped the attention of Hantzsch.

Area for *N. formica*: East Indian Archipelago.

Vivaces Grun.

244. **N. fluminensis** Grun. V. H. Syn. tab. LXII, figs. 3—4.

KKm, KKt, KMn—CLt (4 samples).

Area: Campeachy Bay, Mediterranean, Adriatic, Ceylon, Borneo, Malay Archipelago.

Spathulatæ Grun.

245. **N. distans** Greg. V. H. Syn. tab. LXII, fig. 10.

KCn s. l. (2 samples).

Area: Europe, Bali Sound, Pacific Ocean.

— — var. **tumescens** Grun. V. H. l. c. fig. 17.

KKm, KKt (3 samples).

Area: Campeachy Bay, Mediterranean.

246. **N. angularis** W. Sm. Perag. Diat. de Fr. tab. LXXIII, fig. 6.

KKm, KKt, KMn—CLt (4 samples).

Area: ubiquitous.

Sigmoideæ Grun.

247. **N. macilenta** W. Sm. V. H. Syn. tab. LXIV, figs. 6—7.

KKm, TK (2 samples).

Area: Europe, Ceylon.

Sigmata Grun.

248. **N. Sigma** W. Sm. var. **rigida** (Ktz.) Grun. V. H. Syn. tab. LXVI, fig. 5.

KKm, KKt (3 samples).

Area: the main species ubiquitous.
var. *rigida*: cum specie passim (de Toni).

In a sample from KKt I found a small form belonging to the form-circle of *N. Sigma* with L. 0,048 mm., b. 0,006 mm., carinal puncta 10 in 0,01 mm. Striæ not visible. I consider it a dwarf-form of *N. Sigma* var. *rigida*, as it is too broad to be referred to var. *rigidula*.

Obtusæ Grun.

249. **N. Vidovichi** Grun. V. H. Syn. tab. LXVII, fig. 7.

Found only in two samples without habitat.

Area: Villefranche, Adria, Java.

Lanceolatæ Grun.

250. **N. Palea** (Ktz.) W. Sm. var. **minuta** Bleisch. V. H. Syn. tab. LXIX, fig. 23.

LN (1 sample).

Area: the main species: Europe, Abyssinia, Japan, Central Asia.

Nitzschiella Rabenh.

251. **N. longissima** (Bréb.) Ralfs. Cnfr. V. H. Syn. tab. LXX, fig. 2 & Clev. Westind. tab. III, fig. 21 (*N. longissima* var.? *curvirostris*).

KKt (4 samples).

In the specimens examined by me $4^1/_2$—5 carinal puncta are present in 0,01 mm., the central one of those being remote from the two nearest, a fact which however looks to be intimated in the figure by V. H. quoted above. The more spaced carinal puncta seem to give this form a position nearer to Cleve's var. *curvirostris*. In my specimens the horns are turned in opposite directions, but like H. Peragallo (Diat. de France p. 293) I hardly think this character has any systematic value.

Area: *N. longissima*: West Indies, Europe, Madagascar, Labuan, Java, Samoa.

var. *curvirostris*: St. Bartholomew, Java.

252. **N. Lorenziana** Grun. V. H. Syn. tab. LXX, fig. 12.

L. 0,25 mm.

KKt, TK (2 samples).

Area: Adriatic.

— — var.? **incurva** Grun. V. H. l. c. fig. 14.

Found only in a sample from KKt.

Area: Adriatic.

— — var. **fossilis** Brun. Brun & Temp. Japan tab. I, fig. 10.

KKt, s. l. (2 samples).

Area: Calcaire de Yedo (Brun l. c. p. 46).

253. **N. diversecostata** Brun. Cl. Diat. II, tab. V, fig. 11.

KKt (2 samples).

Area: „Moris Creek sondage" (Brun l. c., p. 78).

Hantzschia Grun.

254. **H. marina** (Donk.) Grun. var. **leptocephala** Öst. n. var. Tab. nostr. II, fig. 31.

L. 0,04 mm., b. 0,0045 mm. Carinal puncta 5,5 in 0,01 mm. Striæ 11 in 0,01 mm.

Solitary in a sample from LN (only one specimen met with).
Area of the main species: Davis Strait, Europe.

Homoeocladia Ag.

255. **H. sigmoidea** W. Sm. Syn. tab. LV, fig. 349.

LN.
Area: Europe, Morocco.

Surirelloideae.

Surirella Turp.

256. **S. Comis** A. S. A. S. Atl. tab. IV, fig. 3.

Found only in a sample from KMn—CLt.
Area: Campeachy Bay, Puerto Cabello, Java, Samoa.

257. **S. eximia** Grev. A. S. Atl. tab. IV, fig. 13.

KKt, LN (4 samples).
Area: the coasts of France, Java.

258. **S. fastuosa** Ehr. A. S. Atl. tab. V, figs. 7 & 10.

KKt, KCn, KMn—CLt, TK (11 samples).

— — var. **cuneata** Witt. Perag. l. c. tab. LVIII, fig. 3.

Found only in a sample without habitat.

— — var. **robusta** A. S. A. S. l. c. tab. CCVI, fig. 3.

Found only in a sample without habitat.

— — var. Perag. Diat. de Fr. tab. LIX, fig. 2 (from Banyuls).

Found only in a sample from KMn—CLt.
Area of the main species: Gulf of Mexico, Campeachy Bay, Europe, Yokohama, Java, Madagascar, Tahiti, Hawaii.
var. *cuneata*: Trégurie (Peragallo).
var. *robusta*: Sumbava (A. S. Atl.).

259. **S. Gemma** Ehr. V. H. Syn. tab. LXXIV, figs. 1—3.

KMn—CLt, TK, s. l. (3 samples).
Area: Rio Grande, Europe, Java.

260. **S. Kittoniana** Leud. Fortm. A. S. Atl. tab. CCV, fig. 17.

Found only in a sample from KKt.
Area: Samoa.

261. **S. recedens** A. S. A. S. Atl. tab. XIX, fig. 3.

KKm, KKt KCn, KMn, s. l. (7 samples).

Area: Brazil.

262. **S. reniformis** Grun. Perag. Diat. de Fr. tab. LXV, fig. 5.

KKt, s. l. (3 samples)-

Area: Honduras, Languedoc, Banyuls, Madagascar, San Thome, Malay Archipelago, Samoa.

This form, taken by Peragallo (l. c. p. 255) as a separate species, is identical with Grunow's *Plagiodiscus nervatus.* It is very near to *Sur. Gemma* and like V. Heurck (Traité p. 374) I am most inclined to regard it as an abnormous form of *S. Gemma* only differing in its outer appearance.

In a sample from TK I found a *Surirella,* identical with a „fragliche Form" from the Gazelle-Expedition cnfr. A. S. Atl. tab. LVI, fig. 6 and Jan Gaz. Exp. tab. XXI, fig. 23.

Campylodiscus Ehb.

Rhaphideæ Deby.

263. **C. biangulatus** Grev. A. S. Atl. tab. CCVIII, fig. 15 & tab. XVIII, fig. 4 (*C. Lorenzianus* Gr.)

KKt, KCn (2 samples).

Area: Adriatic, Red Sea, Sumbava, Java, Manilla, Australia.

264. **C. birostratus** Deby? A. S. Atl. tab. XIV, fig. 23.

Solitary in a sample without habitat.

Area: Campeachy Bay.

Of this species I have only seen one specimen, somewhat smaller than the figure by A. S. and with somewhat more distant rays.

265. **C. crebrecostatus** Grev. = **C. Heufleri** Grun. A. S. Atl. tab. XIV, fig. 26.

Solitary in a sample without habitat.

Area: Porto Seguro, Red Sea, Madagascar, Malay Archipelago, Sansego, Samoa, Sandwich Islands, Philippines, Port Jackson.

266. **C. Grevillei** Leud. Fortm. Leud. Fortm. Ceyl. tab. V, figs.54—56.

KKm, KKt, KMn—CLt s. l. (12 samples).

Area: Madagascar, Ceylon, Sandwich Islands.

267. **C. Ralfsii** W. Sm. A. S. Atl. tab. XIV, fig. 2.

KKm, KKt (2 samples).

Area: Europe, India.

268. **C. samoensis** Grun. A. S. Atl. tab. XV, figs. 18—20.

KKt, KMn—CLt (8 samples).

Area: Bahia, Madagascar, Puerto Cabello, Samoa, Malay Archipelago, Tahiti.

In a sample from KMn—CLt I found a *Campylodiscus* agreeing with *C. Castracani* Jan. (Gaz. Exp. tab. XIX, fig. 15), which by Deby (Camp. p. 26) is identified with *C. incertus* A. S. = *C. Samoensis* Grun.

269. **C. Browneanus** Grev. var. **Phalangium** (A. S.) Deby. A. S. Atl. tab. LIII, fig. 17.

KKt, KMn—CLt (2 samples).

Area: Campeachy Bay.

270. **C. Daemelianus** Grun. A. S. Atl. tab. LIV, fig. 2.

Found only in a sample from KKm.

Area: Madagascar, Malay Archipelago.

271. **C. humilis** Grev. Grev. Trans. Bot. Soc. VIII, tab. III, fig. 1.

KKm, s. l. (2 samples).

Area: Woodlark Island.

272. **C. latus** Shadb. A. S. Atl. tab. XVIII, fig. 26 (*C. ambiguus* Grev.).

Found only in a sample without habitat.

Area: the coasts of America, Europe, East India.

273. **C. Wallichianus** Grev. var. **Normaniana** Grun. A. S. Atl. tab. XIV, fig. 14 (*C. Normanianus* Grun.).

Area: West Indies, Zanzibar, Java.

Striatæ Deby.

274. **C. Thureti** Bréb. Perag. Diat. de Fr. tab. LVII, fig. 8.

KKt, TK, s. l. (4 samples).

Area: Europe. Malay Archipelago.

In a sample from KKt I found a form (Tab. nostr. II, fig. 34) which, if it really is a Diatom — and not only a spore — must probably be referred to *Xanthiopyxis* Ehr. The propositions are: L. c. 0,06 mm, b. c. 0,03 mm., everywhere provided with close radiant spines. Only one specimen met with. It reminds somewhat of *Podosira* (*Xanthiopyxis* ?) *spinoradiata* Brun. (Temp. & Brun Japon tab. IV, fig. 10), found in „Calcaire de Yedo et de Jackson's *Paddock* (très rare)".

The present material examined by me has proved to be rather rich both in individuals and in species but on the whole it is rather uniform. Only seldom a single species is predominant in the samples such as *Cocconeis binotata*, *Grammatophora oceanica*, *Mastogloia inæqualis*, *Synedra affinis*, but I have not been able to point out any difference dependent on variation of the depths which range from one to ten fathoms.

The genera which characterize the material in its entirety are *Cocconeis* and *Mastogloia*, which occur in numerous samples and also often in a great number.

The following species are especially predominant: *Actinocyclus subtilis* var., *Biddulphia pulchella, Climacosphenia elongata, Cocconeis binotata, Cocconeis fimbriata, Euphyllodium spathulatum, Grammatophora oceanica, Mastogloia qvinqvecostata, Nav. (Dipl.) Crabro* and variants, *Navicula Lyra, Nav. (Trachyneis) aspera* and variants, *Rhabdonema adriaticum, Rhaphoneis amphiceros* and variants, *Synedra lævigata* and *Triceratium dubium*. Freshwater forms occur quite singly especially in samples from Lem Ngob (from the mangrove). Plankton forms are rare and occur only as fragments. I have not met with *Achnanthes baccata* (compare Flora of Koh Chang, part VII, p. (40—41) 258—259). Nearly all the species met with by me are recorded from the Tropics and more particularly from the Malay Archipelago, which previously has been well examined by eminent diatomologists [1]).

The marine Diatoms of Siam have a tropical character but do not occupy a peculiar position among the other East-Indian marine Diatoms such as it might also be anticipated.

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[1]) I have first been acquainted with the treatise of C. Mereschkowsky: On Polynesian Diatoms, St. Pétersbourg 1902, when my manuscript was already in press; I have therefore only been able to make use of it in noting the geographical distribution of the species stated in my treatise.

Cycadaceae, Taxaceae, Gnetaceae, Pandanaceae, Smilaceae, Commelinaceae, Amaryllidaceae, Taccaceae, Dioscoreaceae

by **C. H. Ostenfeld** — Copenhagen.

Cycadaceae.

Cycas L.

1. **C. circinalis** L., Sp. pl. 1658; Hook. f., Fl. Brit. India, V, p. 656; *C. sphaerica* Roxb., Fl. India, III, p. 747.

Male cone, female carpophylls with ripe seeds and a young plant were brought home, preserved in alcohol.

Koh Kahdat, sandy seashore, plentiful (No. 548).

Area (after Warburg, Monsunia I): India, Ceylon, Nicobar Islands, Burma, Sumatra, Java, South China.

Taxaceae.

Podocarpus L'Hérit.

1. **P. Wallichianus** C. Presl., Botan. Bemerk., p. 110, 1844; R. Pilger, Taxaceae in Engler: Das Pflanzenreich, Heft 18, 1903, p. 59; *P. latifolia* Wallich, Plantae As. rarior., 1830, p. 26, tab. 30 (non *P. latifolia* (Thunb.) R. Br.); Hook. f., Fl. Brit. India, V, p. 649.

A young plant about 50 cm. high has been collected. The leaves are 10—11 cm. long and 2—2,5 cm. broad; R. Pilger l. c. quotes 3—4 cm. broad, but perhaps the leaves are broader in the grown-up plants.

There have also been collected sterile branches of a plant which I consider as a unusually broad-leaved *P. Wallichianus*. The leaves are broadly ovate, 11—13 cm. long and 5—6 cm. broad, long acuminate. The branches resemble closely branches of *Agathis*, but the buds and their scales are acute as in *Podocarpus*, sect. *Nageia*, while *Agathis* has obtuse bud-scales and rounded buds.

Very common in the jungle near Lem Dan and Klong Munsé (No. 399).

Area: East India, Burma.

Gnetaceae.

Gnetum L.

1. **G. neglectum** Blume, Rumphia, IV, p. 6, pl. 175, fig. 2; Karsten in Ann. Jard. Buitenzorg, XI, p. 205; non Hook. f., Fl. Brit. India, V, p. 642; (?) *G. macrostochyum* Hook. f., Fl. Brit. India, V, p. 642.

Although the collected specimens are sterile, I think that my determination shall be right.

Koh Kahdat, sandy seashore.

Area (according to Warburg, Monsunia I): Arracan, Tenasserim, Malay Peninsula, Sumatra, Borneo, Java.

Pandanaceae.

Pandanus L.

1. **P. tectorius** Soland., Prim. fl. ins. pacif. ined. 350; Parkinson, Journ. of a Voy. to the South Sea in H. M. S. The Endeavour, 1773; Warburg, Pandanaceae, in Engler, Das Pflanzenreich, Heft 3, 1900, p. 46; *P. odoratissimus* L. fil., Suppl., 1791, p. 424; Williams, Liste des plantes connues du Siam, Bull. Herb. Boiss., 2. sér., IV, 1904, p. 220; *P. fasciculatus* Lam. Encyclop.; Hook. f., Fl. Brit. India, VI, p. 485.

α, sinensis Warb., l. c. p. 48.

Very common throughout the area explored, on seashores (No. 101).

Area: Seychelles and Mascarenes Islands, India, Polynesia, South Asia to China, Australia. — Cultivated in the Tropics.

Note. In the collections from Koh Chang some sterile shoots of *Pandanaceae* occur, but I have not been able to determine them.

Smilaceae.

Heterosmilax Kunth.

1. **H. indica** A. DC., Monogr. Phanerog., vol. I, Smilaceae, p. 43; Hook. f., Fl. Brit. India, VI, p. 314.

Dr. Schmidt has brought home a specimen of a plant which undoubtfully must be taken as a *Heterosmilax*; unfortunately the specimen has no flowers nor fruits, but the leaves and the umbel-peduncles with their receptacles and bracteoles agree well with specimens of *H. indica* in the Copenhagen-Museum, collected by the late Dr. Voigt in „India orientalis" (ɔ: Serampore or Calcutta). The leaves of Dr. Schmidt's plant are 9—17 cm. long, 4—8 cm. broad, ovate-oblong, acuminate-cuspidate from the rounded-obtuse or subcordate base; the sheathing part of the petiole is very short and narrow.

Koh Kahdat, jungle, a liane (No. 553).

Area: Assam and the Khasia Hills.

Commelinaceae.

Pollia Thumb.

1. **P. thyrsiflora** (Blume) Hasskarl, Plantae Junghuhnianae, p. 150, 1853; Clarke, Commelinaceae in A. & C. De Candolle, Monogr. Phanerog., vol. III, p. 124; Hook. f., Fl. British India, VI, p. 367; *Tradescantia th.* Blume in Roemer & Schultes, Syst. Veg. VII, 2, 1830, p. 1157; *Lamprocarpus th.* Blume, ibidem, p. 1726.

The specimen collected was beginning to flower and no fruit is developed, but I think that the short and dense inflorescence and the large and broad bracts and bracteoles are sufficient to distinguish it from the allied *P. aclisia* Hassk.

Klong Sarlakpet in the jungle (No. 847).

Area: Java, Philippine Islands, South Andamans.

Amaryllidaceae.

Curculigo Gärtn.

1. **C. latifolia** Dryand. in Ait. Hort. Kew., Ed. 2, II, p. 253; Hook. f., Fl. Brit. India, VI, p. 280; *C. sumatrana* Roxb., Fl. Ind., II, p. 146; Wight, Icones tab. 2042.

The specimens collected belong to the first mentioned form in Hooker f., l. c.

Common in the jungle near Lem Dan (No. 511).

Area: Andaman Islands, Burma, Malay Peninsula, Malay Archipelago.

Crinum L.

2. **C. asiaticum** L., Sp. pl. 419; Baker, Handb. of Amaryllid. p. 75; Botan. Magazine, tab. 1073; Hook. f., Fl. Brit. India, VI, p. 280. *C. toxicanum* Roxb., Wight, Icones tab. 2021—2.

Koh Kahdat, sandy seashore (No. 569).

Area: India, Ceylon.

Taccaceae.

Tacca Forst.

1. **T. pinnatifida** Forst., Plant. Esculent., No. 28; Char. Gen. p. 69, tab. 35; Hook. f., Fl. Brit. India, VI, p. 287; Curtis, Botan. Magazine, tab. 7299, 7300, 1893; *T. pinnatifolia* Gärtn., De Fruct., I, p. 43, tab. 14.

Only a scape with mature fruits was brought home, but the species is recognisable by the ribbed seeds, the unilocular fruit, the long filiform bracts and the numerous involucral leaves.

Koh Kahdat, sandy seashore (No. 572 a).

Area: Madagascar and both coasts of tropical Africa (acc. to Bot. Magazine), The Concans, coasts of India, Ceylon, Malay Peninsula, Malay and Pacific Islands, North Australia. Commonly cultivated in the Tropics of the Eastern Hemisphere.

Note. The *T. viridis* Hemsley (Hook. f., Icones Pl., 2515—16, 1897) is nearly allied to the above species, and by the scarce material a distinction between these two species is hardly possible.

2. **T. lancifolia** Zoll. & Mor., in Moritzi, System. Verzeichniss der von H. Zollinger in den Jahren 1842—44 auf Java gesammelten Pflanzen, etc., Solothurn 1845—46, p. 91; *T. integrifolia* Schnitzlein, Iconographia, vol. I, 1843—46, pl. 58, figs. 1, 7—15, non Ker.-Gawl.; *T. laevis* Wallich herb., non Roxb.

— — var. **breviscapa** nov. var.

Rhizoma subterranea erecta, brevis; petiola foliorum laevia, infra in vaginas dilatata, 10 (8—12) cm. longa; folia lanceolata vel elliptici-lanceolata, longe acuminata, 20 (15—30) cm. longa, 5 (3—7) cm. lata, lævia, petiolo subduplo breviora; scapus floriferus petiolis duplo vel triplo brevior, 5—10 cm. longus, lævis; involucri folia 4, ovato-lanceolata, acuminata, subæqualia, exteriora 2—2,5 cm. longa, 0,7—0,8 cm. lata, 9—10-nervata; flores 3—5 in umbrella, petiolis brevibus (c. 1,0 cm. in statu fructifero); cirri longi numerosi; perianthium, stamina et stylus fere ut in *T. lancifolia* (Schnitzlein, l. c.); fructus (submaturus) sicco-baccatus, 2 cm. longus, perianthio persistenti coronatus, 6-alatus; semina numerosissima, oblique ovata, curvata, striata, 0,25—0,30 cm. longa, 0,15 cm. lata.

Dr. Schmidt has brought home 4 dried specimens and some umbels in alcohol of a *Tacca* which is allied to *T. lancifolia* Zoll. & Mor. in Java, but differs by the shorter stalked leaves, the very short scape etc.; the umbels preserved in alcohol and the three dried specimens have not full-developed flowers, only young buds; but there is one specimen with nearly ripe fruit. The form of the leaves and of the involucral leaves are about as in a javanese specimen of *T. lancifolia*, and consequently I think it better to consider the Siamese plant a variety, until we know the entire-leaved species of *Tacca* better. It seems to me, that they form a line from *T. cristata* Jack, *T. integrifolia* Ker. Gawl., *T. laevis* Roxb. to *T. lancifolia* Zoll. & Mor., the length of the scape and the differentation of the involucral leaves varying very much; therefore other characters are necessary for distinction.

The Indian plant figured by Schnitzlein (l. c.) from a specimen sent by Wallich belongs beyond doubt to *T. lancifolia*; I have also seen a specimen from Wallich's herbarium which is like javanese *T. lancifolia*, only being a little larger.

Jungle near Klong Son, end of February (No. 641).

Area (of *P. lancifolia*): Java, India (Wallich).

Dioscoreaceae.

Dioscorea L.

1. **D. daemona** Roxb., Fl. India, III, p. 805; Wight, Icones, tab. 811; Hook. f., Fl. Brit. India, VI, p. 289.

Only the male racemes, the roots and old leaves were brought home, but the roots were cultivated in the Botanical Gardens of Copenhagen and have given rise to new shoots and 3-foliate leaves.

On rocks in the jungle near Klong Munsé (No. 469), opposite Koh Sarlak on the E. coast (No. 721).

Area: India, Burma, Malay Peninsula, Malay Islands, Tonkin.

Eriocaulaceae

by **V. A. Poulsen** — Copenhagen.

Eriocaulon L.

E. quinquangulare L.

Ricefields near Lem Dan, plentiful (No. 250).

Area: India, Ceylon.

Combretaceae

by **Johs. Schmidt.**

Terminalia L.

1. **T. Katappa** L.

Common throughout the area explored on sandy seashores. Often cultivated around villages (No. 792).

Area: Madagascar, Malay Archipelago, New Guinea, Pacific Islands; commonly cultivated in tropical countries.

2. **T.** sp.

Klong Son; edge of the jungle; a tall tree (No. 657).

Calycopteris Lamk.

3. **C. floribunda** Lamk.

Dry plains near Lem Dan and dry places in the jungle near Klong Munsé. A large scandent shrub. Flowering in January and February. Swarms of insects are often seen around flowering specimens (No. 141, 383, 408, 448).

Area: India, in tropical parts of the Western Peninsula, also found from Assam to Singapore.

Quisqualis L.

4. **Q. indica** L.

Jungle near Klong Son; flowering in March (No. 684).

Area: Indo China, Malay Archipelago, Philippines, Western Tropical Africa, often cultivated in tropical countries.

Lumnitzera Willd.

5. **L. coccinea** W. & Arn.

Very common throughout the area explored with the Mangroves. Flowering in January, February, March; a small tree or a shrub with red flowers (No. 80).

Area: Malay Peninsula, Malay Archipelago, Northern Australia, Pacific Islands.

6. **L. racemosa** Willd.

A shrub with white flowers, far less common than the preceding species. like this on the shores with the Mangroves; Koh Kong and Lem Ngob (No. 356).

Area: Coasts of both Peninsulæ, Malay Archipelago, E. Africa, Madagascar, N. Australia.

Myrsinaceae

by **Carl Mez** — Halle.

Ardisia Sw.

1. **A. Helferiana** Kurz.

Jungle near Lem Dan. A shrub with black fruit in February (No. 109, 797).

Area: Tenasserim, Manipore.

2. **A. crispa** (Thbg.) A. DC.

Lem Dan, Klong Munsé, Klong Majum, in the jungle. A small tree with flowers (white or reddish) in January—February (No. 95, 594 c, 839).

Area: From the Sikkim-Himalaya to the Chinese Prov. Sze-Chuan, island of Yesso, Philippines, Sumatra, Borneo.

— — var. **angusta** Clarke.

Jungle near Klong Munsé. A small tree with flowers (white or reddish) in February (No. 494 a).

Area: Malacca.

3. **A. colorata** Roxb.

Jungle near Klong Munsé. With black fruit in February (No. 843).

Area: From East-Bengal to Singapore; Java; Nilghiri Hills.

4. **A. rigida** Kurz.

Jungle near Klong Munsé. A shrub or a small tree (No. 60, 403).

Area: Tenasserim, Siam — a very rare species.

Maesa Forsk.

5. **M. ramentacea** Wall.

Lem Dan, Klong Prao, Klong Son, in dry plains. A small tree or a shrub with small white flowers in January—March (No. 205, 708, 829).

Area: From East-Bengal to the Chinese Prov. Yun-Nan, the Andamanes and Nicobares, Sumatra, Java and Borneo.

Aegiceras Gärtn.

6. **Ae. corniculatum** (L.) Blanco. [1])

Common with the Mangroves all over the explored area.

Area: From the Malabar Coast and Ceylon to the Chinese Prov. Kwang-Tung, the Philippines, the Malay Archipelago and tropical Australia.

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[1]) Determined by Johs. Schmidt.

Convolvulaceae

by **H. Hallier** — Hamburg.

Merremia Dennst.

1. **M. umbellata** Hallier f. var. **orientalis** Hallier f. in Bull. soc. r. bot. Belg. XXXVI (1896), p. 270.

Koh Lom, on rocks near the Sea (No. 718 g).

Area: Ostafrika (Massailand), Ostindien von Nepal bis Khasia und Burma, Ceylon, Tonkin, Hongkong, Kwangtung, Ostküste von Malacca, Manila, malaiischer Archipel von Sumatra bis Neuguinea, Australien (Rockingham Bay).

Ipomoea Linn.

2. **I. (§ Leiocalyx) reptans** Poir.; Hallier f. in Bull. soc. r. bot. Belg. XXXVII, 1 (1898), p. 97.

Naval station opposite Koh Kong in a pool, rice-field near Lem Dan (No. 327, 840).

Area: Sehr gemein in allen tropischen Gegenden der alten Welt, Australiens und Oceaniens; Südafrika; Cuba.

3. **I. (§ Leiocalyx) pes caprae** Sweet var. **emarginata** Hallier f. in Bull. soc. r. bot. Belg. XXXII, 1 (1898), p. 98 and in Jahrb. Hamb. wiss. Anstalten XII, 3. Beih. (1899), p. 48.

Common throughout the area explored in sandy (also in rocky) coasts (No. 45).

Area: Sehr gemein am sandigen Strande fast aller tropischen und subtropischen Gegenden.

4. **I. (§ Leiocalyx) littoralis** Boiss. (von Bl.); Hallier f. in Jahrb. Hamb. wiss. Anst. XII, 3. Beiheft (18) p. 47.

Rayong, sandy seashore.

Area: Sandiger Meeresstrand in Westindien, Florida, Texas, Mexico, Nicaragua, Costarica, Columbien, Ecuador, Französisch Guiana, Brasilien. Azoren, von Senegal bis nach Angola, Mittelmeerküsten, Mauritius, Ostküste der Halbinsel Malacca, Formosa, Kwantung, Liu-kiu-Archipelag, trop. Australien.

5. **I. (Eriospermum) glaberrima** Boj.

Koh Lom, on rocks near the Sea (No. 718 d).

Area: Mexico, Venezuela, Westindien (St. Domingo, St. Lucia, Portorico, Guadeloupe etc.), Ostafrika und Insel Sansibar, Comoren, Madagascar, Mauritius, Seychellen, Vorder- und Hinterindien, Ceylon, Aldabra-Inseln, Andamanen, Philippinen, Karolineninsel Yap, Marshallinseln (Jaluit), malaiischer Archipel bis zu den Salomonsinseln, Ostküste von Australien, Oceanien bis nach Neucaledonien.

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Verbenaceae

by **C. B. Clarke** — Kew.

Lantana L.

1. **L. Camara** Linn., Sp. Pl. ed. 1, p. 627, ed. 2, p. 874; Schauer in DC. Prodr. v. 11, p. 598; Miq. Fl. Nederl. Ind. v. 2, p. 904 in Obs.; Hook. f. Fl. Brit. Ind. v. 4, p. 562 in nota; Hemsl. in Journ. Linn. Soc. v. 26 (1890), p. 251. *L. aculeata* Linn. Sp. Pl. ed. 1, p. 627, ed. 2, p. 874.

Klong Sarlakpet; a shrub (No. 738).

Area: Native of Tropical America; occurs as a weed in India, China, Malaya.

Stachytarpheta Vahl.

2. **S. indica** Vahl, Enum. v. 1 [1805], p. 206; Schauer in DC. Prodr. v. 11, p. 564 (*Stachytarpha*); Miq. Fl. Nederl. Ind. v. 2, p. 907 (*Stachytarpha*); Hook. f. Fl. Brit. Ind. v. 4, p. 564; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 251.

S. Jamaicensis, Vahl Enum. v. 1 [1805], p. 206; Hook. Bot. Mag. t. 1860.

S. Bogoriensis, Moritzi, Verz. Zoll. Pfl. p. 52.

Verbena Indica, Linn. Sp. Pl. ed. 2, p. 27.

Lem Ngob, edge of dry jungle (No. 33).

Area: Scattered in India, China, Malaya, but perhaps indigenous only in the warm parts of America.

Callicarpa Linn.

3. **C. longifolia** Lamk., Encycl. v. 1 [1783], p. 563, Illustr. t. 69; Schauer in DC. Prodr. v. 11, p. 645; Miq. Fl. Ind. Bat. v. 2, p. 887; Hook. f. Fl. Brit. Ind. v. 4, p. 570; Hemsl. in. Journ. Linn. Soc. v. 26 [1890], p. 253.

Plains near Klong Prao, Klong Sarlakpet on rocks in the jungle; a shrub with lilac flowers and white fruits (No. 717, 861).

Area: India, China, Malaya, Trop. Australia.

4. **C. cana** Linn., Mant. [1771], p. 198; Blume Bijd. p. 817; Schauer in DC. Prodr. v. 11, p. 643; Miq. Fl. Nederl. Ind. v. 2, p. 885; Hook. f. Fl. Brit. Ind. v. 4, p. 568; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 252.

C. Americana, Lour. Fl. Cochinch. p. 70, non Linn.

C. Sumatrana, Miq. Fl. Ind. Bat. v, 2, p. 886.

Lem Ngob, edge of dry jungle; a shrub with lilac flowers and black fruits (No. 5).

Area: India; extending thence to the Philippines and North Australia.

Tectona Linn.

5. **T. grandis**, Linn. f. Suppl. [1781], p. 151; Schauer in DC. Prodr. v. 11, p. 629; Moritzi Verz. Zoll. Pfl. p. 53; Miq. Fl. Nederl. Ind. v. 2, p. 901; Hook. f. Fl. Brit. Ind. v. 4, p. 570; Brandis Forest Fl. p. 354, t. 44.

Occasionally cultivated.

Area: South India. From Northeast India and Burma extended throughout Malaya.

Premna Linn.

6. **P. integrifolia** Linn. Mant. [1771], p. 252, syn. Burm. excl.; Wight Ic. Pl. Ind. Or. t. 1469; Moritzi Verz. Zoll. Pfl. p. 52; Miq. Fl. Nederl. Ind. v. 2, p. 894; Hook. f. Fl. Brit. Ind. v. 4, p. 574; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 255.

P. serratifolia, Linn. Mant. [1771], p. 253; Schauer in DC. Prodr. v. 11, p. 632.

Koh Lom, a shrub on rocks near the Sea (No. 716).

Area: India, China, Malaya, Tropical Africa.

7. **P. obtusifolia** R. Brown Prodr. [1810], p. 512; Schauer in DC. Prodr. v. 11, p. 637.

Littoral forest near Lem Dan (No. 180), plains near Lem Dan (No. 621).

Area: Timor, Tenimber, Tropical Australia.

Vitex Linn.

8. **V. vestita** Schauer in DC. Prodr. v. 11 [1847], p. 692; Miq. Fl. Nederl. Ind. v. 2, p. 864; Hook. f. Fl. Brit. Ind. v. 4, p. 587.

Wallich List n. 1750.

Wallich's List of bare names was not printed; a few lithographed copies were made. The plants were (largely) sorted by hand and eye only, so that the number of mixed species in the type set (omitting the issued duplicates) is large and of mixed genera considerable; on these facts, botanists now hesitate to accept Wallich's List as „published species".

Jungle near Klong Munsé, river-side; yellow flowers and black fruits (No. 294, 434).

Area: Malaya (from Penang to Borneo).

9. **V. pubescens** Vahl Symb. v. 3 [1794], p. 85; Blume Bijd. p. 812; Moritzi Verz. Zoll. Pfl. p. 53; Miq. Fl. Nederl. Ind. v. 2, p. 861; Schauer in DC. Prodr. v. 11, p. 685; Hook. f. Brit. Ind. v. 4, p. 585.

V. arborea, Roxb. Fl. Ind. v. 3, p. 73; Wight Ic. Pl. Ind. Or. t. 1465.

Pistacia Vitex, Linn. Fl. Zeyl. p. 195.

Lem Dan (No. 428).

Area: Throughout India and Malaya.

10. **V. trifolia** Linn. Sp. Pl. ed. 1, p. 638, ed. 2, p. 890; Schauer in DC. Prodr. v. 11, p. 683; Hook. f. Fl. Brit. Ind. v. 4, p. 583.

Area: Southeast Asia, to Japan and Trop. Australia.

var. β **unifoliata** Schauer in DC. Prodr. v. 11, p. 683; Miq. Fl. Nederl. Ind. v. 2, p. 859; Hemsl. in Journ. Linn. Soc. v. 26 [1890] p. 258.

V. ovata Thunb. Fl. Jap. p. 257; Hook. et Arn. Beechey Voy. pp. 206, 268, t. 47.

Rayong, Cape Liant on sandy seashores.

Area: From Mauritius to the Sandwich Isles.

Clerodendron Linn.

11. **C. inerme** Gaertn. Fruct. v. 1 [1788], p. 271, t. 57, fig. 1; Miq. Fl. Nederl. Ind. v. 2, p. 868; Schauer in DC. Prodr. v. 11, p. 660; Hook. f. Fl. Brit. Ind. v. 4, p. 589; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 261.

Koh Kahdat, sandy seashore, a shrub with white flowers (No. 321, 552 d).

Area: India, Malaya, Polynesia, near the sea.

12. **C. Siphonanthus**, Aiton Hort. Kew ed. 2, v. 4 [1812], p. 65; Wight Illustr. Ind. Bot. t. 173; Miq. Fl. Nederl. Ind. v. 2, p. 883; Schauer in DC. Prodr. v. 11, p. 670; Hook. f. Fl. Brit. Ind. v. 4, p. 595; Hemsl. in Journ. Linn. Soc. v. 26 [1890] p. 262.

Open grassy places near Lem Dan, a shrub (No. 16, 260).

Area: India, Malaya.

13. **C. villosum** Blume Bijd. [1825], p. 811.

Syn. Rheede excl.; Schauer in DC. Prodr. v. 11, p. 667; Miq. Fl. Nederl. Ind. v. 2, p. 877; Hook. f. Fl. Brit. Ind. v. 4, p. 595.

C. velutinum, Moritzi, Verz. Zoll. Pfl. p. 53. — Wallich List n. 1797.

Lem Ngob, Lem Dan in dry jungle, a shrub (No. 12, 217).

Area: Malaya (Malacca to the Philippines).

14. **C. Schmidtii**, C. B. Clarke sp. nova.

Rami teretes pubescentes. Petioli 5 cm. longi, pilis simplicibus brevibus densius vestiti. Folii lamina 18 cm. longa, 5—6 cm. lata,

oblonga, breviter acuminata, basi auriculis rotundatis cordata; margines integri; nervi primarii 10 pares; facies superior vix rugosula, praeter nervum centralem glabrata; facies inferior in nervis breviter villosa. Pedunculus terminalis 5 cm. longus, florens arcte deflexus. Panicula 14 cm. longa, 5 cm. lata, oblonga, composita, 80-flora. Calyx 6 mm. longus, glaber, rubescens, lobis lanceolatis alte lobatus. Corollae tubus 1 cm. longus, linearis; lobi 5 mm. longi [albi]. Fructus 1 cm. in diam., glaber, niger. — Sp. eximia. Cl. nutanti proxima.

Klong Sarlakpet; Klong Munsé, a small tree or a shrub with black fruit (No. 740, 475).

15. **C. hastato-oblongum** C. B. Clarke sp. nova.

Petioli 8 cm. longi. Folii lamina basi truncata hastata. Panicula subglobosa, 6—7 cm. in diam., 12—16 flora. Calycis lobi ovati acuti. Ceteroquin ut *C. Schmidtii*, hujusque forsan var. umbrosa, foliis tenuioribus, pedunculo gracillimo.

Jungle near Klong Son, a shrub (No. 692 a).

Congea Roxb.

16. **C. velutina** Wight Ic. Pl. Ind. Or. [1850], t. 1479, 3 vel 1566; Hook. f. Fl. Brit. Ind. v. 4, p. 603.

Common in the jungle near Lem Dan, especially along riverbanks, a liane (No. 433).

Area: Malay Peninsula.

Sphenodesma Jacq.

17. **S. microstylis** C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 4 [1885], p. 600.

Brachynema ferruginea, Griff. Notul. v. 4, p. 176.

Plains near Lem Dan, a shrub (No. 474, 862).

Area: Malay Peninsula, Siam.

18. **S. Jackiana** Schauer in DC. Prodr. v. 11 [1847], p. 622; Miq. Fl. Nederl. Ind. v. 2, g. 909; Wight Ic. Pl. Ind. Or. t. 1477;

S. pentandra, Jack in Malay. ms. v. 1, p. 19, in Hook. Brit. Misc. v. 1, p. 285; C. B. Clarke in Hook. f. Fl. Brit. Ind. v. 4, p. 602 pro parte.

Congea Jackiana Wallich in Hook. Bot. Misc. v. 1, p. 285 in Obs. — Wallichs List n. 1735.

Folia (imo inter inflorescentiam) usque ad 17 cm. longa, 9 cm. lata, breviter acutata chartacea, micantia, fere glabrata. Calyx glaber tubuloso-campanulatus, dentibus 10, nempe 5 lanceolatis subreflexis, 5 lato-triangularibus acutis erectis (ut recte cl. Schauer).

Koh Chick, in the jungle (No. 862).

Area: Malaya — Cultivated in Saharunpore, Hongkong &c.

Sph. Wallichiana Schauer in DC. Prodr. v. 11, p. 622, i. e. *S. pentandra*, Wight Ic. Pl. Ind. Or. t. 1475, i. e. *Roscoea pentandra*, Roxb. Fl. Ind. v. 3, p. 54, a Sylhet plant, differs much in the size, shape and texture of the leaves, in the calyx-teeth 5 only, subtruncate; and appears specifically distinct enough from *Sphenodesma Jackiana*. But there are intermediate sub-species or varieties, of which *Sph. acuminata* Wight Ic. Pl. Ind. Or. t. 1476 is one; and in the Flora of British India, the whole series was united in one broad species as had been previously done in the Kew Herbarium. At all events, the Koh Chang example is typical *Sphenodesma Jackiana* Schauer.

Avicennia Linn.

19. **A. officinalis** Linn. Sp. Pl. ed. 1, p. 110; Schauer in DC. Prodr. v. 11, p. 700; Hook. f. Fl. Brit. Ind. v. 4, p. 604; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 265.

A. tomentosa, R. Brown Prodr. p. 518; Wall. Pl. As. Rar. v. 3, p. 44, t. 271.

Bontia germinans, Linn. Sp. Pl. ed. 2, p. 891.

Very common with the Mangroves throughout the area explored (No. 38).

Area: E. Africa, Tropical and subtropical seashores of Asia, Australia, Polynesia. New Zealand.

Labiatae.

by **C. B. Clarke** — Kew.

Dysophylla Lour.

1. **D. Auricularia** Blume Bijdr. [1825], p. 826; Wight Ic. Pl. Ind. Or. t. 1445; Benth. in DC. Prodr. v. 12, p. 156; Moritzi Verz. Pfl. Zoll. p. 55; Hook. f. Fl. Brit. Ind. v. 4, p. 638; Hemsl. in Journ. Linn. Soc. v. 26 [1890], p. 276.

Pogostemon auricularia, Hassk. Cat. h. Bogor. p. 131; Miq. Fl. Nederl. Ind. v. 2, p. 964.

Mentha Auricularia Linn. Mant. [1767], p. 81.

Klong Sarlakpet, Lem Dan in muddy ricefields (No. 261, 626, 864).

Area: Common throughout India; extending to China, Malaya and the Philippines.

Anisochilus Wall.

2. **A. sp.** (**A. dysophylloidi** Benth. proxima).

Klong Prao, on rocks in the jungle (No. 706 c).

Area:

Ocimum Linn.

3. **O. Basilicum** Linn. Mant. [1767], p. 85; Benth. in DC. Prodr. v. 12, p. 38; Moritzi Verz. Zoll. Pfl. p. 55; Miq. Fl. Nederl. Ind. v. 2, p. 939; Hook. f. Fl. Brit. Ind. v. 4, p. 609; Boiss. Fl. Orient v. 4, p. 539; Hemsl. in Journ. Linn. Soc. v. 26 [1890] p. 266.

Lem Dan near the village, where it is occasionally cultivated (No. 281).

Area: From Cabul to China, Polynesia, Australia.

This is a sacred plant, cultivated at temples and monasteries. It varies a good deal in habit; the Koh Chang plant is the glabrate form of *Bentham*.

København. — Bianco Lunos Bogtrykkeri.

Explanation of Plate I.

			Pag.
Fig.	1.	*Actinoptychus moronensis* (Grev.) Cl. var. nov. *guttata* Öst.	270
—	2.	*Cyclotella transsylvanica* Pant. var. *dessiminato-punctata* Pant.	268
—	3a.	*Euphyllodium spathulatum* Shadbolt	278
—	b.	— — — Structure × 1500	278
—	c.	— — — Frustule	278
—	4.	*Triceratium* sp.	273
—	5.	*Rutilaria recens* Cl.?	275
—	6.	*Rhaphoneis bilineata* Cl. & Grun. var. *contracta* Grun.?	280
—	7.	*Navicula balatonis* Pant.	286
—	8.	*Glyphodesmis siamensis* Öst. forma *minor*	281
—	9.	— — —	280
—	10.	*Navicula (Pinnularia) Farcimen* Öst.	286
—	11.	— *(Caloneis) siamensis* Öst.	287
—	12.	*Cyclophora siamensis* Öst.	283
	13.	*Striatella delicatula* (Ktz.) Grun. var. *gibbosa* Öst.	276
—	14.	*Achnanthes mammalis* Cast.	283
—	15.	*Achnantes javanica* Grun. var. *rhombica* Grun.	282
—	16.	— — — — — — Epitheca	282

With exception of fig. 3b, the figures have been enlarged 660 times.

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3 a

3 b

3 c

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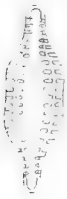

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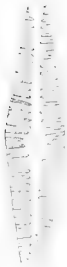

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15

16

E. Østrup del. Pacht & Crone phototyp.

Explanation of Plate II.

		Pag
Fig. 17.	*Navicula (Caloneis) disticha* A. S.	287
— 18.	— *crucifera* Grun.? var. *capitata* Öst.	287
— 19.	— *(Caloneis)* sp.	287
— 20.	— *(Diploneis) ocellata* Öst.	291
— 21.	— *mediopartita* Grove var.	292
— 22.	— *(Pseudoamphiprora) decora* Grev.	293
— 23-24.	— *subglabra* Öst.	296
— 25.	*Mastogloia Jelenecki* Grun. var.?	300
— 26.	*Van Heurckia siamensis* Öst.	296
— 27.	*Scoliopleura siamensis* Öst.	298
— 28.	*Rhoicosphenia tenuissima* Öst.	303
— 29.	*Nitzschia panduriformis* Greg. var. *interrupta* Öst.	306
— 30.	*Navicula bipunctata* Grun.?	294
— 31.	*Hantzschia marina* (Donk.) Grun. var. *leptocephala* Öst.	310
— 32.	*Mastogloia* sp. No. 212	302
— 33.	— *qvadrinotata* Öst.	301
— 34.	*Xantiopyxis* sp.??	312
— 35.	*Mastogloia parvula* Øst.	302
— 36.	*Mastogloia* sp. No. 211	302

All figures have been enlarged 660 times.


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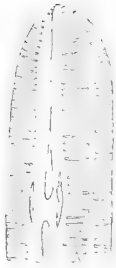
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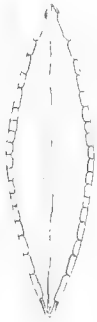
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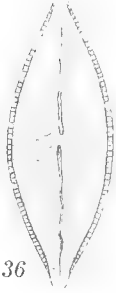
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E. Østrup del. Pacht & Crone phototyp.

CONTENT OF PRECEDING PARTS.

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

—

Part IX.

(**U. Dammer**: Palmae. — **C. H. Ostenfeld**: Lentibulariaceae. — **Edw. A. Wainio**: Lichenes).

Palmae

by **U. Dammer** — Berlin.

The small collection of Siamese Palms brought home by the Danish Expedition consists of 20 samples and in addition to those 4 species are recorded by Dr. Schmidt.

The collection is of special interest being one of the first made in Siam. 11 genera and 12 species are represented. A few samples are unfortunately so incompletely developed that a doubtless identification is impossible, this being specially the case with the seedlings of *Calamus*. All the plants collected are typical inhabitants of the hot and damp regions (resp. tropical coastal regions).

The species of *Calamus* and *Daemonorops* have been determined by the monographer of these genera O. Beccari who found a new species *D. Schmidtianus* amongst them.

Phoenix Linné.

1. **P. paludosa** Roxb. Hort. Beng. 75; Fl. Ind. 789. Syn. *P. siamensis* Miq. Palm. Archip. Ind. 14.

The specimens collected by Dr. Schmidt differ from the typical *Ph. paludosa* Roxb. in having the segments of the leaves arranged in fascicles; besides this the male as well as the female inflorescences are much shorter than those of the type, resembling very much those of *Ph. humilis* Royle var. *Roebelenii* (O'Brien); but the basilar embryo shows clearly that the specimens belong really to *P. paludosa* Roxb.

Swamps near Lem Ngob (no. 362) and at Klong Sarlakpet (no. 744 a) fl. & fruct. immat.

Area: East India: Aestuarial shores from Bengal to Burma and Andaman Isles, Siam, Cochin China.

Licuala Thunb.

2. **L. spinosa** Wurmb in Verh. Bat. Genootsch. II. 469. var. **cochinchinensis** Becc. Malesia III. 74.

Though I have not seen typical specimens of Beccari's varieties I think I am right when referring the specimens collected by Dr. Schmidt to the typical form of Beccari's var. *cochinchinensis*. The fruits (exsiccated) are 6 mm. long, 5 mm. in diameter, the seeds 4 mm. long, 3,5 mm. in diameter.

Grassy plains near Lem Dan (no. 471).

Area: Java. Sumatra, Malacca; var. *cochinchinensis* Becc.. Cochinchina meridionalis, subvar. *brevidens* Becc.: Saigon et ins. Phu Quoc in sinu siamensi.

Borassus Linné.

3. **B. flabellifer** L. Sp. Pl. 1187 [1]).

Rayong, Lower Menam, cultivated.

Area: Malaya.

Zalacca Reinw.

4. **Z. Wallichiana** Mart. Hist. Nat. Palm. III 200, 325 tab. 118, 119, 136.

Plains near Lem Dan (no. 442).

The petioles etc. of this palm are used by the natives of Koh Chang as a material for building.

Area: Burma, Malacca, Penang, Singapore, Siam, Banca.

Calamus Linné.

5. **C. palustris** Griff. in Calcutta Journ. of Nat. Hist. V, p. 62; Palms of Brit. India p. 71 tab. 199.

Edge of the jungle, near Klong Munsé. (Sine num., 10—2—1900, folia).

Area: Tenasserim, Perak, Andaman Isles.

Daemonorops Blume.

6. **D.** (sect. *Cymbospatha*) **Schmidtianus** Becc. sp. nov.

Caudex, ut videtur, non alte scandens, mediocris vel gracilis. Folia superiora cirrifera, segmentis lineari-lanceolatis, majoribus 30 cm. longis, 15 mm. latis, basi a medio attenuatis et apice sen-

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[1]) Determined by Johs. Schmidt.

sim acuminatis, supra in costulis tribus setis brevibus nigris conspersis, marginibus patule et crebre ciliatis. Spadices erecti subsessiles, late fusiformes, modice rostrati, spatha exteriori cymbiformi spiculis valde elongatis tenuibus criniformibus obtecta et in rostrum quam corpus subdimidio brevius producta; secunda et tertia spatha in dorso plus minusve spinulosa; spathis secundariis squamaeformibus acuminatis. Involucrophorum breve et spathella sua subaequilongum. Involucrum in involucrophoro omnino immersum, floris neutri areola depressa leviter tumescenti. Fructus sphaericus, 10—20 mm. diam., squamarum orthostichis 18. Semen globulare, lateraliter paullo compressum, in facie rapheali non ventricosum. — Species *D. melanochaeti* proxima.

Plains and jungle near Lem Dan (no. 206, 515, 624 b). Flowers & fruits found in January and February.

In addition to 5 and 6 the collection of Dr. Johs. Schmidt contains a leaf of a *Calamus* or *Daemonorops* (no. 286, river-bank in the jungle near Klong Munsé) and further some seedlings belonging to one of the said two genera (no. 399. jungle near Klong Munsé), but their incomplete development render a determination impossible.

Caryota Linné.

7. **C. furfuracea** Bl. in Mart. Hist. Nat. Palm. III. 195, Rumphia II. 141.

The present specimens are identical with those collected by Blume in Java and which are now in the Herb. Lugd. Bat. No. 900, 171—399. I cannot unite this species with *C. mitis* Lour., which has pinnules of another shape.

Common in the jungle; Koh Kahdat (no. 578 a), Klong Munsé (no. 207, 494).

Area: Java.

Pinanga Blume.

8. **P. malayana** Scheffer in Natuurk. Tijdsch. Ned. Ind. XXXII. 175.

Klong Son (no. 635, 693 a) and Klong Munsé (no. 852), river-banks in the jungle.

Area: Malacca, Penang, Perak.

Areca Linné.

9. **A. Catechu** Linné Sp. Pl. 1189[1]).

Common everywhere throughout the area explored, cultivated.

Area: Cultivated in the hot damp regions of Asia and Malay Islands.

10. **A. triandra** Roxb. Hort. Beng. 68; Fl. Ind. III. 617.

Plains and jungle near Lem Dan (no. 120, 384, 441). According

[1]) Determined by Johs. Schmidt.

to the natives the Siamese name of this palm is "ton mak ling" i. e. „monkey betel-palm".

Area: Chittagong, Martaban, Tenasserim, Andamans, Malay Peninsula.

Cocos Linné.

11. **C. nucifera** L. Spec. Pl. 1188 [1]).

Throughout the area explored, especially on sandy sea shores; commonly cultivated.

Area: All tropical shores.

Nipa Wurmb.

12. **N. fruticans** Wurmb in Verh. Bat. Genootsch. I. 349 [1]).

Found everywhere throughout the area explored in swamps inside the mangroves.

Area: Shores of the Malay Archipelago and Australia.

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[1]) Determined by Johs. Schmidt.

Lentibulariaceae[1])

by **C. H. Ostenfeld** — Copenhagen.

Utricularia L.

Sect. **Phyllaria** S. Kurz.

1. **U. striatula** Sm. in Rees, Cyclop. V, 37 (1819); Cooke, Fl. Presid. Bombay II. 2. 320; *U. orbiculata* Wallich, Catalogue (1828) 1500; De Candolle, Prodromus VIII, 18; Oliver in Journ. Linn. Soc., III, 187; Hook. f., Fl. Brit. India IV, 334; Goebel, Ann. Jard. bot. Buitenzorg IX, 53, figs. 28, 29, 34; *U. glochidiata* Wight, Icones Plant. Ind. orient., IV, tab. 1581, figs. 2, 3, 12, 13.

On wet perpendicular rocks, waterfall at Klong Munsé in the jungle (Jan. 18th, 19th 1900, No. 851).

Area: India, Malaya, S. China.

Sect. **Oligocista** DC.

2. **U. siamensis** Ostenfeld, in Fedde, Repertorium II (1906), 68.

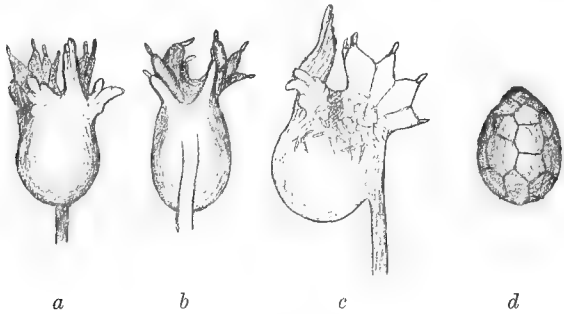


Fig. 1. *Utricularia siamensis* Ostf., *a*, *b*, *c*, Bladders seen from beneath, from above and from the side (c. $^{85}/_{1}$); *d*, seed (c. $^{85}/_{1}$). (Seibert OC. I, Ob. II).

Herba terrestris parva, 2—5 cm. alta, glabra; folia per anthesin rarissima, lineari-spathulata, uninervia, parva, integra; utriculae minutae, parce foliis frequentius rhizoidis adfixae; os utriculae appendicibus flabellatis instructus; scapus erectus, strictus, filiformis, 1—4-florus, squamis parvis integris praecipue ad basin instructus;

[1]) MS. finished in September 1905.

pedicelli c. 2 mm. longi, erecti; lobi calycini ovati, obtusi, inferior superiorem superans; corolla violacea, labium inferius corollae valde reflexum, 3-lobum, labium superius aequans vel parvo superans; calcar strictum, conicum, 5 mm. longum, calycem triplo labiumque superius duplo longius; capsula fere globosa; semina ovoidea, testa reticulata, cellulae testae paucae (15—25), subhexagonales.

This new small species is mostly related to *U. affinis* Wight (incl. *U. brachypoda* Wight), but differs: lower lip of corolla 3-lobed (not scarcely emarginate), spur straight (not slightly curved), cells of the seed-testa very few in number, and especially the peculiar scape of the bladder-appendices, of which the figures (Fig. 1) should give some idea.

Klong Prao, river-bed in the jungle. Flowers mauve (No. 704, March 8th 1900).

3. **U. bifida** L. spec. pl. 26; De Candolle, Prodromus VIII, 21; Oliver, l. c. 182; Hooker f., l. c. 332; Goebel, Pflanzenbiol. Schilderungen II, 150, fig. 49, Ann. Jard. bot. Buitenzorg IX, 66, figs. 71, 77, 78; *U. humilis* Wight, l. c. tab. 1572.

Lem Dan in rice-swamps. Flowers yellow (No. 443, February 8th 1900).

Area: India, E. Asia from Japan to Borneo, Jawa and the Philippines.

4. **U. bosminifera** Ostenfeld, in Fedde Repertorium II (1906), p. 68.

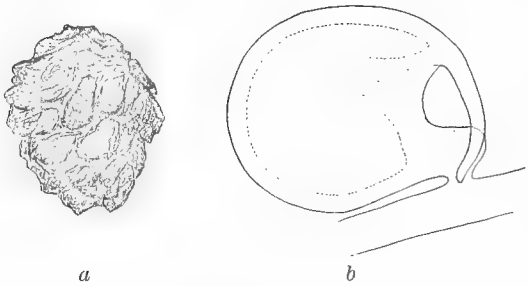


Fig. 2. *Utricularia bosminifera* Ostf., *a*, Seed (c. $^{85}/_{1}$) (Seibert Oc. I, Ob. II), *b*, bladder ($^{35}/_{1}$).

Herba terrestris vel amphibia, 10—15 cm. alta; folia per anthesin persistentia, oblonga vel lineata-spathulata, 3(—5)-nervia, integra, interdum dichotoma, usque ad 3 cm. longa, 2—5 mm. lata; utriculae, *Bosminis* simillimae, parce foliis adfixae, permultae in rhizoidis stolonibusque, globosae, c. 1 mm. in diametro, tentaculis 2 longis instructae; scapus erectus, laxus interdum ramosus, squamis parvis perpaucis instructus, 2—3(1—4)-florus; pedicelli 1—2,5 cm. longi, laxi; lobi calycini inaequales, ovato-cordati, superior acutus, in flore 3,5 mm., in fructu 5—6 mm. longus, inferior obtusus vel truncatus, in flore 2,5 mm., in fructu 4 mm. longus; corolla flava, labium superius obovatum, erectum vel reflexum,

c. 5 mm. longum, inferius obcordatum emarginatum, c. 10 mm. latum, c. 8 mm. longum; palatum valde elevatum (galeiforme), laeve; calcar elegans, angustum, 6—7 mm. longum, leviter curvatum; capsula ovoida; semina subglobosa vel globoso-ovoidea, scrobiculata, c. 0,30 mm. longa, cellulae testae leviter denseque striatae.

Related to *U. bifida* and *U. Wallichiana* Wight; it has about the same shape of the seed-testa and of the bladders as *U. bifida* (see Fig. 2), also the prominence of the innerside of the bladder-stalks mentioned by Goebel (Ann. Jard. Buitenzorg, IX, 73, fig. 54) occurs in our species, the leaves, stolons and rhizoids are very like those of *U. bifida,* but the leaves are much more numerous and large, further 3- (rarely 5-) nerved (not uninerved). It is also easily distinguable by the long flower-stalks, the large underlip of the corolla and the narrow spur.

H. N. Ridley (Journ. of Botany, vol. 33, 1895, p. 11) describes an *U. involvens* from the Malay Peninsula (Kedah), which comes near to our species. It differs in the narrower leaves, the much higher stem ("*circiter pedalis*"), the shape and largeness of the calyx lobes and the straight spur, but the description is very incomplete, e. g. the bladders and the fruit are not mentioned.

Very common in river-beds in the jungle all over Koh Chang. Some specimens were submerse, other terrestrial. Flowers yellow. Collected (with flowers) at Klong Munsé (Jan. 5th & 18th (No. 61), Klong Son (Feb. 28th, No. 679 b), and Klong Prao (March 8th, No. 704 a).

Lichenes

by **Edw. A. Wainio,** Helsingfors.

I. *Discolichenes.*

A. Cyclocarpeae.

Trib. 1. *Parmelieae.*

1. Ramalina Ach.

1. **R. farinacea** (L.) Ach.

Ster. Medulla thalli KHO non reagens. Conf. cum **R. subcomplanata* Nyl., Mon. Ramal. (1870), p. 36, et *R. Sandwicensi* Zahlbr., Neue Flecht., p. 6 (Annal. Mycol. Vol. I, no. 4, 1903).

Ad *Rhizophoram conjugatam* prope Lem Ngob (no. XV, XXXIII, XXXIV).

Area: Cosmopolita est, at regioni antarcticae deficiens et in regione arctica rara.

2. Parmelia (Ach.) De Not.

2. **P.** (sect. *Amphigymnia*) **perlata** Krempelh., Fl. 1869, p. 222; Wain., Étud. Lich. Brés. I (1890), p. 28, et II, p. 256; Hue, Caus. Parm., p. 17 (Journ. de Bot. 1898), Lich. Extra-Eur. I (1901), p. 194.

Thallus margine parce sorediosus, ciliis destitutus, KHO superne et intus lutescens, KHO ($CaCl_2O_2$) intus rubescens, $CaCl_2O_2$ solo non reagens. Ster.

Ad *Rhizophoram* prope Lem Ngob (no. XXXVI).

Area: In partibus calidioribus orbis terrarum provenit.

Specimen Swartzianum ex Ind. occ. in herb. Ach. apotheciis instructum est (conf. Wain., Étud. Lich. Brés. II, p. 256). Apothecia ejus cupuliformia, breviter stipitata, imperforata, usque ad 6 mm. lata, disco rufo; sporae long. 0,030—0,022, crass. 0,016—0,010 mm., membrana crassiuscula; thallus ciliis destitutus, intus KHO primum lutescens, demum fulvescens (oxidatione aut alia mutatione chemica postea subrubescens), $CaCl_2O_2$ non reagens, KHO ($CaCl_2O_2$) intense rubescens (conf. Th. Fr., Lich. Scand., p. 112).

Descriptiones sporarum, in scriptis Nylanderi datae, secund. herb. Nyl. in museo fennico asservatum spectant ad plantas ad alias species pertinentes. Nomine *P. perlatae* in herb. Nyl. (no. 35500) etiam adest nova species, quae nominetur **P. Bangi** Wain. Thallus ejus statura *P. perlatae* similis, superne albido-glaucescens, laciniis irregulariter lobatis, marginibus adscendentibus, basin loborum versus passim parce isidioideo-laceratis, granulis sorediorum et isidiis brevibus irregularibus marginem

versus parce aut sat parce inspersus, ceterum laevigatus, medulla alba, ambitum versus subtus late nudus, ceterum rhizinis tenuibus brevibus crebris instructus, margine passim parcissime ciliato aut fere eciliato, subtus fusco-niger, ambitum versus castaneus, ad marginem anguste castaneo-pallescens, KHO superne et intus intense lutescens, $CaCl_2O_2$ non reagens, KHO ($CaCl_2O_2$) intus passim levissime obsolete aurantiacus aut passim solum lutescens. Apothecia usque ad 5 mm. lata, cupuliformia, subsessilia, imperforata, disco rufo aut testaceo. Excipulum granulis sorediorum et isidiis parcius inspersum, ceterum laevigatum. Sporae „ellipsoideo-oblongae, long. 0,026—0,036, crass. 0,011—0,016 mm., membrana crassiuscula". Pycnoconidia „subbifusiformia, long. 0,005 mm." (observante Nyl.). In rupe prope Le Paz in Bolivia anno 1891 legit M. Bang (no. 13). Postea etiam ad „v. *ciliatam* DC." hoc specimen in herb. Nyl. ductum est.

3. **P. latissima** Fée, Ess. Crypt. Écorc. Suppl. (1837), p. 119, tab. XXXVIII, fig. 1; Hue, Lich. Extra-Eur. I (1901), p. 204. *P. glaberrima* Krempelh., Fl. 1869, p. 223.

Var. **cristifera** (Tayl.) Hue, l. c. p. 205. *P. cristifera* Tayl. in Hook. Journ. of Bot. 1847, p. 165 (Müll. Arg., Lich. Beitr., Fl. 1888, no. 1250).

Thallus margine sorediosus, intus KHO lutescens et demum rubescens, $CaCl_2O_2$ non reagens, ciliis destitutus, subtus passim rhizinis instructus, ad ambitum late nudus. Ster.

In trunco *Rhizophorae* ad flumen Klong Prao in insula Koh Chang (no. XX).

Secundum specimen no. 35399 in herb. Nyl. var. *cristifera* apotheciis instructa est cupuliformibus, breviter pedicellatis, imperforatis, disco testaceo-rufo, sporis „long. 0,026—0,032 mm., crassit. 0,015—0,018 mm.", pycnoconidiis „sublageniformibus, long. 0,005—0,007 mm., crass. 0,001 mm." (secund. annot. Nylanderi in specimine a Jardin lecto e loco incerto).

Area: In zona aequinoctiali distributa.

4. **P. Claudelii** (Harm.) Wain. *P. perforata* v. *Claudelii* Harm., Cat. Lich. Lorr. (1894), p. 196; Hue, Caus. Parm. (1898), p. 16.

Thallus margine passim sorediosus, isidiis destitutus, ciliis marginalibus vulgo brevibus (circ. 0,3—2 mm. longis) parce instructus, superne albidus aut glaucescenti-albidus, intus albus, subtus fuscescens aut ambitum versus castaneus testaceusve, cortice continuo, haud maculato, subtus rhizinis passim crebris instructus, ad ambitum plus minusve late aut in eodem specimine quoque solum anguste denudatus, medulla alba, KHO superne lutescens, intus primo lutescens, dein rubescens, $CaCl_2O_2$ non reagens. Apothecia ignota. Autonoma est species, in *P. perforatam* Ach. haud transiens. Ad species inter *Amphigymnias* et *Hypotrachynas* intermedias pertinet.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X, XL, fig. 1).

Area: Tantum in Europa et Asia hucusque observata.

In *P. urceolata* v. *nuda* Müll. Arg., Lich. Beitr. (Fl. 1880), no. 183, secund. specim. orig. ad Petropolin in Brasilia lectum thallus margine sorediosus, superne rimulosus, subtus ambitum versus late nudus, centrum versus rhizinis brevibus crebris instructus, KHO superne flavescens, intus primo lutescens; dein rubescens. — In *P. urceolata* v. *subcetrata* Müll. Arg., Lich. Beitr. (Fl. 1883), no. 569, secund. specim. orig. ad Twofold Bay ab Hartmann lectum thallus subtus usque ad ambitum rhizinis instructus, KHO superne lutescens, intus primo lutescens, dein rubescens, superne rimulosus, lacinulis sorediosis. Ad *P. cetratam* Ach. pertinet, at thallo subtus partim albido, partim nigricante a f. *sorediifera* Wain., Étud. Lich. Bres. I (1890), p. 40, differt. In *P. urceolata* v. *cladonioide* Müll. Arg., Lich. Beitr., no. 183, secund. specim. orig. no. 35 ad Petropolin a Deventer lectum thallus sorediis isidisque destitutus, passim margine ciliato, ceterum subtus late nudus albidusque aut partim interdum nigricans, lobis bene lacinulatis et partim etiam rotundatis, KHO superne flavescens, intus non reagens, $CaCl_2O_2$ neque solo, nec KHO addito, intus reagens. Apothecia ciliis destituta. Observante cel. Zahlbr., Stud. Bras. Flecht. (Sitzungsber. K. Ak. Wiss. Wien 1902), p. 423, thallus KHO intus primo lutescens, dein rubescens. Non annotavi, anne alia species specimini originali immixta sit, at secundum Müll. Arg. crescit cum var. *nuda*, cujus reactio talis est, qualis a cel. Zahlbr. describitur. Ceterum reactio false observatur, nisi penna, quacum solutio reagens ad thallum applicatur, exacte perpurgata est.

5. **P. adspersa** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 168.

Thallus superne albidus vel glaucescenti-albidus, subtus niger et ambitum versus castaneus vel testaceo-pallescens, laciniis circ. 15—3 mm. latis, irregulariter lobatis, lobis apice rotundatis, integris aut rarius rotundato-crenatis, aut minutissime isidioideo-denticulatis, apicibus marginibusque laciniarum plus minusve recurvo-adscendentibus aut adpressis, eciliatus, esorediatus, praesertim medium versus isidiosus, isidiis tenuissimis brevissimisque, medulla alba, subtus rhizinis brevibus passim instructus, ambitum versus late nudus, KHO superne et intus lutescens, $CaCl_2O_2$ non reagens, at his reagentiis unitis intus rubescens. Habitu similis est *P. coralloideae* (Mey. & Flot.) Wain. (*P. tinctorum* Despr.), at reactionibus ab ea differens et tantum sterilis lecta.

Ad corticem *Rhizophorae* prope Lem Ngob (no. XV et XXXIV).

6. **P. platyphyllina** Wain., l. c.

Thallus superne albidus aut albido-glaucescens, intus albus, subtus niger aut ambitu interdum castaneus, laciniis circ. 20—5 mm. latis, adpressis, irregulariter lobatis, lobis rotundatis, basi vulgo angustatis, adpressis, esorediatus, isidiis destitutus, eciliatus, cortice continuo, subtus rhizinis brevibus passim instructus, ad ambitum late nudus, KHO superne et intus lutescens, addito $CaCl_2O_2$ intus rubescens, $CaCl_2O_2$ solo non reagens. Apothecia circ. 7—3 mm. lata, applanato-cupuliformia aut pr. p. applanata, imperforata, peltata, sessilia, disco rufo aut testaceo-rufescente, margine subintegro aut interdum leviter crenulato, vulgo leviter incurvo, eciliato, excipulo extus laevigato. Sporae 8:nae, distichae, ellipsoideae

aut rarius oblongae, long. 0,014—0,020, crass. 0,007—0,010 mm., apicibus rotundatis, membrana mediocri aut sat tenui. Hymenium jodo passim caerulescens, dein decoloratum, ascis persistenter caerulescentibus. Pycnoconidia fusiformi-acicularia, alterum apicem versus crassiora, apicibus acutis, long. 0,007—0,005, crass. 0,0007 mm. Habitu fere sicut *P. mutata* Wain., Étud. Lich. Brés. I, p. 39, Lich. Bras. Exs., no. 539, at reactione ab ea differens et thallo subtus late nudo; revera ad *Amphigymnias* pertinet, at, apicibus et marginibus thalli haud aut parum distincte adscendentibus instructa, ad *Hypotrachynas* tangit.

Ad corticem arboris in limite silvae prope Stationem navalem in insula Koh Chang (no. XXX).

7. **P.** (sect. **Hypotrachyna** ***Sublinearis**) **addenda** Wain., l. c. p. 169.

Thallus superne albidus aut glaucescenti-albidus, subtus nigricans et ambitum versus pallidus, adpressus, dichotome laciniatus, laciniis 2—0,3 mm. latis, planis, lacinulatis, laciniis lacinulisque conniventibus axillisque rotundatis aut axillis lacinularum apicalium rotundato-patentibus, apicibus vulgo subtruncatis, esorediatus, lamina crebre isidiosa, isidiis tenuissimis, teretibus, concoloribus, ceterum laevigatus, subtus rhizinis brevibus (circ. 0,2 mm. longis), nigris, crebris fere usque ad apicem laciniarum instructus, KHO superne lutescens, intus non reagens, $CaCl_2O_2$ non reagens. Habitu similis *P. coronatae* Fée var. *isidiosae* Müll. Arg. (Wain., Étud. Lich. Brés. I, p. 60), at isidiis unicoloribus, teretibus, tenuioribus, supra laminam thalli sparsis ab ea differens et tantum sterilis visa. *P. deformis* Wain. (*P. tropica* v. *deformis* Wain., Lich. Antill., 1896, p. 3) item huic, nec *P. tiliaceae* affinis, isidiis parcissimis increbrisque et habitu paululum ad *P. sublaevigatam* vergente a *P. addenda* distinguitur.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X et XXI).

8. **P.** (sect. **Xanthoparmelia**) **ecoronata** Nyl., Lich. Andam. (1874), p. 5. *P. relicina* ***P. ecoronata*** Nyl. in Hue, Lich. Exot. (1892), p. 79, no. 681. *P. relicina* var. *ecoronata* Müll. Arg., Lich. Beitr. XXXV (Fl. 1891), no. 1652.

Thallus superne flavescens, subtus pallidus, intus albus, adpressus, crebre iteratim dichotome laciniatus, laciniis circ. 1,5—0,5 mm. latis, planis, laciniis lacinulisque conniventibus axillisque rotundatis aut axillis lacinularum apicalium rotundato-patentibus, apicibus vulgo subtruncatis, esorediatus, isidiis destitutus, subtus rhizinis mediocribus brevibusve (circ. 0,5 mm. longis aut paullo longioribus), fuscescentibus, crebris, fere usque ad apicem laciniarum instructus aut ad apices initiis papillaeformibus rhizinarum obductus, KHO superne parum reagens aut leviter lutescens, intus leviter diluteque lutescens, $CaCl_2O_2$ non reagens, at KHO ($CaCl_2O_2$) intus rubescens. Apothecia parva, circ. 1,5—1 mm. lata, peltata, sessilia, disco rufo, plano aut concaviusculo, margine leviter crenato (in no. II etiam conceptaculis nigris coronato). Excipulum subtus flavescens, laevigatum, rhizinis destitutum. Hymenium circ. 0,070—0,065 mm. crassum. Asci clavati. Sporae 8 : nae, distichae, ellipsoideae (aut subgloboso-ellipsoideae), long. 0,006—0,007 mm., crass. 0,004 mm. In specimine originali

in herb. Nyl. reactio omnino similis observatur, et thallus superne flavescens, subtus pallidus, rhizinis concoloribus aut obscuratis, sporae „long. 0,006—0,007, crass. 0,004—0,005 mm.“, pycnoconidia „cylindrica, recta, long. 0,007—0,010, crass. 0,0005—0,0006 mm.“ (ex Nyl. in sched.). A *P. relicina* Fr. (Wain., Étud. Lich. Brés. I, p. 65) variis notis differt et autonoma est species.

Ad corticem arborum in silva prope cataractam in Koh Chang (no. II et XVI).

Area: In insulis Sinus Bengalensis provenit.

Trib. 2. *Lecanoreae.*

1. Lecanora (Ach.) Wain.

9. *L. subfusca* (L.) Ach.

Var. **chlarona** Ach., Syn. Lich. (1814), p. 158; Norrl. et Nyl., Herb. Lich. Fenn., no. 133 b; Wain., Adj. Lich. Lapp. I (1881), p. 157.

Thallus verruculoso-inaequalis, sat tenuis, glaucescenti-albidus, KHO lutescens, $CaCl_2O_2$ non reagens. Apothecia mediocria aut sat parva, circ. 0,8—0,6 mm. lata, disco testaceo aut testaceo-pallido, opaco, nudo, margine tenui, subintegro aut leviter verruculoso-crenulato, discum vulgo aequante.

Ad corticem arborum frondosarum prope Lem Ngob (no. IX, XXXII), ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. XVII).

Area: Fere cosmopolitica et praesertim in zonis temperatis distributa.

10. **L. subgranulata** Nyl. apud Cromb., Lich. Ins. Rodrigu. (Journ. of Bot., 1877), p. 439; Hue, Lich. Exot. (1892), p. 145. *L. subfusca* var. *subgranulata* Nyl., Lich. Nov.-Gran. Addit. (1867), p. 542 (secund. specim. orig. no. 27301 in herb. Nyl.), Syn. Lich. Nov. Cal. (1868), p. 26; Stizenb., De Lec. subf. (Bot. Zeit. 1868), p. 9.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X).

Area: In zonis calidioribus provenit.

11. **L. cinereocarnea** (Eschw.) Wain., Étud. Lich. Brés. I (1891), p. 80. *L. chlaroterodes* Nyl., Fl. 1876, p. 508, pr. p. (huc pertinet Wr. L. Cub., ser. II, no. 64, no. 27322 in herb. Nyl., ad quem descriptio a Nyl. data spectat, at no. 49 et 67 a ad variationes male evolutas *L. subfuscae* pertinent). *L. achroa* Nyl. in Cromb., Lich. Ins. Rodrigu. (1877), p. 439 (secund. specim. orig. in herb. Nyl.).

Ad corticem *Rhizophorae* et aliorum arborum frondosarum prope Lem Ngob (no. XIV, XXXII), ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X, XVII, XXI).

Area: In zonis calidioribus obvia.

12. ***L. monodorae** Wain. (Lich. Welw., 1901, p. 403).

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X).

Ad hanc subspeciem forsan pertinet *L. achroella* Nyl. in Cromb. Lich. Rodrigu. (1877), p. 439, at specimen orig. malum in herb. Nyl. vix certe determinari potest. Pycnoconidiis „arcuatis, long. 0,015—0,018, crass. 0,0005 mm.“ descripta est.

Area: In zonis calidis Asiae et Africae obvenit.

Trib. 3. *Pertusarieae.*

1. Pertusaria DC.

13. **P. (Lecanorastrum) Bengalensis** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 169.

Thallus sat tenuis, continuus aut demum rimosus, leviter verruculoso-inaequalis, glaucescens, nitidiusculus, neque KHO, nec $CaCl_2O_2$ reagens (neque superne, nec intus), KHO ($CaCl_2O_2$) intus (zona gonidialis et pars superior medullae) intense violascens, superne minus distincte violascens, medulla jodo caerulescens. Pseudostromata 0,7—0,5 (—1) mm. lata, elevata, subcylindrica aut vulgo demum basi plus minusve constricta, crebra, apice demum albo, parce soredioso, apothecium unum continentia aut rarius 2—4 confluentia. Discus neque KHO, nec $CaCl_2O_2$ reagens, KHO ($CaCl_2O_2$) intense violascens. Sporae haud evolutae. Paraphyses ramoso-connexae. Gonidia cystococcacea. Affinis est *P. subvaginatae* Nyl., Fl. 1864, p. 619, 1866, p. 290 (Wain., Étud. Lich. Brés. I, p. 107), at reactione thalli ab ea differens. In specimine orig. *P. subvaginatae* in herb. Nyl. (no. 23508, coll. Lindig. no. 2658) medulla jodo passim parce caerulescens.

Ad corticem arboris prope Klong Sarlakpet in Koh Chang (no. I).

14. **P. (Porophora) sphaerulifera** Wain., l. c.

Thallus sat tenuis, continuus, leviter inaequalis aut sat laevigatus, glaucescens, nitidus, $CaCl_2O_2$ neque superne, nec intus reagens, KHO haud distincte reagens (aut intus demum dilutissime roseus), medulla jodo non reagente, esorediatus, isidiis destitutus. Pseudostromata globosa, diam. 0,5—0,7 mm., basi constricta, albida, opaca, $CaCl_2O_2$ non reagentia, KHO intus violascentia, extus dilute violascentia, nucleo haud evoluto. *P. thelocarpoidem* Nyl., Prodr. Fl. Nov.-Gran. Addit., p. 546, in memoriam revocans.

Ad rupem in silva prope cataractam in Koh Chang (no. XIII).

15. **P. pustulata** (Ach.) Nyl., Énum. Gén. Lich. (1857), p. 116, Prodr. Lich. Gall. (1857), p. 194, Lich. Scand. (1861), p. 181, Lich. Jap. (1890), p. 51, Lich. Paris (1896), p. 72; Th. Fr., Lich. Scand. (1871), p. 313; Flag., Fl. Lich. Fr.-Comté (1886), p. 322; Oliv., Rev. Bot. (1890), p. 18; Harm., Cat. Lich. Lorr. (1894), p. 324; Darb., Deutsch. Pert. (Engl. Bot. Jahrb. 1897), p. 604 (Müll. Arg., Lich. Beitr.,

1884, no. 724, saltem pr. p. huc non pertinet). *Porina pustulata* Ach., Lich. Univ. (1810), p. 309, Syn. Lich. (1814), p. 110.

Thallus laeviter verruculoso-inaequalis sublaevigatusque aut inter pseudostromata rugoso-inaequalis, nitidulus, glaucescenti-albidus aut stramineo-glaucescens, KHO superne leviter lutescens, intus distincte lutescens, $CaCl_2O_2$ non reagens, KHO ($CaCl_2O_2$) intus rubescens, extus haud reagens (in no. XXI) aut rubescens (in no. XL). Pseudostromata 0,5—0,8 (raro —1,5) mm. lata, depresso-subglobosa, basi vulgo demum plus minusve constricta aut abrupta, apice applanato aut demum parum impresso, disco nigro, punctiformi aut raro demum irregulariter dilatato, discum aequante aut raro impresso, apothecia solitaria aut 2—3 (—6) continentia, intus alba, KHO extus leviter lutescentia, intus lutescentia et demum rubescentia (in no. XL) vel aurantiaca (in no. XXI), $CaCl_2O_2$ non reagentia. Paraphyses increbre ramoso-connexae. Asci subcylindrici. Sporae binae, oblongae, long. 0,064—0,106, crass. 0,024—0,055 mm. In sporis bene evolutis membrana bene incrassata; in KHO visis strati distincti, laevigati et stratum exterius interiore circ. duplo crassius. Sporae et asci jodo persistenter caerulescunt.

In *Porina pustulata* Ach. secund. specimen orig., no. 86, a Dufour lectum, in herb. Ach. pseudostromata KHO intus intense lutescentia, dein distincte aurantiaco-rubescentia; in no. 59, item in Gallia lecto, in herb. Ach. pseudostromata intus intense lutescentia, demum intense aurantiaco-fulvescentia, non autem rubentia. In specimine autentico *Pert. melaleucae* Dub., Bot. Gall. II (1830), p. 673 (no. 23414 in herb. Nyl.) pseudostromata KHO intus demum intense fulvescentia, nec rubescentia.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (n. XXI, XL, fig. 10).

Area: In zonis temperatis et calidis crescit.

16. **P. subnegans** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 170.

Thallus glaucescenti-albidus, tenuis, verruculoso-inaequalis, neque extus, nec intus KHO, $CaCl_2O_2$, KHO ($CaCl_2O_2$) reagens. Pseudostromata 0,5—1 mm. lata, hemisphaerica, basi abrupta, haud constricta, vertice vulgo convexo, thallo concoloria aut partim stramineo-glaucescentia, KHO extus leviter flavescentia aut non reagentia, intus non reagentia, $CaCl_2O_2$ non reagentia, KHO ($CaCl_2O_2$) non reagentia, apothecia 1—2 (—4) continentia, discis punctiformibus, nigricantibus aut obscuratis, KHO non reagentibus, pseudostroma aequantibus aut demum vulgo in verrucula ostiolari leviter prominente ceracea vel ceraceo-nigricante sitis. Sporae binae, oblongae aut ellipsoideae, long. 0,070—0,090, crass. 0,028—0,040 mm., membrana incrassata, stratis laevigatis, crassitudine sat aequalibus aut strato exteriore duplo crassiore.

In specimine orig. *P. subpustulatae* Nyl., Lich. Guin. (1889), p. 52, Lich. Jap. (1890), p. 51, thallus est laevigatus et pseudostromata KHO intus lutescentia. In *P. Wilmsii* Stizenb., Lich. Afr., p. 140, secund. specim. orig., no. 25453, in herb. Nyl. thallus verruculoso-rugulosus, discus cinereo-nigricans, pseudostromata KHO intus lutescentia. In *P. diffidente* Nyl., Lich. Jap., p. 52, et in *P. denotanda* Nyl., l. c. p. 53, pseudostromata KHO intus lutescentia, et in *P. exalbescente* Nyl., Fl. 1881,

p. 450, pseudostromata KHO intus leviter lutescentia (ex spec. orig. no. 23456 in herb. Nyl.). Hae omnes plantae nostrae habitu subsimiles sunt, at reactionibus ab ea differunt.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X).

Trib. 4. *Theloschisteae.*

1. Theloschistes (Norm.) Th. Fr.

17. **Th. flavicans** (Sw.) Müll. Arg., Lich. Beitr. (Fl. 1885), no. 932.

F. **glabra** Wain., Étud. Lich. Brés. I (1890), p. 114.

Ad corticem *Rhizophorae conjugatae* prope Lem Ngob (no. XXXIII, XXXIV). Ster.

Area: In America, Oceania, Asia tropica, Africa et in Europa occidentali *Th. flavicans* provenit.

2. Placodium (DC.) Tul.

18. **Pl.** (subg. **Blastenia**) **testaceorufum** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 170.

Thallus crustaceus, effusus, tenuis, verrucoso vel verruculoso-areolatus inaequalisve, areolis 0,3—0,1 mm. latis, majoribus parum elevatis, minoribus verruculaeformibus, contiguis aut thallus sat continuus aut areolis passim parce dispersis, glaucescenti-albidus aut stramineo-glaucescens, sat opacus, neque KHO, nec $CaCl_2O_2$, nec KHO ($CaCl_2O_2$) reagens, hypothallo nigricante limitatus. Apothecia sat crebra, 0,5—0,3 mm. lata, demum convexa aut rarius persistenter planiuscula, adpressa, disco rufo aut rarius rufo-pallescente, raro fusco, opaco, margine proprio, disco vulgo pallidiore aut subconcolore, tenui, subintegro, persistente aut demum excluso. Hypothecium albidum. Epithecium in lamina tenui rufescenti-pallidum, KHO non reagens. Sporae 8:nae, orculaeformes aut ellipsoideae oblongaeve, apicibus rotundatis, distichae, decolores, placodiomorphae, septo bene incrassato, poro instructo, long. 0,015—0,012, crass. 0,006—0,007 mm.

Gonidia ad *Cystococcum humicolam* pertinentia, diam. circ. 0,010—0,008 mm., simplicia, membrana sat tenui. Apothecia strato gonidioso imposita. Perithecium ex cellulis minutis rotundatis aut ellipsoideis sat leptodermaticis formatum, in lamina tenui pallidum aut albidum. Paraphyses tenues, apice clavatae aut parum incrassatae. Hymenium circ. 0,080—0,120 mm. crassum, jodo intense persistenter caerulescens. Affine *Pl. diplacio* (Ach.) Wain., Lich. Antill. (Journ. of Bot. 1896), p. 7 (68). Ad subg. *Blasteniam* etiam pertinent *Lecidea endochromoides* Nyl., Lich. Nov. Zel. (1888), p. 89, *L. iodomma* Nyl., l. c., et *L. coaddita* Nyl., Lich. Jap., p. 66.

Ad corticem *Rhizophorae* prope Lem Ngob (no. XIV).

Trib. 5. *Buellieae.*

1. Physcia (Schreb.) Wain.

Sect. 1. **Euphyscia** Th. Fr.

19. **Ph. crispa** (Pers.) Nyl., Syn. Lich. (1858—60), p. 143 (pr. p.).

Var. **mollescens** (Nyl.) Wain., Étud. Lich. Brés. (1891), p. 144. *Ph. mollescens* Nyl. in Jard., Ess. Hist. Nat. Mendana (1857), p. 301.

Thallus KHO superne et intus lutescens, primum tantum margine sorediosus, in partibus vetustis demum simul etiam centro sorediosus, subtus albidus, rhizinis albidis. Ster.

Ad corticem arboris prope Lem Ngob (no. IX, XXXII).

Area: Var. *mollescens* in insulis tropicis Americae, Africae et Asiae lecta est.

Sect. 2. **Hypomelaena** (Trev.) Wain.

Dimelaena sect. III. *Hypomelaena* Trev., Sul Gen. Dimel. (Atti Soc. Ital. Sc. Nat. XI, 1868), p. 20. *Pyxine* **Dirinaria* Tuck., Syn. North Am. (1882), p. 78.

20. **Ph. picta** (Sw.) Nyl., Syn. Lich. (1858—60), p. 430 (pr. p.); Wain., Étud. Lich. Brés. I (1890), p. 150.

Ad corticem arborum prope Lem Ngob (IX, XXXII). Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (XVII, XXI, XL, fig. 2, 15). In rupe eruptione formata in insula Koh Lom in viciniis insulae Koh Chang (no. XXXI). Fert.

Area: In zonis tropicis et in partibus calidioribus zonarum temperatarum crescit.

2. Pyxine Fr.

21. **P. Schmidtii** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 170.

Thallus albus aut albidus, laevigatus, esorediatus, isidiis destitutus, intus albus, KHO superne et intus lutescens, irregulariter laciniatus, laciniis circ. 1—0,4 mm. latis, irregulariter multifidis, contiguis et inter se subcontinuis, applanatis aut summo apice saepe concaviusculis. Apothecia 1—0,5 mm. lata, lecideina, extus tota nigra, disco nigro, nudo. Sporae 1-septatae.

Thallus opacus, pruina destitutus, adpressus, subtus nigricans, rhizinis nigricantibus, KHO intus reactionem luteam solam praebens, at oxidatione aut alia mutatione chemica postea fusco-rubescens. Apothecia omnino gonidiis destituta. Excipulum strato corticali fusco-fuligineo, tenui, KHO prope hymenium rubescente, ceterum non reagente, strato medullari stramineo, KHO non reagente. Hypothecium fuscescens, KHO non reagens. Hymenium circ. 0,070 mm. crassum, jodo persistenter caerulescens. Epithecium aeruginoso-fuligineum, KHO pulchre violascens. Paraphyses graciles, simplices, apicibus incrassatis, arcte cohaerentes. Sporae 8 : nae, distichae, fuscescentes, ellipsoideae, haud constrictae, apicibus obtusis aut rotundatis, in apicibus membrana crassiore, long. 0,016—0,014, crass. 0,007—0,006 mm.

Ad truncos arborum in silva prope Stationem navalem in insula Koh Chang (no. XXV).

22. **P. retirugella** Nyl., Lich. Exot. (1859), p. 240, Énum. Lich. Antill. (1869), p. 10, Syn. Lich. II (1888), p. 3; Wain., Étud. Lich. Brés. I (1890), p. 155; Malme, Gatt. Pyx. (Bih. K. Sv. Vet.-Ak. Handl. 23 III, 1897), p. 33.

Var. **laevior** Wain.

Thallus leviter foveolatus neque reticulato-rugosus, aut parcissime et parum distincte reticulato-rugosus, margine demum sat parce granulato-sorediosus, KHO superne flavescens, zona gonidiali KHO lutescente et demum rubescente. Medulla alba; pars inferior medullae KHO non reagens.

In specimine orig. **P. retirugellae** Nyl. e Nukahiva a Jardin lecto in herb. Nyl., sicut etiam in speciminibus e Taiti et Nova Caledonia a Nyl. postea citatis, thallus bene reticulato-rugosus, margine parce granulato-sorediosus. Ad var. *sorediigeram* Müll. Arg., Anal. Lich. Austral. (1896), p. 91, secundum descriptionem a Müll. datam pertinent. Wain. Lich. Bras. Exs., no. 1178 et 1263, sorediis destituti, ad var. *denudatam* Wain. pertinent.

Ad corticem arborum prope Lem Ngob (no. IX, XXXII). Ster.

Area: Haec species in zonis tropicis obvenit.

23. **P. Asiatica** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 171.

Thallus glaucescens aut albido-glaucescens, levissime reticulato-rugosus, isidiis destitutus, soraliis rotundatis, circ. 0,6—0,3 mm. latis, albidis vel cinereo-glaucescentibus supra laminam thalli in partibus vetustioribus inspersus, intus albus, KHO superne et intus lutescens, iteratim dichotome vel irregulariter laciniatus, laciniis circ. 1—0,4 mm. latis, irregulariter multifidis, contiguis, applanatis aut summo apice saepe concavo.

Thallus nitidiusculus, pruina destitutus, adpressus, subtus nigricans, rhizinis nigricantibus. Rugae striis albidis indicatae. Sorediis *Physciam pictam* in memoriam revocans, at ceterum variationibus laevioribus *Pyx. retirugellae* similis. Ster.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X, XXI).

3. Buellia De Not.

24. **B. pleiophoroides** (Nyl.) Wain. *Lecidea pleiophoroides* Nyl., Lich. Jap. (1890), p. 81.

Var. **meiospermoides** Wain.

Thallus crustaceus, uniformis, sat tenuis aut crassitudine mediocris (circ. 0,2 mm. crassus), albidus, KHO lutescens, $CaCl_2O_2$ non reagens, KHO ($CaCl_2O_2$) non reagens, verruculoso-inaequalis, rimulosus, hypothallo nigricante limitatus. Apothecia mediocria, 1,5—0,7 mm. lata, adpressa, disco plano, nigro, nudo aut pr. p. tenuissime et parum distincte cinereo-pruinoso, margine sat tenui, nigro, nudo, discum vulgo leviter superante. Hypothecium fuscum. Hymenium circ. 0,080 mm. crassum, haud oleosum, jodo intense persistenter caerulescens. Epithecium fuscum. Sporae 8 : nae—16 : nae, ellipsoideae aut oblongae, fuscae, membrana aequaliter parum incrassata, 1-septatae, septo tenui, haud constrictae, long. 0,010—0,015, crass. 0,005—0,007 mm.

Apothecia saepe ambitu flexuoso irregulariaque, haud raro demum e vetustis apotheciis prolifera et tunc aggregata. Paraphyses sat laxe cohaerentes, 0,001—0,0015 mm. crassae, apice leviter incrassatae. Sporae apicibus obtusis aut rotundatis. Habitu *Lecanactidibus* similis. *Buellia pleiophoroides* (Nyl.) sporis partim majoribus, long. vulgo 0,023—0,015, rarius 0,011 mm., crassit. 0,007—0,005 mm., medio vulgo leviter constrictis, membrana aequaliter parum incrassata, septo tenui, hymenio 0,080 mm. crasso, bene oleoso, paraphysibus laxius cohaerentibus, crassioribus, crassit. vix 0,002 mm., thallo tenui, parum inaequali a var. *meiospermoide* differt, at secund. specimen orig. (no. 10435 in herb. Nyl.) habitu apotheciorum insigni modo plantae nostrae similis, quare hae sine dubio ad eandem speciem pertinent.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X).

Area: *B. pleiophoroides* etiam in Japonia lecta est.

25. **B. blastenioides** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 171.

Thallus crustaceus, uniformis, tenuis, sordide cinerascens aut cinereo-glaucescens, neque KHO, nec $CaCl_2O_2$, nec KHO ($CaCl_2O_2$) reagens, leviter verruculoso-inaequalis aut sat laevigatus, subcontinuus aut crebre rimulosus, hypothallo nigricante limitatus. Apothecia parva, latit. 0,3—0,4 mm., adpressa, disco plano aut rarius demum convexiusculo, nigro, nudo, margine tenui, persistente aut demum excluso, nigro, nudo. Hypothecium fuscum. Hymenium circ. 0,070—0,080 mm. crassum, haud oleosum, jodo persistenter caerulescens. Epithecium fusco-fuligineum. Sporae 8 : nae, oblongae aut parcius ellipsoideae, fuscae, 1-septatae, placodiomorphae, septo plus minusve incrassato, haud constrictae, long. 0,011—0,016, crass. 0,0045—0,006 mm.

Apothecia margine integro. Paraphyses arcte cohaerentes, graciles, apice capitato-incrassatae, capite fuscofuligineo, KHO non reagente. Excipulum fuscofuligineum, KHO non reagens. Sporae distichae, apicibus obtusis aut rotundatis, membrana ad septa leviter incrassata, ceterum parum incrassata, septa ipsa vulgo magis incrassata, poro distincto instructa. Hypothecium KHO non reagens.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X).

26. **B. subdives** Wain., l. c.

Thallus crustaceus, uniformis, tenuis aut sat tenuis, albidus, KHO lutescens, $CaCl_2O_2$ non reagens, verruculoso-inaequalis, verruculis crebris contiguisve, subcontinuus aut rimulosus, hypothallo indistincto. Apothecia parva, latit. 0,4—0,3 mm., adpressa, disco plano planiusculove, nigro, nudo, opaco, margine tenui, persistente, nigro, nudo. Hypothecium fusco-fuligineum. Hymenium circ. 0,060—0,110 mm. crassum, oleosum, jodo persistenter caerulescens. Epithecium fusco-fuligineum. Sporae 16 : nae, (— 12 : nae), oblongae, fuscae, 1-septatae, septo tenui, membrana aequaliter modice incrassata, haud constrictae, long. 0,010—0,017, crass. 0,004—006 mm.

Apothecia margine integro. Excipulum fusco-fuligineum, KHO non reagens. Paraphyses sat arcte (in KHO sat laxe) cohaerentes, graciles,

apice clavato-vel capitato-incrassatae, capite fusco, KHO non reagente. Sporae distichae, apicibus obtusis aut rotundatis, septa poro haud instructa. Reactione thalli a *B. polyspora* (Willey) Wain., Étud. Lich. Brés. I, p. 171, differt et affinis est *B. disciformi,* at *B. polyspora* affinis est *B. myriocarpae* et thallus ejus KHO non reagens. *B. subnexa* (Nyl., Lich. Jap., p. 77) habitu ei subsimilis est et item septo membranaque sporarum modice aequaliterque incrassatis instructa est (secund. specim. orig. no. 10651 in herb. Nyl.).

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. XXI, XL, f. 4).

27. **B. stramineoatra** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 172.

Thallus crustaceus, uniformis, sat tenuis, stramineus aut stramineo-glaucescens, KHO intensius flavescens, $CaCl_2O_2$ rubescens, verruculoso-inaequalis aut e verruculis contiguis subdispersisve constans, hypothallo nigricante limitatus aut inter areolas thalli visibili. Apothecia parva, 0,3—0,25 mm. lata, adpressa, disco plano aut rarius convexiusculo, nigro, nudo, opaco, margine tenui, integro, nigro, persistente aut demum excluso. Hypothecium fuscum. Hymenium circ. 0,060 mm. crassum, haud oleosum, jodo persistenter caerulescens. Epithecium fuscum. Sporae 16 : nae, ellipsoideae vel oblongae, fuscae, membrana aequaliter modice incrassata, 1-septatae, septo tenui, haud constrictae, long. 0,014—0,007, crass. 0,005—0,006 mm.

Apothecia KHO non reagentia. Excipulum fusco-fuligineum. Paraphyses graciles, arcte cohaerentes, apice capitato- vel clavato-incrassatae. Asci circ. 0,016 mm. crassi, apice membrana leviter incrassata. Sporae distichae, apicibus rotundatis, poro haud instructae in septo.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X, XXI).

Trib. 6. *Collemeae.*

1. Leptogidium Nyl.

28. **L. Mooreii** (Hepp) Nyl., Lich. Jap. (1890), p. 14, Lich. Pyr. Or. Obs. Nov. (1891), p. 72; Hue, Lich. Exot. (1892), p. 309, Lich. Extr.-Eur. (1901), p. 2. *Leptogium* Hepp in Journ. of Bot. (1865), p. 287; Leight., Lich. Great Brit., ed. 2 (1872), p. 27 (ed. 3, 1879, p. 13). *Ephebe byssoides* Carring. in Trans. Bot. Soc. Edinb. VII (1862), p. 411, tab. 10 f. 2 (teste Cromb., Lich. Brit. I, 1894, p. 36).

Thallus fruticulosus, altit. circ. 1—1,5 mm., teres aut subteres, iteratim dichotome aut parce trichotome ramosus, ramis (praesertim superioribus) crebris, circ. 0,100 mm. crassus, ramulis superioribus circ. 0,030—0,040 (— 0,050) mm. crassis, papillis apicalibus circ. 0,020—0,025 mm. crassis, caesio-cinerascens, partibus crassioribus cinereo-pallescentibus, ex hyphis irregulariter longitudinalibus, sat leptodermaticis, conglutinatis, formatus, cellulis elongatis, homoeomericus, at demum in partibus crassioribus medulla gonidiis destituta angusta irregularique instructus, etiam in superficie thalli hyphis consimilibus, longitudinalibus, conglutinatis, serie subsimplice

gonidia obducentibus, stratum corticale nullum distinctum formantibus. Gonidia coccocarpoidea (scytonemea), cellulis subglobosis aut compressis ellipsoideisve glaucescentibus in filamenta gyrosa brevia aut sat brevia concatenatis (heterocystis intercalaribus parce visis), vagina gelatinosa tenui induta, diam. circ. 0,012—0,010 mm.

Ab hac specie *Leptogidium dendriscum* Nyl. (Syn. Lich., p. 135, Lich. Jap., p. 14, Lich. Pyr. Or. Obs. Nov., p. 72, Wain., Étud. Lich. Brés. I, p. 220) ramulis crassioribus et colore et textura thalli differt. In specim. orig. *L. dendrisci* in mus. Paris. gonidia crassit. 0,006—0,005 mm.

Supra *Graphidem fissurinoideam* in rupe ad cataractam prope Klong Prao (no. XXIX) et supra muscos et alias plantas vetustas ad cataractam prope Lem Dan (no. XXIV) in insula Koh Chang. Ster.

Area: In Europa et Asia raro obvia.

2. **Leptogium** (Ach.) Gray.

29. **L. caesium** (Ach.) Wain., Étud. Lich. Brés. I (1890), p. 225. *L. tremelloides* var. *caesium* Hue, Lich. Extr.-Eur. I (1891), p. 12. *L. tremelloides* f. *isidiosa* Müll. Arg., Lich. Beitr. (1882), no. 374.

Thallus demum isidiosus. Ster.

Ad truncum arboris in capite septentrionali insulae Koh Kong (no. XI).

Area: In zonis temperatis calidioribusque crescit.

3. **Physma** Mass.

30. **Ph. plicatum** (Pers.) Hue, Physm. (Bull. Soc. Linn. Norm. 5 sér. IX, 1905), p. 18. *Collema plicatum* Pers., Lich. in Gaudich. Bot. apud Freycinet Voy. Uran. Physc. (1826), p. 203. *Physma pulvinatum* Hue, Lich. Extra-Eur. (1898—1901), p. 9, no. 20, Lich. Jav. (Ann. Jard. Bot. Buitenzorg, 2 sér. II, 1901), p. 171.

Thallus humidus crassus aut sat crassus, irregulariter laciniatus, laciniis circ. 5—1 mm. latis, demum plus minusve confertis et passim confluentibus, margine subcrenulatis, verrucis 1,5—0,3 mm. latis, irregularibus et saepe demum tuberculato-inaequalibus, passim demum etiam crebre confertis et thallum omnino obtegentibus, phyllocladia *Stereocauli denudati* in memoriam revocantibus obsitus, rugis parum elevatis, acutis, ramosis flexuosisque, albidis praesertim ambitum versus et supra verrucas instructus, ceterum livido-virescens aut olivaceus, subtus vulgo concolor, rhizinis destitutus. Sporae 8 : nae, simplices, decolores, exosporio incrassato gelatinoso instructae, long. 0,014—0,016, crass. 0,006—0,008 mm.

Thallus superne et inferne strato corticali vero destitutus, at in superficie passim hyphis crebre reticulatim ramoso-connexis, paullo vel duplo crassioribus, leptodermaticis, cellulis partim brevibus, partim elongatis. Gonidia nostocacea, sat abundanter mucosa. Apothecia circ. 4—2 mm. lata, strato corticali destituta, margine thallode radiatim ruguloso et verrucoso, thallo consimili, elevato et discum superante, margine proprio tenui passim distincto, ceterum amphithecio (margine thallode) obducto. Parathecium minute parenchymaticum, luminibus cellularum

rotundatis, membranis modice incrassatis. Perithecium basale membranis bene incrassatis, luminibus cellularum elongatis. Hymenium jodo persistenter caerulescens. Epithecium pallidum. Etiam in herb. Nyl. (no. 42369) adest specimen hujus speciei, in insulis Nicobar a Didrichsen lectum, nomine *C. byrsini*. In *Ph. byrsino* Mass. thallus superne et inferne obductus strato ex hyphis formato crebre contextis, partim conglutinatis, crassioribus, quam in strato medullari, cellulis brevibus, rhizinis instructus ex hyphis aggregatis constantibus.

Ad truncos arborum in silva littorali in insula Koh Kahdat (no. XXII, V).

Area: In insulis tropicis Asiae crescit.

4. Lecidopyrenopsis Wain.

31. **L. corticola** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 172.

Thallus crustaceus, circ. 1—0,5 mm. crassus, effusus, areolatus, areolis circ. 2,5—1 mm. latis, difformibus, angulosis, contiguis, planis, opacis, fusco-fuligineis, e granulis subfruticulosis connatis constantibus. Apothecia biatorina, 0,25—0,15 mm. lata, disco plano, fusco, opaco, margine tenui, pallido aut pallido-fuscescente, integro. Hymenium circ. 0,060 mm. crassum, jodo persistenter caerulescens. Epithecium fere decoloratum. Asci clavati. Sporae 8 : nae, distichae, decolores, simplices, ellipsoideae aut oblongae, long. 0,013—0,008, crass. 0,005—0,004 mm.

Genus *Lecidopyrenopsis* Wain. apotheciis lecideinis (biatorinis) a *Pyrenopside* differt. Thallus sub microscopio rubescens, KHO violascens. Gonidia gloeocapsoidea, similia iis *Pyrenopsidis*. — Perithecium in hac specie parenchymaticum, ex cellulis 0,008—0,004 mm. latis, sat leptodermaticis formatum. Paraphyses graciles (0,001 mm. crassae), partim apice paulum incrassatae, arcte cohaerentes, hydrate kalico separatae, partim simplices, saepe increbre ramosae, parcissime ramoso-connexae, maxima parte haud connexae. Asci clavati, membrana tenui. Habitu haec species **Lecideam humosam* (Ehrh.) in memoriam revocat.

Ad truncos Palmarum (*Cocos nucifera*) prope Stationem navalem in Koh Chang (no. XXVIII).

Trib. 7. *Lecideae.*

1. Lecidea (Ach.) Wain.

32. **L. (Catillaria) testaceolivens** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 173.

Thallus crustaceus, tenuis, e granulis minutissimis dispersis aut parcius contiguis albis albidisve constans, KHO non reagens, hypothallo indistincto. Gonidia cystococcacea. Apothecia adpressa, 0,5—0,3 mm. lata, disco convexo aut convexiusculo, livido- aut cinereo-testaceo, nudo, margine tenui, pallidiore, mox excluso. Hypothecium pallido-rufescens. Hymenium totum electrino-pallidum, jodo caerulescens, dein sordide vinose rubens. Sporae 8 : nae, decolores, bacillari-oblongae, rectae, apicibus rotundatis aut obtusis, 1-septatae aut pro parte simplices, long. 0,015—0,011, crass. 0,002 mm.

Apothecia interdum prolificationibus ex apotheciis vetustis enata,

colore sicut in speciminibus a Zw. lectis *L. prasinae* f. *prasinizae* Nyl. Gonidia ad *Cystococcum humicolam* Naeg. pertinentia, simplicia, diam. 0,010—0,008 mm., membrana modice incrassata, haud gelatinosa. Paraphyses simplices aut furcato-ramosae, haud connexae, membrana gelatinoso-incrassata. Asci clavati. Haec species potius *L. globulosae* Floerk., quam *Bacidiis,* est affinis.

Ad truncos arborum in silva prope cataractam in insula Koh Chang (no. XXIII).

33. **L. (Catillaria) unicolor** Wain., l. c.

Thallus crustaceus, tenuis, subcontinuus, leviter verruculoso-inaequalis aut sat laevigatus, partim crebre rimulosus, albido-glaucescens, KHO lutescens, $CaCl_2O_2$ non reagens, KHO ($CaCl_2O_2$) lutescens, hypothallo indistincto. Gonidia cystococcoidea. Apothecia adpressa, 0,5—0,7 mm. lata, disco plano, nigro aut fusco, nudo, margine nigro, crassitudine mediocri, demum saepe excluso. Excipulum basale albidum, KHO lutescens. Hypothecium albidum aut pallidum. Hymenium circ. 0,070 mm. crassum, jodo persistenter caerulescens. Epithecium dilute sordide violascens aut partim decoloratum, KHO non reagens. Sporae 8 : nae, decolores, ellipsoideae aut ellipsoideo-oblongae, apicibus rotundatis, distichae, 1-septatae, halone nullo indutae, long. 0,014—0,011, crass. 0,007—0,005 mm.

Apothecia gonidiis destituta. Excipulum in margine ex hyphis radiantibus pachydermaticis formatum, superne aut extus cyanescens, inferne aut intus violaceum, KHO dilute sordideque olivaceum aut vix reagens, basi albidum et KHO lutescens. Hypothecium guttulas oleosas abundanter continens. Asci clavati, membrana apice modice incrassata. Paraphyses arcte cohaerentes, simplices, sat tenues, apice clavato-incrassatae. Gonidia diam. circ. 0,008 mm. — A *L. tricolore* (With.) Nyl. sporis crassioribus et apotheciis unicoloribus differt, at ei affinis. A *L. atropurpurea* (Schaer.) Th. Fr. thallo et reactione jodetica hymenii ceterisque notis differt. Habitu vix differt a *Buellia disciformi.*

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X).

Trib. 8. *Gyalecteae.*

1. Gyalecta (Ach.) Wain.

34. **G. lutea** (Dicks.) Tuck., Lich. Hawai. (1867), p. 227, Syn. North Am. (1872), p. 218; Wain., Lich. Brés. II (1890), p. 71. *Biatorinopsis lutea* Müll. Arg., Lich. Beitr. (Fl. 1881), no. 254, Graph. Féean. (1887), p. 5.

Apothecia 0,3—0,4 mm. lata, disco pallido aut raro lutescenti-pallido, plano aut raro convexiusculo, margine tenui, integro aut verruculoso, albido aut raro pallido, discum haud superante. Perithecium in parte exteriore cellulis mediocribus. Hymenium circ. 0,040 mm. crassum, jodo dilute caerulescens, dein vinose rubens. Paraphyses apice leviter incrassatae. Sporae 8 : nae, distichae, fusiformi-oblongae aut oblongae, apicibus obtusis aut rotundatis, 1-septatae, decolores, long. 0,007—0,008, crass. 0,002—0,003 mm.

Ad corticem arborum prope Rangoon in Burma britannica (leg. Johs. Schmidt).

Area: In zonis calidioribus et temperatis provenit.

Trib. 9. *Thelotremeae.*

1. Thelotrema (Ach.) Eschw.

35. **Th. (Leptotrema) arecae** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 174.

Thallus sat tenuis aut crassitudine fere mediocris, continuus, leviter inaequalis, cinerascenti- vel cinereoglaucescenti-albicans, sat opacus aut nitidiusculus, KHO haud distincte reagens (olivaceus). Excipulum verrucam depresso-subglobosam, circ. 1 (0,7—1,2) mm. latam, basi constrictam formans, thallo concolor, vertice impresso, ostiolo 0,2—0,4 mm. lato, rotundato, margine ostiolari integro, tenui, thallo subconcolore aut demum anguste nigricante. Apothecia crebra aut increbra, disco livido-nigricante. Perithecium dimidiatum, fuligineum, columella centrali fuliginea, apice circ. 0,140 mm., basi 0,080 mm. crassa. Sporae singulae, demum sat leviter obscuratae, oblongae, murales, cellulis numerosissimis, membrana parietali crassitie mediocri, jodo violaceo-caerulescentes, long. 0,120—0,180, crass. 0,026—0,040 mm.

Perithecium basi deficiens. Hypothecium albidum aut sordidum. Hymenium circ. 0,220 mm. crassum, jodo haud reagens. Epithecium decoloratum, at passim granulis nigricantibus inspersum. Hypothallus indistinctus. — Habitu simile est *Thelotremati (Ocellulariae) cinchonarum* (Fée) Wain.

Ad corticem *Arecae catechu* in insula Koh Chang (no. XXI).

36. **Th. (Leptotrema) calathiforme** Wain., l. c.

Thallus tenuis aut sat tenuis, continuus, sat laevigatus, glaucescens vel glauco-virescens, nitidus, KHO non reagens. Excipulum verrucam circ. 1—0,5 (—0,3) mm. latam, circ. 0,3—0,5 mm. (aut minus) elevatam, basin versus sensim dilatatam aut sat abruptam formans, ostiolo demum sat lato (circ. 0,8—0,3 mm.), rotundato, margine ostiolari denticulato-crenato aut subintegro, sat tenui, simplice aut rarius duplice, albo. Apothecia sat crebra aut increbra, disco caesio-livido, pruinoso. Perithecium pallidum, integrum, KHO fulvo-fuscescens (margine et basi), columella centrali nulla. Sporae 8 : nae, distichae, ellipsoideae vel fusiformi-ellipsoideae, apicibus obtusis aut rotundatis, leviter obscuratae, murales, cellulis haud valde numerosis, septis transversalibus circ. 5—7, jodo violaceo-caerulescentes, long. 0,022—0,024, crass. 0,009—0,011 mm.

Hypothecium albidum vel pallidum. Hymenium circ. 0,100 mm. crassum, jodo non reagens. Epithecium decoloratum aut pallidum, parce granulosum. Paraphyses simplices, tenues, apice vix incrassatae. — *Th. (Brassiam) subcalvescens* Nyl., Lich. Andam., p. 9, in memoriam revocans, at sporis obscuratis et margine apotheciorum magis elevato ab eo differens. *Th. (Brassia) leucomelanum* Nyl. thallo opaco et sporis decoloribus a planta nostra differt.

Ad truncos arborum in silva prope cataractam in insula Koh Chang (no. XXIII).

37. **Th. (Brassia) Asiaticum** Wain., l. c. p. 175.

Thallus tenuis aut sat tenuis, continuus, crebre aut sparse verruculosus, ceterum sat laevigatus, glaucescens aut stramineo-glaucescens aut olivaceo-glaucescenti-variegatus, nitidus, KHO parum reagens (olivaceus). Excipulum verrucam circ. 0,7—0,3 mm. latam, depresso-hemisphaericam aut parum elevatam, basin versus sensim dilatatam formans, ostiolo circ. 0,1—0,4 mm. lato, rotundato, margine ostiolari tenui, integro, thallo subconcolore aut magis albido. Apothecia sat crebra aut partim sparsa, disco livido-nigricante. Perithecium fuligineum, subintegrum, latere mediocre aut sat tenue, basi tenue, columella centrali fuliginea, crassitudine mediocri. Sporae 8 : nae, distichae, ellipsoideae vel ellipsoideo-oblongae, apicibus rotundatis, decolores, septis transversalibus 5—4, demum murales, cellulis paucis, jodo violaceo-caerulescentes, long. 0,014—0,017, crass. 0,006—0,007 mm.

Thallus linea hypothallina fusconigricante angusta limitatus. Hymenium circ. 0,090 mm. crassum, jodo non reagens. Epithecium decoloratum. Paraphyses simplices. Sporae halone nullo indutae, primum loculis lenticularibus instructae. — Huic habitu subsimilia sunt: *Th. subconforme* Nyl. in Cromb., Lich. East As. (Journ. of Bot. 1882), p. 53, apotheciis incoloribus et sporis paullo majoribus secund. descriptionem recedens (no. 22587 in herb. Nyl.), et *Th. concretum* Fée (*Th. myriocarpoides* Nyl., Lich. Nov.-Gran., p. 326), sporis majoribus et perithecio fulvo differens.

Ad corticem arboris in silva prope cataractam in insula Koh Chang (no. 40).

38. **Th. (Ocellularia) Siamense** Wain., l. c.

Thallus tenuis aut sat tenuis, continuus, verruculis crebre instructus, sordide glaucescenti-albicans, opacus, KHO bene rubescens. Excipulum verrucam circ. 1—1,5 (—2) mm. latam, circ. 0,5 mm. altam, hemisphaericam, basin versus sensim dilatatam aut sat abruptam, plus minusve verruculoso-inaequalem formans, ostiolo circ. 0,1—0,15 mm. lato, rotundato, margine ostiolari tenui, integro, thallo subconcolore aut magis albido. Apothecia sparsa, disco nigricante (circum columellam apice demum albidam, in ostiolo demum visibilem). Perithecium dimidiatum, latere fuligineum tenueque, basi deficiens, columella centrali fuliginea, crassa. Sporae binae aut paucae in ascis, decolores, fusiformes, pluriseptatae, jodo violaceo-caerulescentes, long. 0,030—0,110, crass. 0,012—0,014 mm.

Hymenium circ. 0,270 mm. crassum, jodo non reagens. Epithecium partim decoloratum, partim granulis obscuratis inspersum. Hypothecium decoloratum. Sporae 2 : nae—3 : nae visae, septis 11—17, loculis lenticularibus, membrana sat tenui, halone nullo indutae. Paraphyses simplices. Columella fuliginea, apice strato albido obducta, basi sensim dilatata, circ. 0,800 mm. lata, apice circ. 0,280 mm. crassa. — *Th. dolichotatum* Nyl., Sert. Lich. Lab. (1891), p. 19, huic valde affine videtur et habitu subsimile, at ascis monosporis ab eo differt et, secundum iconem

in sched. speciminis Nylanderiani, columella destitutum. Etiam in Nyl. Lich. Ceyl. (1900), p. 17, commemoratur, at specimina Ceylonensia haud omnino identica cum speciminibus Singaporensibus. In comparabili *Th. porinoide* Mont. (Nyl., Lich. Andam., p. 8, Lich. Ceyl., p. 17) perithecium est albidum.

Ad corticem arboris in silva prope flumen Klong Sarlakpet in insula Koh Chang (no. XXVI).

39. **Th. (Ocellularia) microascidium** Wain., l. c. p. 176.

Thallus tenuis aut sat tenuis, continuus, leviter verruculoso-inaequalis, glaucescenti- vel stramineo-glaucescenti-albidus, leviter nitidus, KHO parum reagens (olivaceus). Excipulum verrucam circ. 0,5—0,4 mm. latam, depresso-hemisphaericam, basin versus abruptam aut partim leviter constrictam, saepe plus minusve verrucoso-inaequalem, vertice applanato instructam formans, ostiolo circ. 0,1—0,3 mm. lato, rotundato, margine ostiolari tenui, integro, thallo concolore, haud aut interdum demum paululum elevato, interdum demum (praesertim in apotheciis morbosis) duplice et perithecium nigricantem ostendente. Apothecia sat crebra, disco lividonigricante aut morboso plus minusve pruinoso. Amphithecium intus dilute roseum aut flavescens, KHO rubescens. Perithecium dimidiatum, latere fuligineum, basi deficiens, columella centrali fuliginea. Sporae 8 : nae, distichae, oblongae aut fusiformi-oblongae, apicibus obtusis aut rotundatis, 3—5-septatae, decolores, jodo violaceo-caerulescentes, long. 0,017—0,018, crass. 0,007 mm.

Thallus linea hypothallina fusconigricante limitatus. Hypothecium albidum, tenue. Hymenium circ. 0,080 mm. crassum, jodo non reagens. Epithecium decoloratum. Paraphyses simplices, apice parum incrassatae. Sporae halone nullo indutae, loculis lenticularibus. — Affine est *Th. granulatulo* Nyl. (Fl. 1876, p. 561), quod jam thallo magis verruculoso-inaequali ab eo differt. Habitu in memoriam revocans *Th.* (*Leptotrema*) *Bahianum* Ach. var. *obturascens* Nyl. (Lich. Nov.-Gran., 1863, p. 453, ed. 2 p. 332), in quo amphithecium intus item KHO rubescens, at thallus KHO dilute rubescens deindeque fuscescens.

Ad corticem arboris in capite septentrionali insulae Koh Kong (no. XI).

2. Gyrostomum Fr.

40. **G. scyphuliferum** (Ach.) Fr., Syst. Orb. Veg. (1825), p. 268; Wain., Étud. Lich. Brés. II, p. 86.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. XVII, XXI).

Area: In regionibus calidioribus distributum.

Trib. 10. *Lecanactideae.*

1. Lecanactis (Eschw.) Wain.

41. **L. deminuens** (Nyl.) Wain. *Lecidea premnea* f. *deminuens* Nyl., Fl. 1867, p. 373 (conf. infra), Syn. Lich. Nov. Cal. (1868), p. 54; Norrl.,

Bidr. Syd. Tav. Fl. (1870), p. 191. *Biatora premnea* Sommerf., Cent. Pl. Crypt. Norv. (1826), no. 238 (no. 19094 in herb. Nyl.).

Thallus tenuis aut sat tenuis, subcontinuus aut rimulosus, sat laevigatus, glaucescenti-cinereus, esorediatus, hypothallo nigricante partim limitatus. Apothecia solitaria, elevata, orbicularia, diam. 0,8—0,5 mm., adpressa, basi constricta, lecideina, margine crassitudine mediocri, leviter aut parum discum superante, subintegro aut paululum radiatim fisso, teretirotundato, nigro, nudo. Perithecium fuligineum, integrum. Discus apertus, planiusculus aut demum etiam convexiusculus, tenuiter flavescenti- vel aeruginoso-pruinosus aut denudatus. Sporae 8 : nae, distichae, decolores, fusiformes, apicibus obtusis, 3-septatae, long. 0,015—0,016, crass. 0,005 mm.

Hymenium circ. 0,080—0,090 mm. crassum. Perithecium, hypothecium et epithecium fusco-fuligineum. Asci clavati, long. circ. 0,060, crass. 0,010 mm., membrana haud incrassata. Sporae halone nullo indutae. — Commixta cum *Lecanactide premnea* (Ach.) Wain. (*Lecidea premnea* Nyl., Lich. Scand., p. 241, Lich. Jap., p. 76, Lich. Paris, p. 94; Leight., Lich. Great Brit., 3 ed., p. 364), quae sporis 5- et 4-septatis majoribusque ab ea differt. Nomine „*Lecideae premneae*“ in herb. Ach. adest specimen in Anglia ab Afzelio lectum, apotheciis nudis, margine radiatim diffracto instructis, ad *Lecanactidem premneam* pertinens, et alia specimina ad varias species pertinentia. „Var. *taxicola*“ Ach. (Lich. Univ., p. 670) apotheciis flavescenti-pruinosis et sporis 5-septatis instructa est (secund. herb. Ach.). Var. *deminuens* Nyl., Syn. Lich. Nov. Cal. (1868), p. 54, secund. specim. orig. in herb. Nyl. apotheciis nudis et sporis „3-septatis, long. 0,016—0,018, crass. 0,0035—0,0045 mm.“ instructa est, in Fl. 1867, p. 373, et in Norrl., l. c., secund. specimen no. 10790 in herb. Nyl. apothecia habet partim nuda, at nonnulla tenuiter flavido-pruinosa, „sporas 3-septatas“. *B. premnea* Sommerf., l. c. no. 238, secundum specimen no. 19094 in herb. Nyl. apotheciis nudis, „sporis long. 0,015—0,020, crass. 0,003—0,004 mm., 1—3-septatis“ instructa est. *Lecanactis chloroconia* Tuck., Obs. Lich. (Proceed. Am. Ac. of Arts and Scienc. 1864, vol. VI), p. 285 (*L. premnea* v. *chloroconia* Tuck., Gen. Lich., 1872, p. 194, Syn. North Am. II, 1888, p. 115; *Lecidea chloroconia* Nyl. & Cromb., On Collect. Lich. East As., 1882, p. 56, Nyl., Sert. Lich. Lab., 1891, p. 22), secundum specimen Nylanderianum in Malacca lectum apotheciis bene flavido-pruinosis a *L. deminuente* (Nyl.) leviter differt.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. XVII).

Area: In Europa, Asia et Oceania observata, at distributione defecte cognita.

B. Hysterieae.

Trib. 1. *Graphideae.*

1. **Graphis** (Adans.) Nyl.

Subg. I. **Phaeographina** (Müll.) Wain.

42. **Gr.** (sect. **Epiloma**) **subrigida** Nyl. in Cromb., On Collect. Lich. East As. (Journ. of Bot. 1882), p. 58; Hue, Lich. Exot. (1892), p. 236, 320. *Lecanactis* Nyl., Sert. Lich. Lab. (1891), p. 24.

Thallus tenuis, epiphloeodes, leviter verruculoso-inaequalis, griseo-olivaceus aut minore parte sordide albicans, nitidiusculus, KHO parum reagens. Apothecia sat approximata, elevata, simplicia aut rarius parce ramosa, vulgo elongata, curvata aut recta, long. 6—1,5 (raro —0,5) mm., lat. 0,5—0,4 mm., basi constricta vel abrupta. Perithecium fuligineum, dimidiatum, basi deficiens, labiis conniventibus, clausis, latere vel parte inferiore amphithecio thallino obductis, superne denudatis, sulca una longitudinali rimae approximata obsolete semel striatulis aut pro parte sat laevigatis. Discus rimaeformis, inconspicuus. Sporae solitariae, fuscescentes, murales, long. circ. 0,070, crass. 0,024 mm.

Thallus linea hypothallina nigricante partim limitatus. Sporae ellipsoideo-oblongae, apicibus rotundatis, cellulis numerosissimis, halone nullo indutae, in speciminibus Nylanderianis „long. 0,115—0,145, crass. 0,026—0,030 mm."

Ad corticem *Arecae catechu* in insula Koh Chang (no. X).

Area: In regione tropica Asiae obvia.

43. **Gr.** (sect. **Epiloma**) **heterocarpoides** Nyl. in Cromb., On Collect. Lich. East As. (Journ. of Bot. 1882), p. 57; Hue, Lich. Exot. (1892), p. 240.

Thallus tenuis aut sat tenuis, epiphloeodes, glaucescens vel pallido-glaucescens, sat laevigatus aut leviter verruculoso-inaequalis, nitidiusculus, KHO primum dilute rubescens, dein bene rubescens. Apothecia vulgo bene approximata, leviter elevata, semiimmersa, majore parte simplicia, at partim parce vel etiam bene ramosa, vulgo elongata, partim recta, partim curvata, long. circ. 13—1 (—0,5) mm., latit. 0,4—0,3 mm. Perithecium basi albidum, labiis majore parte superiore fuligineis, conniventibus, primum clausis, demum anguste hiantibus, amphithecio thallino latere obductis, superne denudatis nigrisque, haud striatis. Discus rimaeformis inconspicuusque aut demum angustus, canaliculato-concavus, nigricans, nudus. Sporae solitariae, obscuratae, murales, long. circ. 0,144—0,120, crass. 0,030—0,028 mm.

Thallus hypothallo vix ullo distincto instructus. Amphithecium thallinum demum basi abrupta. Hymenium circ. 0,180 mm. crassum, modice oleosum, superne fuscescens vel pallidum. Sporae oblongae, apicibus rotundatis, cellulis numerosissimis, jodo intense violascentes, halone anguste indutae. Jodo hymenium dilute violascens, perithecium intense violascens, amphithecium thallinum et thallus distincte violascentes. — *Gr. heterocarpa* Nyl., Lich. Nov.-Gran. (1863), p. 465 (Nyl. & Cromb., On Collect. Lich. East As., 1882, p. 49, 57), Lich. Guin. (1889), p. 29, Lich. Jap. (1890), p. 114, Sert. Lich. Lab. (1891), p. 12, habitu sat similis, thallo KHO haud reagente describitur. Sic res se habet in speciminibus orig. in herb. Nyl. e Marianis et e Rangoon, at thallus KHO revera rubescens in speciminibus orig. e. Cayenne, e Malacca et e Labuan. *Gr. internigricans* Nyl., Prodr. Lich. Nov.-Gran. Addit. (1867), p. 566, habitu sat similis, sporis 8 : nis a *Gr. heterocarpoide* distinguitur. *Gr. rudescens* Nyl., Lich. Guin. (1889), p. 29, ei item habitu similis, sporis decoloribus, jodo caerulescentibus et perithecio fuligineo magis evoluto ab ea differt (secund. specim. orig.).

Ad corticem Arecae catechu prope Lem Dan (no. XVII, XXI, XL, fig. 8, 14).

Area: In regionibus tropicis Oceaniæ et Asiae lecta est.

44. **Gr.** (sect. **Leucogramma**) **chlorocarpoides** Nyl., Fl. 1866, p. 133, Prodr. Fl. Nov.-Gran. Addit. (1867), p. 566, Énum. Lich. Husnot Antill. (1869), p. 21, Lich. Jap. (1890), p. 113, Sert. Lich. Lab. (1891), p. 11; Hue, Lich. Exot. (1892), p. 243, 321.

Thallus tenuis, epiphloeodes, pallido-glaucescens aut glaucescenti-albidus, sat laevigatus aut rarius leviter verruculoso-inaequalis, nitidiusculus aut rarius opacus, KHO leviter rubescens. Apothecia sat approximata, elevata, simplicia aut parce vel sat parce ramosa, vulgo elongata, saepe curvata flexuosave, long. 9—2 (—1) mm., lat. 0,6—0,4 mm. Perithecium albidum vel pallidum vel intus lutescens, integrum, basi tenue, labiis conniventibus, clausis, parte inferiore amphithecio thallino anguste obductis, ceterum denudatis, longitrorsum bene striatis, vulgo albido-pallidis vel subalbidis. Discus rimaeformis, inconspicuus. Sporae solitariae aut binae, pallido-fuscescentes, murales, long. 0,060—0,132, crass. 0,018—0,029 mm.

Thallus hypothallo vix ullo distincto aut albido. Perithecium laterale crassum, KHO fulvescens. Hymenium circ. 0,140 mm. crassum, oleosum, jodo haud reagens. Epithecium olivaceo-pallidum. Sporae oblongae, apicibus rotundatis, jodo violaceo-fuscescentes vel caeruleo-violascentes. — Affinis est *Gr. chrysenterae* Mont. (Wain., Étud. Lich. Brés. II, p. 99), quae sporis typice 8 : nis ab ea differt. *Gr. chrysenterodes* Nyl., Lich. Ceyl. (1900), p. 22 (*Gr. chlorocarpa* var. *excellens* Nyl., Énum. Lich. Husnot Antill., 1869, p. 21), sporis 2 : nis—8 : nis et thallo KHO non reagente a *Gr. chlorocarpoide* distinguitur, et secundum specimen no. 6895 in herb. Nyl. apotheciis haud striatis instructa est, at habitu ei subsimilis. „*Gr. excellens*“ Nyl., Lich. Jap. (1890), p. 112, Sert. Lich. Lab. (1891), p. 11, etiam apotheciis supra non striatulis descripta est. *Gr. chlorocarpoides* Nyl., Fl. 1866, p. 133, secundum descriptionem facie *Gr. frumentariae* et hymenio passim jodo dilute vinose rubente dignota [in specim. orig. no. 6898 ex Java in herb. Nyl. apothecia striata, thallus KHO fusco-rubescens, sporae ex annotatione Nylanderi „2 (—3) : nae, incolores (demum fuscescentes raro visae), long. 0,055—0,110, crass. 0,020—0,035 mm.“], et ex Nyl. ipso, l. c. et in Hue, Lich. Exot. (1892), p. 321, forsan specie non distinguenda a *Gr. excellente*, at habitu omnino identica cum planta nostra.

Ad corticem *Arecae catechu* et aliarum Palmarum (no. X, XVII, XL, fig. 13) ad Stationem navalem Lem Dan in insula Koh Chang.

Area: In insulis Asiae tropicae obvia.

45. **Gr.** (sect. **Eleutheroloma**) **Schmidtii** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 176.

Thallus sat crassus (crassitudine circ. 0,4—0,3 mm.), sat laevigatus, continuus, substrato adnatus, sat opacus, cinereo-aut olivaceo-glaucescens, KHO superne vix distincte reagens, intus dilute rubescens, intus jodo bene caerulescens. Apothecia vulgo sparsa, vulgo elongata, long. circ. 5—1 (—0,5) mm., furcata aut dendroideo-ramosa aut pro parte simplicia, vulgo curvata flexuosave, thallo immersa aut demum parum emergentia. Perithecium dimidiatum, basi pallidum, latere superne fusco-fuli-

gineum, inferne fusco-pallidum, apertum. Discus apertus, concavus, latit. circ. 0,25—0,15 mm., leviter aut parum immersus, fusco- vel livido-nigricans, subnudus, margine proprio cinereo-nigricante vel nigricante, tenui, discum leviter superante, extus strato thallino tenui plus minusve distincte obducto, thallum leviter superante aut fere aequante cinctus. Sporae 8 : nae, fuscescentes, septis transversalibus 3—5, demum submurales, long. 0,015—0,018, crass. 0,006—0,007 mm.

Perithecium superne modice incrassatum, etiam in basi maculis pallido-fuscescentibus indicatum. Hymenium circ. 0,090—0,120 mm. crassum, guttulas oleosas haud continens, jodo haud reagens. Epithecium subfuscum. Paraphyses simplices. Sporae subdistichae aut monostichae, oblongae, apicibus obtusis aut altero apice rotundato, diu 3-septatae loculisque lenticularibus, demum nonnullis loculis divisis et tunc murales septisque transversalibus 3—5, jodo parum reagentes. Habitu *Gr. diversulam* Nyl., Fl. 1886, p. 103, Lich. Jap., p. 113, in memoriam revocans (haec autem perithecio pallido a planta nostra differt). *Gr. subdiversa* Nyl., Fl. 1886, p. 103, secund. Wright, Graph. Cub., no. 48, in herb. meo, thallo endophloeode et perithecio pallido a *Gr. Schmidtii* distinguitur. Etiam sporis differunt.

Ad rupem in silva prope Stationem navalem Lem Dan in insula Koh Chang (no. VI).

46. ***Gr.** (sect. **Eleutheroloma**) **persimilis** Wain. (n. subsp.).

Thallus crassus aut sat crassus (crassitudine circ. 1—0,5 mm.), sat laevigatus, continuus, substrato adnatus, sat opacus aut nitidiusculus, sordide albido-glaucescens, KHO superne et intus dilute rubescens, intus jodo bene caerulescens. Apothecia sparsa aut passim approximata, vulgo elongata, long. circ. 3—0,8 mm., furcata aut simplicia, vulgo flexuosa curvatave, thallo immersa. Perithecium fusco-fuligineum, integrum, tenue, apertum. Discus apertus, concavus, latit. circ. 0,25—0,1 mm., bene immersus, nigricans, nudus, thallo labia perithecii omnino aut fere omnino obtegente marginata, margine vulgo thallum haud superante, passim circumscisso. Sporae 8 : nae, fuscae, septis transversalibus 3—5, demum submurales, long. 0,014—0,017, crass. 0,007—0,009 mm.

Perithecium totum tenue, fusco-fuligineum, integrum. Hymenium circ. 0,090—0,100 mm. crassum, guttulas oleosas haud continens, jodo haud reagens. Epithecium dilute fuscescens. Sporae monostichae, ellipsoideae, apicibus rotundatis aut obtusis, diu 3—5-septatae loculisque lenticularibus, demum nonnullis loculis in duas cellulas divisis et tunc murales, juniores jodo leviter violaceo-fuscescentes. — In *Gr. Schmidtii* transire videtur et forsan ejus variatio.

Ad saxa et rupes in cataracta in insula Koh Chang (no. XII).

Subg. II. **Graphina** (Müll. Arg.) Wain.

47. **Gr.** (sect. **Hololoma**) **Ruiziana** (Fée) Mass., Mem. Lich. (1853), p. 111; Wain., Étud. Lich. Brés. II (1890), p. 106.

Var. **gracilior** Müll. Arg., Lich. Beitr. (Fl. 1882), no. 468.

Thallus tenuis, sat laevigatus aut passim leviter verruculoso-inaequalis,

albidus aut glaucescens vel sordide albicans, sat opacus, KHO primum flavescens, dein rubescens. Apothecia vulgo sat approximata, vulgo oblonga, long. 1,2—0,5, lat. 0,3—0,2 mm., simplicia, recta aut raro leviter curvata, elevata, basi abrupta aut leviter constricta. Perithecium fuligineum, integrum, elevatum, denudatum aut saepius basi anguste vel plus minusve late amphithecio thallino tenui obductum, labiis conniventibus, clausis aut demum anguste hiantibus, laevigatis. Discus rimaeformis, inconspicuus. Sporae 8 : nae, decolores, murales, long. 0,034—0,044, crass. 0,010—0,014 mm.

Hymenium circ. 0,180—0,190 mm. crassum. Epithecium pallidum. Sporae fusiformes aut altero apice rotundato, altero apice sat acuto, halone fere nullo indutae, septis transversalibus 8—11, polystichae, jodo violaceo-caerulescentes. — Reactione thalli et apotheciis minoribus a *Gr. Ruiziana* differt et autonoma sit species (specimen orig. Müllerianum autem non vidi).

Ad corticem *Rhizophorae* prope Lem Ngob (no. XIV).

Area: *Gr. Ruiziana* praesertim in regionibus tropicis crescit.

48. **Gr.** (sect. **Hemiloma**) **subintricata** Krempelh., Fl. 1876, p. 420. *Gr. intricata* Eschw. in Mart. Fl. Bras. I (1833), p. 79; Nyl., Lich. Nov.-Gran. Prodr. (1863), p. 472 et 495, ed. 2 (1863), p. 85, Addit. (1867), p. 567, Syn. Lich. Nov. Cal. (1868), p. 72. *Graphina intricata* Müll. Arg., Rev. Lich. Eschw. (Fl. 1888), p. 510. Haud *Gr. intricata* Fée, Ess. Crypt. Exot. (1824), p. 42, Müll. Arg., Graph. Féean. (1887), p. 30 (Hue, Lich. Exot., 1892, p. 234). Haud *Gr. subintricata* Knight, Contr. Lich. New Wales (1882), p. 40 (Müll. Arg., Sert. Austral., 1895, p. 320), quae nominetur *Gr. extricata* Wain.

Thallus tenuis aut sat tenuis, sat laevigatus, albidus vel glaucescenti-albidus, sat opacus, KHO parum reagens. Apothecia vulgo sat approximata, elongata, long. 7—1, lat. 0,25—0,15 mm., ramosa aut pr. p. simplicia, vulgo flexuosa curvatave. Perithecium fuligineum, demum dimidiatum, emergens aut demum elevatum et basi vel fere totum amphithecio thallino tenui obductum vel superne anguste denudatum vel totum pruinosum, labiis conniventibus, anguste hiantibus vel clausis, demum saepe sulco uno striatis, vulgo laevigatis. Discus rimaeformis, caesio-pruinosus, conspicuus angustissimusque aut tantum linea caesio-pruinosa indicatus. Sporae 8 : nae, decolores, murales, septis transversalibus 3—2, cellulis paucis, long. 0,011—0,012, crass. 0,006 mm., jodo parum reagentes.

Thallus linea hypothallina nigricante limitatus, KHO olivaceus [in Wrighti Graph. Cub., no. 9, passim demum dilute subrubescens]. Perithecium primum integrum et basi tenue, demum dimidiatum. Hymenium circ. 0,080 mm. crassum. Epithecium decoloratum. Paraphyses simplices. Sporae distichae, ellipsoideae, apicibus rotundatis, halone vix ullo indutae, jodo parum distincte violascentes. — *Gr. intricata* Eschw. secundum annotationes Nylanderi in specimine orig. in herb. Nyl. sporis long. 0,014—0,022, crass. 0,007—0,009 mm., I—, septis transversalibus 3—5, cellulis paucissimis, instructa est et habitu identica plantae nostrae.

Ad corticem arboris in capite septentrionali insulae Koh Kong (no. XI).

Area: In regionibus tropicis Americae, Oceaniae et Asiae crescit.

49. **Gr.** (sect. **Hemiloma**) **simplex** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 177.

Thallus tenuis, sat laevigatus vel leviter verruculoso-inaequalis, albidus vel glaucescenti-albidus, sat opacus aut nitidiusculus, KHO primum leviter flavescens, dein rubescens. Apothecia sat approximata aut sparsa, vulgo elongata, long. 4—1, lat. 0,3—0,25 mm., simplicia, recta aut raro curvata, elevata, basi abrupta aut vulgo leviter constricta. Perithecium fuligineum, demum dimidiatum, elevatum, basi sat anguste amphithecio thallino tenui obductum, ceterum denudatum, labiis conniventibus, clausis, laevigatis. Discus rimaeformis, inconspicuus. Sporae 2 : nae aut singulae, decolores, murales, long. 0,038—0,050, crass. 0,013—0,014 mm.

Hymenium circ. 0,140 mm. crassum. Epithecium fuscescens. Perithecium primum integrum, basi tenue fuligineumque, demum distincte dimidiatum basique deficiens et hypothecium tunc albidum, inferne tenuiter pallidum. Sporae oblongae, altero apice rotundato, altero obtuso, halone fere nullo obductae, septis transversalibus 9—12, cellulis sat numerosis, jodo violaceo-caerulescentes. — *Gr. Ruizianae* var. *graciliori* habitu subsimilis, at apotheciis longioribus, sporis haud 8 : nis et perithecio demum dimidiato ab ea differens. *Gr. adtenuans* Nyl. in Cromb., On Collect. Lich. East As. (Journ. of Bot. 1882), p. 57, Nyl., Lich. Jap. (1890), p. 114, Sert. Lich. Lab. (1890), p. 12, apotheciis magis immersis et sporis 8 : nis majoribusque a planta nostra differt.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X).

50. **Gr.** (sect. **Hemiloma**) **consimilis** Wain., l. c.

Thallus tenuis, sat laevigatus, albidus aut albido-glaucescens, sat opacus, KHO non reagens aut leviter diluteque rubescens. Apothecia vulgo sat approximata, vulgo oblonga, long. 2—0,6, lat. 0,3—0,25 mm., simplicia, recta aut raro leviter curvata, elevata, basi abrupta aut leviter constricta. Perithecium fuligineum, dimidiatum aut primum integrum et demum dimidiatum, elevatum, basi anguste amphithecio thallino tenui obductum, ceterum denudatum, labiis conniventibus, clausis, laevigatis. Discus rimaeformis, inconspicuus. Sporae 8 : nae, decolores, murales, long. 0,028—0,040, crass. 0,010—0,011 mm.

Hymenium circ. 0,130 mm. crassum. Epithecium olivaceo-pallidum vel sordide pallidum vel fuscescens. Hypothecium pallidum. Sporae oblongae aut fusiformi-oblongae, apicibus rotundatis aut altero apice obtuso, halone fere nullo indutae, septis transversalibus 8—10, jodo violaceo-caerulescentes. — Perithecio dimidiato et reactione thalli a *Gr. Ruiziana* var. *graciliore* Müll. Arg. differt, at habitu ei consimilis. Forsan ad eandem speciem pertinent.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. XVII).

51. **Gr.** (sect. **Thalloloma**) **concolor** Nyl., Énum. Gén. Lich. (1857), p. 129, Lich. Ceyl. (1900), p. 22 (hb. Nyl., no. 6814). *Ustalia Junghuhnii* Mont. et V. d. Bosch, Lich. Jav. (1856), p. 51 (no. 6813 et 6854 in herb. Nyl.); Mont., Syllog. Pl. Crypt. (1856), p. 352. *Graphina Boschiana* Müll. Arg., Lich. Beitr. (Fl. 1882), no. 470 (Lich. Exot. III, Hedwigia 1895, no. 138). Haud *Gr. Junghuhnii* Mont. et V. d. Bosch, Lich. Jav. (1856), p. 45; Mont., Syllog. (1856), p. 347 (secund. Müll. Arg., Lich. Beitr., no. 473).

Thallus tenuis aut sat tenuis, sat laevigatus, continuus aut rimulosus, albidus, opacus, KHO circa apothecia leviter flavescens, ceterum haud reagens. Apothecia vulgo plus minusve aggregata, vulgo elongata, partim ellipsoidea, long. circ. 7—0,5, latit. 0,5—0,2 mm., radiato-vel dendroideo-ramosa vel varie ramosa aut subsimplicia, recta aut leviter flexuosa, thallo immersa. Perithecium tenue, albidum, labiis apertis. Discus apertus, planus, latit. 0,5—0,2 mm., lividus vel caesio-cinerascens, pruinosus, margine thallode saepe demum leviter elevato aut thallum haud superante, fissura circumscisso, albido cinctus. Sporae solitariae, decolores, murales, long. circ. 0,090—0,094, crass. 0,040—0,044 mm.

Thallus linea hypothallina angusta nigricante limitatus. Discus thallo leviter immersus aut vulgo thallum aequans. Hymenium circ. 0,120 mm. crassum, haud oleosum, jodo leviter caerulescens. Epithecium olivaceum aut fuscescens. Sporae ellipsoideae aut oblongae, apicibus rotundatis, cellulis numerosissimis, jodo caeruleo-violascentes, halone fere nullo indutae.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X, XVII, XXI, XL, fig. 12).

Area: In insulis tropicis Asiae lecta.

52. **Gr.** (sect. **Thalloloma**) **fissurinoidea** (Nyl.) Wain. *Gr. reniformis* var. *fissurinoidea* Nyl., Énum. Gén. Lich. (1857), p. 129, Lich. Exot. (Ann. Sc. Nat., 4 sér., Bot. XI, 1859), p. 228 (no. 6940 in herb. Nyl.).

Thallus crassus aut sat crassus (circ. 1—0,2 mm.), sat laevigatus, albidus aut partim glaucescens, opacus, KHO neque superne, nec intus reagens aut dilutissime rubescens, jodo superne et intus intense caerulescens, fragilis, inferne strato hypothallino tenui nigro crebre contexto totus obductus, demum substrato saltem passim laxe adhaerens. Apothecia saepe aggregata aut approximata, vulgo elongata, pro parte ellipsoidea, long. circ. 6—0,5 mm., lat. vulgo 0,5—0,25 mm. [aut demum etiam latiora in Wright, Graph. Cub. no. 26], parce ramosa aut bene dendroideo-ramosa aut simplicia, plus minusve flexuosa aut recta, thallo immersa et demum plus minusve emergentia. Perithecium albidum. Discus apertus, planus aut primum concavus, latit. vulgo 0,5—0,1 mm., caesio-pallidus, pruinosus, margine thallode vulgo demum leviter elevato [aut rarius demum bene elevato: in Wright, Graph. Cub. no. 26], discum superante aut aequante, tenui [aut raro demum crasso: in Wright, Graph. Cub. no. 26], albo aut thallo concolore cinctus. Sporae solitariae, decolores, murales, long. circ. 0,076—0,140, crass. 0,040—0,080 mm.

Apothecia KHO rubescentia, basi sensim dilatata aut abrupta; labia hiantia, amphithecio thallino tenui obducta. Hymenium circ. 0,200 mm.

crassum, haud oleosum, jodo superne dilute caerulescens. Paraphyses simplices aut apice parce ramosae, ad latera hymenii parce ramoso-connexae. Epithecium albidum. Sporae ellipsoideae, apicibus rotundatis, cellulis numerosissimis, jodo caeruleo-violascentes, halone nullo indutae. — *Gr. reniformis* Fée, Ess. Crypt. Écorc. (1824), p. 46, secund. specim. orig. in herb. Nyl. (no. 6932) thallo adnato, KHO ferrugineo-rubescente, hypothallo indistincto instructa est (conf. Müll. Arg., Graph. Féean. p. 43). Wright, Graph. Cub. no. 23 et 26 (in herb. meo) et coll. Lindig no. 2894 (hb. Nyl. no. 6934, sub *Gr. reniformi* Nyl. in Lich. Nov.-Granat., 1863, p. 471) ad *Gr. fissurinoideam* pertinent. *Gr. hologlauca* Nyl., Fl. 1866, p. 133, ex Java (hb. Nyl. no. 7636), thallo crasso et hypothallo indistincto ab ea differt, at in specimine a Glaziou in Brasilia collecto (hb. Nyl. no. 7842, a Nyl. ad eam ducto) thallus sicut in *Gr. fissurinoidea* (KHO non reagens). *Diorygma tinctoria* Eschw. in Mart. Fl. Bras. (1833), p. 67, secund. specim. orig. in herb. Nyl. (no. 6944) thallo passim laxe adhaerente, KHO rubescente, strato hypothallino nigro subtus obducto, apotheciis thallo immersis, immarginatis a *Gr. reniformi* et *Gr. fissurinoidea* differt (ex Müll. Arg., Fl. 1888, p. 508, est *Gr. macrospora* Krempelh., Fl. 1876, p. 380) et autonoma est species *Graphidis*.

In rupe ad cataractam fluminis Klong Prao in insula Koh Chang (no. XXIX).

Area: In regionibus tropicis Americae et Asiae lecta est.

Subg. III. **Phaeographis** (Müll. Arg.) Wain.

53. **Gr.** (sect. **Platygramma**) **diversa** Nyl., Lich. Exot. (1859), p. 227 pr. p. (conf. Müll. Arg., Lich. Beitr., 1882, p. 455), Exp. Lich. Nov. Cal. (1862), p. 50, Syn. Lich. Nov. Cal. (1868), p. 74; Krempelh., Beitr. Lich. Süds. (Journ. Mus. Godeffr. IV, 1873), p. 106; Nyl., Lich. Ins. Andam. (1874), p. 16, Lich. Ins. Guin. (1889), p. 30, Lich. Jap. (1890), p. 113; Hue, Lich. Exot. (1892), p. 239, 320. *Phaeographis diversa* Müll. Arg., Lich. Beitr. (Fl. 1882), no. 455, Rev. Lich. Eschw. II (Fl. 1888), p. 522 (8). *Lecanactis diversa* Nyl., Sert. Lich. Lab. (1891), p. 11. *Solenographa confluens* Mass., Esam. Comp. Gen. Lich. (1860), p. 26; Krempelh., Flecht. Amb. (Verh. K.-K. Zool.-Bot. Ges. Wien 1871), p. 866, tab. VII (haud *Arthonia confluens* Fée, Ess. Crypt. Écorc., 1824, p. 55; conf. Müll. Arg., Graph. Féean., p. 45).

Thallus tenuis, laevigatus, albidus vel pallescenti-glaucescens, sat opacus aut nitidiusculus, KHO dilute fusco-rubescens aut olivaceus. Apothecia sparsa [aut aggregata in Wright, Graph. Cub. no. 100 d), elongata aut pro parte ellipsoidea aut subrotunda, long. circ. 5—0,5, lat. circ. 0,5—0,3 mm. [—0,8 mm.: Wright, l. c.], simplicia aut parce ramosa, vulgo plus minusve flexuosa curvatave, thallo immersa et demum plus minusve emergentia elevataque, basi sensim dilatata abruptaque [aut demum constricta: Wright, l. c.]. Perithecium fuligineum, integrum, basi incrassatum, labiis tenuibus, late apertis, extus strato thallino totis obductis, discum vulgo leviter superantibus. Discus apertus, concavus aut demum planus, latit. circ. 0,4—0,2 mm. [—0,8 mm.: Wright, l. c.],

livido- aut fusco-nigricans, tenuiter caesio-pruinosus aut nudus. Sporae fuscae, vulgo 7-septatae, long. 0,024—0,030, crass. 0,007—0,008 mm.

Thallus linea nigricante angusta hypothallina limitatus. Hymenium circ. 0,120 mm. crassum, distincte oleosum, jodo vix reagens. Epithecium fusco-fuligineum. Paraphyses simplices. Sporae oblongae, apicibus obtusis aut rotundatis, halone nullo indutae, septis 6—8, loculis lenticularibus, plures in eodem asco.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. XVII).

Area: In regionibus tropicis Americae, Oceaniae, Asiae, Africae crescit.

54. **Gr.** (sect. **Platygramma**) **Nylanderi** Wain. *Gr. subinusta* Nyl., Fl. 1886, p. 103 (no. 7983), 326, Lich. Jap. (1890), p. 114; Hue, Lich. Exot. (1892), p. 240, 321. *Lecanactis subinusta* Nyl., Sert. Lich. Lab. (1891), p. 11. Haud *Gr. subinusta* Leight., Lich. Ceyl. (1870), p. 177 (Müll. Arg., Lich. Beitr., Fl. 1882, no. 458).

Thallus sat tenuis aut crassitudine mediocris, sat laevigatus aut leviter inaequalis, albidus, opacus, KHO primum lutescens, dein rubescens, jodo caerulescens. Apothecia bene approximata, elongata aut oblonga aut ellipsoidea aut stellata radiisque 3—7 aut furcata vel dichotome ramosa aut pro parte simplicia, recta aut curvata, thallo immersa. Perithecium fusco-fuligineum, dimidiatum, basi deficiens, laterale, tenue, late apertum. Discus apertus, vulgo planus, latit. 0,35—0,2 mm., nigricans aut fusco-nigricans, nudus, margine proprio nigro tenuissimo saepe cinctus. Sporae 8:nae, distichae, fuscae, septis 5—3, long. 0,014—0,024, crass. 0,005—0,009 mm.

Thallus passim linea hypothallina nigricante angusta limitatus aut hypothallus nullus distinctus, KHO passim bene reagens, passim haud reagens (in eodem thallo reactio variabilis). Hymenium circ. 0,100—0,090 mm. crassum, guttulas oleosas continens, jodo leviter caerulescens aut non reagens. Epithecium fuscescens. Hypothecium albidum vel pallidum. Sporae oblongae aut ovoideo-oblongae, apicibus rotundatis aut altero apice angustiore obtusoque, halone nullo indutae, jodo violascentes vel caeruleo-fuscescentes, loculis lenticularibus. Thallo albido, bene evoluto (haud hypophloeode), apotheciis immersis et perithecio basi deficiente a *Gr. sexlocularі* Wain., Catal. Welw. Afr. Pl. II, P. II (1901), p. 439, differt.

Ad corticem arboris prope Lem Ngob (no. XXXII, IX).

Area: In regionibus tropicis Americae, Australiae, Asiae crescit.

55. **Gr.** (sect. **Platygramma**) **sericea** (Eschw.) Wain., Catal. Welw. Afr. Pl. II, P. II (1901), p. 439. *Leiogramma sericeum* Eschw. in Mart. Fl. Bras. (1833), p. 99. *Glyphis sericea* Nyl., Prodr. Nov.-Granat. Addit. (1867), p. 341. *Phaeographis sericea* Müll. Arg., Fl. 1888, p. 523.

Thallus tenuis, albidus aut partim stramineo-glaucescens, KHO haud distincte reagens, sat laevigatus, leviter nitidus aut sat opacus. Pseudostromata haud distincta. Apothecia aggregata confluentiaque et vulgo radiato-ramosa radiisque vulgo numerosis, circ. 0,15—0,1 mm. latis, flexuosis, acervulos 3—0,8 mm. latos formantia, partim circumscissa,

thallo immersa. Perithecium fuligineum, integrum, labiis patentibus. Discus apertus, concavus aut planus, tenuissime pruinosus lividusque aut nudus fuscescensque, margine proprio concolore, tenuissimo saepe cinctus. Sporae 8 : nae, fuscescentes, septis 3, long. 13—17, crass. 0,005—0,006 mm. (loculis lenticularibus).

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X, XL, fig. 7).

Area: In regionibus tropicis Americae, Africae et Asiae distributa.

56. **Gr.** (sect. **Platygramma**) **subtigrina** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 177.

Thallus tenuis, sat laevigatus, epiphloeodes, albidus, sat opacus aut leviter nitidus, KHO primum lutescens, dein rubescens. Pseudostromata haud distincta. Apothecia aggregata confluentiaque et vulgo radiato-ramosa, radiisque vulgo numerosis, circ. 0,2—0,15 mm. latis, flexuosis, acervulos 5—2 mm. latos formantia, partim circumscissa, thallo immersa. Perithecium tenuissimum, fuligineum, aut latere fuscescens basique pallidum, labiis patentibus. Discus apertus, concavus aut planus, tenuiter pruinosus lividusque, immarginatus aut margine thallino tenui circumscisso partim cinctus. Sporae 8 : nae, fuscescentes, septis 3, long. 0,010—0,015, crass. 0,005—0,006 mm.

Thallus jodo passim leviter violascens, haud bene reagens, hypothallus indistinctus. Hymenium circ. 0,080 mm. crassum, haud oleosum. Epithecium fuscescens. Paraphyses simplices. Asci cylindrico-clavati, membrana tenui, apice leviter incrassata. Sporae distichae, ellipsoideae, apicibus rotundatis aut obtusis, loculis lenticularibus. — *Graphis tricosula* (Nyl.) Wain. (*Glyphis* Nyl. apud Cromb., Lich. Ins. Rodrigu., Journ. of Bot. 1877, p. 444) secund. specim. orig. (no. 7130 in herb. Nyl.) thallo albido, tenuissimo, KHO lutescente deindeque fulvescente (nec rubescente) et ramis paucis apotheciorum a planta nostra differt. *Gr. tricosa* Ach. (Wain., Étud. Lich. Brés. II, p. 116) praesertim thallo glaucescente, tantum ad apothecia KHO reagente ab ea recedit.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. XXI).

57. **Gr.** (sect. **Platygramma**) **labyrinthica** (Ach.) Wain., Catal. Welw. Afr. Pl. II, P. II (1901), p. 439. *Glyphis* Ach., Syn. Lich. (1814), p. 107; Nyl., Énum. Gén. Lich. (1857), p. 134; Hue, Lich. Exot. (1892) p. 271 et 322. *Sarcographa* Müll. Arg., Graph. Féean. (1887), p. 62, Lich. Beitr. (Fl. 1887), no. 1100 et 1102.

Thallus tenuis, laevigatus, epiphloeodes, leviter nitidus, glaucescens vel stramineo-glaucescens, KHO leviter rubescens. Pseudostromata distincta, elevata, applanata, lateribus sensim dilatatis, extus alba, opaca, KHO primum lutescentia, dein leviter rubescentia. Apothecia in pseudostromatibus crebre aggregata confluentiaque et seriata, humida rotundata aut parcius etiam oblonga, sicca angulosa difformiaque et saepe fissuris separata circumscissaque, long. circ. 0,1—0,3, latit. circ. 0,1 mm. Perithecia fusco-fuliginea, integra, basi crassiora, partim confluentia. Discus

apertus, concavus, tenuiter pruinosus aut denudatus, margine tenui, cinereo aut albo, saepe circumscisso cinctus. Sporae 8 : nae, fuscescentes, 5-septatae, long. 0,018—0,023, crass. 0,005—0,006 mm.

Pseudostromata difformia, long. 16—1,5 mm., interdum etiam confluentia, intus alba. Perithecia labiis patentibus, in statu sicco discum, sed haud superficiem pseudostromatis, superantibus. Hymenium circ. 0,100 mm. crassum, oleosum. Epithecium fuscescens. Sporae subdistichae, oblongae, apicibus obtusis aut rotundatis.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan (no. XXI, X) et ad corticem arborum frondosarum prope cataractam fluminis Klong Majum (no. XXVII) in insula Koh Chang.

Area: In regionibus tropicis Americae, Africae, Asiae et Oceaniae distributa.

Subg. IV. **Scolaecospora** Wain.

58. **Gr.** (sect. **Solenographa**) **subdisserpens** Nyl., Lich. Ins. And. (Bull. Soc. Linn. Norm. 2 sér., t. VII, 1874), p. 16.

Thallus sat tenuis aut tenuis, sat laevigatus, albidus aut sordide albicans vel cinereo-albicans, sat opacus, KHO dilute flavescens et demum sat dilute, sed distincte rubescens. Apothecia dendritice ramosa et radiatim aggregata, valde elongata, long. 13—4 mm., flexuosa, thallo immersa aut demum leviter emergentia. Perithecium fusco-fuligineum, integrum, labiis laevigatis, conniventibus, basi immersis, superne denudatis nigrisque, circ. 0,25—0,1 mm. latum, apicibus sensim attenuatis. Discus rimaeformis, inconspicuus. Sporae 8 : nae, decolores, septis circ. 16—18, long. circ. 0,046—0,053, crass. 0,007—0,010 mm., jodo violascentes, halone tenui aut fere nullo indutae, loculis lenticularibus. Epithecium fuscescens.

Ad corticem rami sicci arboris in silva prope cataractam in insula Koh Chang (no. XVI). — Hoc specimen ad f. **irregularem** Wain., apotheciis irregulariter intricatis dignotam, pertinet.

F. **arbusculaeformis** Wain.

Apothecia acervulos crebre dendroideo-radiatos, sparsos formantia, parum distincte subcinerascenti-pruinosa. Sporae septis circ. 17—20, long. circ. 0,060—0,068, crass. 0,010—0,012 mm., jodo violascentes. Thallus KHO demum bene rubescens.

Ad corticem *Arecae catechu* in insula Koh Chang (no. X).

Habitu subsimilis est *Gr. assimilis* Nyl. formae „apotheciis radiato-ramosis“ Nyl., Lich. Nov.-Gran. Prodr. (1863), p. 465.

In specimine orig. *Gr. subdisserpentis* Nyl. (no. 7156 in herb. Nyl.) thallus albidus, opacus, KHO dilute, sed distincte rubescens, apothecia dendritico-ramosa, ramis longis, labiis immersis thallumque haud superantibus, laevigatis, nigris, nudis, sporae „septis 11—13, long. 0,045—0,060, crass. 0,008—0,009 mm.“ (Nyl. in sched.). In *Gr. disserpente* Nyl., Fl. 1864, p. 618, Lich. Ins. Andam., p. 16 (Müll. Arg., Graph. Féean., p. 40), secundum no. 7415 in herb. Nyl. apothecia dendritico-radiata, labiis haud striatis, sporae murales, „long. circ. 0,045, crass. circ. 0,015 mm.“ *Gr. disserpens* Wain., Étud. Lich. Brés. II, p. 123, nominetur *Gr. proserpens* Wain.

Area: *Gr. subdisserpens* in regione tropica Asiae lecta est.

59. **Gr.** (sect. **Solenographa**) **sauroidea** Leight., Lich. Amaz. et And. (Transact. Linn. Soc. Lond. XXV, 1866), p. 452 (secund. specim. orig. no. 7137 in herb. Nyl.).

Thallus sat tenuis, sat laevigatus, albidus, sat opacus, KHO haud reagens. Apothecia sat approximata, simplicia aut furcata vel parce ramosa, vulgo elongata, long. circ. 4—1 mm., curvata flexuosave, semiimmersa. Perithecium fusco-fuligineum, integrum, labiis laevigatis, conniventibus, basi strato thallino obductis, superne denudatis nigrisque, circ. 0,2—0,15 mm. latum, apicibus sat obtusis. Discus rimaeformis, inconspicuus. Sporae 8 : nae, decolores, septis circ. 10—11, long. circ. 0,032—0,043, crass. 0,007—0,008 mm., jodo violascentes.

Epithecium decoloratum. Sporae polystichae, fusiformes. — *Gr. intricata* Fée, Ess. Crypt. Écorc. (1824), p. 42 (Nyl., Lich. Ins. Andam., p. 16, Müll. Arg., Graph. Féean. p. 30), secund. specim. orig. Féeanum no. 7142 in herb. Nyl. apotheciis immersis, parum emergentibus instructa est et identica cum *Gr. assimili* Nyl. (Wain., Étud. Lich. Brés. II, p. 120). *Gr. anfractuosa* Eschw. apud Mart., Fl. Bras. (1833), p. 86, ex opinione Nylanderi (Prodr. Nov.-Granat. Addit., 1867, p. 329, 562) ad *Gr. sauroideam* pertinet et teste Müll. Arg., Fl. 1888, p. 512, „lirellis emersis, nudis, dorso non thallino-vestitis“ ei congruens, at secundum specimen forsan non orig. in herb. Nyl. apotheciis immersis instructa est, quare hoc nomen adhuc dubium.

Ad corticem *Arecae catechu* prope Stationem navalem in Koh Chang (no. X, XL, fig. 3).

Area: In regionibus tropicis Americae, Oceaniae et Asiae lecta est.

60. **Gr.** (sect. **Eugraphis**) **tenella** Ach., Syn. Lich. (1814), p. 81; Nyl., Lich. Nov.-Gran. ed. 2 (1863), p. 358, Lich. Nov.-Gran. Addit. (1867), p. 329, Syn. Lich. Cal. (1868), p. 70, Fl. 1886, p. 174; Müll. Arg., Lich. Beitr. (Fl. 1882), no. 449, Graph. Féean. (1887), p. 32; Wain., Étud. Lich. Brés. II (1890), p. 121.

Var. **epiphaea** Wain.

Epithecium fuscescens. Apothecia labiis nigris, nudis, epruinosis. — Perithecium primum integrum basique tenui, demum dimidiatum basique apotheciorum deficiens. Paraphyses simplices. Sporae septis 9—14, loculis lenticularibus, long. 0,036—0,060, crass. 0,007—0,010 mm.

Ad corticem *Arecae catechu* prope Stationem navalem in Koh Chang (no. XXI).

Var. **leptocarpoides** Wain.

Epithecium fuscescens. Apothecia labiis pruinosis. — Perithecium fuligineum, dimidiatum basique deficiens, thallo immersum et thallum subaequans aut parte superiore leviter emergens aut parte inferiore amphithecio thallino anguste obductum, superne pruinosum, laevigatum. Apothecia long. vulgo 4—2 (7—1) mm., circ. 0,160 mm. lata. Sporae decolores, septis 7—5, loculis lenti-

cularibus, jodo violascentes, long. circ. 0,020—0,025, crass. 0,007—0,009 mm. In var. *epiphaeam* apotheciis epruinosis instructam transit. *Gr. Pavoniana* Fée (Müll. Arg., Graph. Féean., p. 33) secund. specim. orig. in herb. Nyl. (no. 7182) apotheciis magis elevatis a var. *leptocarpoide* differt et apotheciis basi thallo obductis, perithecio dimidiato, labiis pruinosis, laevigatis, sporis long. circ. „0,014—0,015, crass. 0,006 mm., 3-septatis, jodo violascentibus" instructa est.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X).

Area: In regionibus tropicis *Gr. tenella* frequenter obvenit.

61. **Gr.** (sect. **Eugraphis**) **lineola** Ach., Lich. Univ. (1810), p. 264, Syn. Lich. (1814), p. 74, 80; Müll. Arg., Graph. Féean. (1887), p. 32. *Gr. scripta* **Gr. comma* Nyl., Syn. Lich. Nov. Cal. (1868), p. 70 (Prodr. Nov.-Gran. ed. 2 in Ann. Sc. Nat. IV sér. Bot. t. XIX, 1863, p. 112). *Gr. comma* Mass., Mem. Lich. (1853), p. 109; Hue, Lich. Exot. (1892), p. 233.

Thallus tenuis, laevigatus, albidus, sat opacus aut leviter nitidus, KHO non reagens. Apothecia approximata, simplicia aut raro furcata, elongata aut oblonga, long. circ. 0,3—1,5 (—2) mm., recta aut curvata flexuosave, vulgo immersa et thallum fere aequantia aut demum semiimmersa. Perithecium fusco-fuligineum, dimidiatum basique apothecii deficiens, latit. circ. 0,1—0,13 mm., labiis conniventibus, laevigatis, epruinosis. Discus rimaeformis, inconspicuus. Epithecium fuscescens. Sporae 8 : nae, decolores, septis circ. 5—7, long. circ. 0,022, crass. circ. 0,006—0,007 mm., jodo violascentes.

Hypothecium superne decoloratum, inferne sat dilute fuscescens. Sporae oblongae, altero apice rotundato aut ambobus apicibus obtusis, halone nullo indutae, loculis lenticularibus. — Apotheciis tenuioribus et brevioribus a *Gr. tenella* Ach. differt. In specimine orig. *Gr. lineolae* ex India Occid. in herb. Ach. apothecia long. 0,5—1,2 mm., angustissima, simplicia aut raro furcata, curvata aut subrecta, immersa et thallum fere aequantia, peritheciis nigris, epruinosis, labiis demum hiantibus. In specimine *Opegraphae commatis* Ach. (Syn. Lich., p. 74) ex Guinea in herb. Ach. apothecia elevata, recta (conf. Müll. Arg., Graph. Féean., p. 32).

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X).

Area: In regionibus tropicis Americae, Oceaniae, Asiae, Africae crescit.

62. **Gr.** (sect. **Eugraphis**) **striatula** (Ach.) Nyl., Lich. Nov.-Gran. (1863), p. 467 (excl. syn.); Krempelh., Lich. Beccar. Born. (1875), p. 36, Fl. 1876, p. 418; Müll. Arg., Lich. Beitr. (Fl. 1880) no. 139, (Fl. 1882) no. 453, (Fl. 1884) no. 818, Graph. Féean. (1887), p. 34; Hue, Addend. (1888), p. 246, Lich. Exot. (1892), p. 238, 320; Wain., Étud. Lich. Brés. II (1890), p. 122.

Gr. elegans (Sm.) Ach. (Leight., Lich. Great Brit., 3. ed., 1879,

p. 427) ab hac specie differt peritheciis latioribus, diutius thallo immersis magis grosse striatis, striis paucioribus.

Ad corticem Arecae catechu prope Stationem navalem in insula Koh Chang (no. XXI).

Area: In regionibus tropicis Americae, Oceaniae, Asiae, Africae et in zona temperata Europae (in Lusitania) crescit.

63. **Gr.** (sect. **Eugraphis**) **ochrocheila** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 178.

Thallus tenuis, sat laevigatus, pallidus aut olivaceo-pallidus, sat nitidus, KHO dilute fusco-rubescens. Apothecia sparsa, simplicia aut raro furcata, elongata, long. circ. 15—2 mm., latit. vulgo 1,1—0,9 (raro —0,5) mm., recta aut curvata flexuosave, elevata, basi bene constricta. Perithecium fusco-fuligineum, dimidiatum, labiis conniventibus, laevigatis, crassis, superne e strato crasso, albido-pallescente, KHO sat dilute fusco-rubescente formatis. Discus rimaeformis, inconspicuus. Sporae 8 : nae, decolores, 3-septatae, long. 0,014—0,016, crass. 0,005—0,006 mm.

Hypothecium album, inferne jodo caerulescens. Hymenium circ. 0,120 mm. crassum. Epithecium fuscescens. Sporae irregulariter monostichae, oblongae, altero apice rotundato, altero obtuso, halone nullo indutae, loculis lenticularibus, jodo haud reagentes aut vinose rubentes. — Valde affinis est *Graphidi Afzelii* Ach., Syn. Lich. (1814), p. 85, Nyl., Prodr. Nov.-Gran. Addit. (1867), p. 563, Syn. Lich. Nov. Cal. (1868), p. 75, Sert. Lich. Lab. (1891), p. 23, Müll. Arg., Graph. Féean. (1887), p. 37, Fl. 1888, p. 511, Wain., Étud. Lich. Brés. II (1890), p. 124, Catal. Welw. Afr. Pl. II, P. II (1901), p. 441 (*Dyplolabia Afzelii* Mass., Neag. Lich. 1854, p. 6), at ab ea distinguenda. In *Gr. Afzelii* apothecia alba, nec pallida, breviora et vulgo angustiora, KHO non reagentia, sporae majores et thallus KHO non reagens aut tantum dilutissime et vix distincte violascens, et stratum album labia fuliginea apotheciorum in parte superiore intus et vulgo etiam extus obducens.

Ad truncos arborum prope Cataractam magnam in insula Koh Chang maculas pedales formans (n. III).

64. **Gr.** (sect. **Fissurina**) **glaucocinerea** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 178.

Thallus sat crassus aut crassitudine mediocris, substrato partim laxe affixus et in pustulas rugasque elevatus, glauco-cinereus, opacus, KHO non reagens. Apothecia sparsa, simplicia aut raro furcata, vulgo elongata, long. circ. 10—0,5 mm., vulgo flexuosa curvatave. Perithecium tenue pallidumque, at in parte superiore parathecii crassius et pallido-fuscescens, labiis apertis hiantibusve, amphithecio thallino rugam circ. 0,4—0,7 mm. latam, plus minusve elevatam, basi sensim dilatatam aut rarius abruptam constrictamve formante obductis. Discus concavus, impressus, latit. circ. 0,15 mm., rufus, epruinosus. Sporae decolores, septis 15—17, long. 0,030—0,048, crass. 0,006—0,008 mm., jodo violascentes.

Thallus subtus pallidus. Hymenium circ. 0,120 mm. crassum. Epithecium sordide fuscescens (dilute aut intense). Paraphyses simplices. Sporae oblongae, apicibus obtusis aut rotundatis, halone nullo indutae,

8 : nae, ut videtur. — Habitu omnino similis est *Gr. Balbisinae* Nyl., Sert. Lich. Lab. (1891), p. 42 (Hue, Lich. Exot., 1892, p. 243, 321, Müll. Arg., Lich. Exot. IV in Hedwigia 1895, p. 144), at sporis minoribus ab ea differens. *Gr. Balbisina* in Mexicana lecta est (no. 7725 in herb. Nyl.) et sporis long. 0,060—0,100, crass. 0,011 mm. describitur. Ad *Fissurinam Gr. glaucocinerea* rectius pertinet, ut apothecia bene evoluta ostendunt, at in apotheciis plurimis, quae male evoluta sunt, labia clausa.

Ad corticem vetustum pali lignei in capite septentrionali insulae Koh Kong (no. VIII).

65. **Gr.** (sect. **Fissurina**) **pyrrhocheila** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 179.

Thallus sat tenuis, leviter verruculoso- vel ruguloso-inaequalis, albidus, opacus, KHO primum lutescens, dein rubescens. Apothecia sat approximata, simplicia aut raro furcata, vulgo elongata, long. circ. 4—2 (—0,8) mm., latit. circ. 0,5 (0,6—0,4) mm., flexuosa curvatave aut pr. p. recta. Perithecium sat tenue, dimidiatum basique apothecii deficiens, fuligineum, KHO purpureo-fuligineum, labiis apertis hiantibusve, latere amphithecio thallino, crassitudine mediocri, basi abrupto aut leviter constricto et saepe fissura circumscisso obductis, superne anguste denudatis, tenuiter pruinosis, laevigatis. Discus concavus aut planiusculus, impressus, latit. circ. 0,25—0,15 mm., livido- vel subcaesio-pruinosus. Sporae decolores, septis 10—13, long. 0,040—0,046, crass. 0,008—0,012 mm., jodo violascentes.

Thallus linea hypothallina nigricante angustissima passim limitatus. Apothecia modice elevata, apicibus attenuatis aut raro obtusis. Hypothecium fulvescens, KHO purpureo-rubescens. Epithecium fuscescens, KHO non reagens. Paraphyses simplices. Hymenium circ. 0,140 mm. crassum, guttulas oleosas abundanter continens. Sporae numero in ascis variantes, 2 : nae, 4 : nae et verisimiliter etiam 8 : nae (6 sporas in eodem asco observavi), saepe halone 0,002 mm. crasso indutae.

Ad corticem arboris prope Stationem navalem Lem Ngob (no. IX).

66. **Gr.** (sect. **Glyphis**) **cicatricosa** (Ach.) Wain., Étud. Lich. Brés. II (1890), p. 127. *Glyphis cicatricosa* Ach., Syn. Lich. (1814), p. 107. *Gl. favulosa* Ach., l. c.

Var. **confluens** (Zenk.) Wain., l. c.

Ad corticem *Arecae catechu* prope Stationem navalem Lem Dan in insula Koh Chang (no. X, XVII, XXI), prope Stationem navalem Lem Ngob (no. IX).

Area: *Gr. cicatricosa* in regionibus tropicis Americae, Oceaniae, Asiae, Africae, et in zona temperata Asiae (in China) et Europae (in Lusitania) crescit.

2. Opegrapha (Humb.) Wain.

67. **O. subvulgata** Nyl., Fl. 1869, p. 71; Hue, Lich. Exot. (1892), p. 253; Wain., Catal. Welw. Afr. Pl. II, P. II (1901), p. 442. *O. vulgata*

Nyl., Syn. Lich. Nov. Cal. (1868), p. 56, teste auctore ipso (no. 6782 in herb. Nyl.).

Thallus tenuis, albidus aut cinereo-glaucescens, linea nigricante hypothallina angusta limitatus. Apothecia long. circ. 0,5—0,3 mm., latit. 0,12—0,1 mm., simplicia aut pro parte furcata, nigra, nuda, opaca, sat approximata aut sparsa, leviter elevata. Perithecium fuligineum, integrum, labiis conniventibus. Sporae 8 : nae, decolores, aciculares aut fusiformi-aciculares, apicibus attenuatis acutisque, septis circ. 7—8, long. 0,026—0,040, crass. 0,003—0,006 mm.

Hymenium jodo leviter vinose rubens. Asci obovoideo-clavati, long. 0,050, crass. 0,020 mm. Ex annotationibus Nylanderi in herb. suo sporae long. 0,025—0,036, crass. 0,0035—0,0045 mm., 7-septatae, fusiformi-aciculares et pycnoconidia recta, cylindrica, long. 0,004 mm.

Ad corticem *Rhizophorae* prope Stationem navalem Lem Ngob (no. XIV).

Area: In regionibus tropicis Americae, Oceaniae et Asiae obvenit.

68. **O. robusta** Wain. (n. sp.).

Thallus tenuis aut tenuissimus, sat laevigatus, albidus, opacus, linea hypothallina nigricante circ. 1 mm. lata limitatus. Apothecia vulgo sparsa, elevata, partim elongata, long. 7—0,8 mm., latit. 0,5—0,35 mm., simplicia aut interdum approximata, ut ramosa videntur, recta aut leviter curvata, basi constricta, atra, leviter nitida. Perithecium integrum, fuligineum, labiis arcte conniventibus, laevigatis. Discus rimaeformis, inconspicuus. Hymenium jodo vinose rubens. Epithecium decoloratum. Paraphyses ramoso-connexae. Asci clavati. Sporae incognitae.

Planta adhuc defecte cognita, sporis haud visis. Herbario Nyl. deest.

Ad corticem arboris in silva prope flumen Klong Sarlakpet (no. XXVI).

3. Chiodecton (Ach.) Wain.

69. **Ch.** (subg. **Enterographa**) **pallidellum** (Nyl.) Wain. *Platygrapha pallidella* Nyl., Fl. 1867, p. 5 (no. 4622 in herb. Nyl.); Krempelh., Reis. Novar. Flecht. (1870), p. 108.

Var. **olivaceo-straminea** Wain.

Thallus stramineus. Apothecia disco olivaceo. — Thallus tenuis, sat laevigatus, continuus aut dispersus, crebre contextus, opacus, $Ca\,Cl_2\,O_2$ non reagens, hypothallo indistincto. Apothecia thallo immersa, demum leviter elevata, approximata, vulgo elongata, long. circ. 1,5—0,3 mm., simplicia aut furcata, flexuosa aut curvata. Discus olivaceus, epruinosus, latit. vix 0,1 mm., thallo marginatus. Hypothecium albidum. Sporae 8 : nae, decolores, fusiformi-aciculares, apicibus attenuatis acutisque aut rarius obtusis, septis 7—9 aut pluribus, loculis cylindricis (lumine cellularum cubico), halone nullo indutae, long. 0,028—0,034, crass. 0,003—0,0045 mm.

Pseudostromata nulla distincta. Perithecium indistinctum. Hymenium circ. 0,060 mm. crassum. Epithecium lutescenti-pallidum. Asci obovoideo-clavati, long. circ. 0,046—0,050 mm., crass. 0,016 mm., membrana haud aut parum incrassata. Thallus gonidiis chroolepoideis, ut videtur.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X).

Var. **perpallida** Wain. *Platygrapha pallidella* Nyl., Fl. 1867, p. 5.

Thallus continuus, stramineo-albidus. Apothecia conferta, disco pallido aut raro pallide olivaceo-fuscescente.

Var. **olivaceo-alba** Wain.

Thallus dispersus aut subdispersus, albidus. Apothecia disco olivaceo-fuscescente aut pallide olivaceo-fuscescente aut fusco. — „Thallus KHO non reagens et sporae long. 0,025—0,030, crass. 0,003 mm.“ secundum annotationem Nylanderi in herb. suo. Ad Simonosaki in Japonia legit E. Almquist („*Stigmatidium pallidellum*“ Nyl.).

Huic speciei habitu subsimilia sunt: *Ch. anguinellum* (Nyl.) Wain. (*Stigmatidium* Nyl., Prodr. Nov.-Gran. ed. 2, 1863, p. 96, Lich. Jap., 1890, p. 84) et *Ch. praepallens* (*Stigmatidium* Nyl., Lich. Jap., 1890, p. 84, Lich. Ceyl., 1900, p. 19) et *Ch. elegantulum* (*Stigmatidium* Nyl., Fl. 1886, p. 104), quorum posterius autem sporis ovoideis, 3-septatis ab ea differt.

Area: *Ch. pallidellum* in regionibus tropicis Oceaniae et Asiae crescit.

70. **Ch.** (subg. **Stigmatidiopsis**) **subsphaerale** Nyl. in Nyl. et Cromb., On Collect. Lich. East As. (in Journ. of Bot., 1882), p. 59.

Thallus crassitudine mediocris, creberrime contextus, opacus, superficie granulosa aut partim verruculosa, hypothallo nullo distincto. Pseudostromata elevata, rotundata aut rarius ellipsoidea aut confluentia, convexa, basi constricta, albida, intus fusco-nigricantia. Hypothecium fusco-nigricans. Disci rotundati aut difformes, nigri, epruinosi. Sporae decolores, aciculares, 3-septatae, long. circ. 0,020—0,026, crass. circ. 0,0025 mm.

Pseudostromata in parte exteriore gonidia continentia et crebre contexta, hymenia vulgo numerosissima aut raro solitaria continentia. Hypothecium KHO non reagens. Hymenium parte superiore olivaceo-fuscescens aut fuscescens aut totum smaragdulum, jodo caerulescens deindeque vinose rubens. Sporae 8 : nae, aciculares, apicibus attenuatis. — Specimen hic descriptum ob thallum granulosum ad *Ch. subsphaerale* pertinens, sporis longioribus magis cum *Ch. sphaerali* Ach. congruens. In specimine orig. *Ch. subsphaeralis* sporae long. 0,016—0,017, crass. 0,035 mm., 3—5-septatae, at sine dubio in hac specie magis variabiles sunt. *Ch. sphaerali* item habitu simile est *Ch. subordinatum* Nyl., Fl. 1864, p. 618, Prodr. Nov.-Granat. Addit. (1867), p. 352 (574), secund. specim. no. 4525 in herb. Nyl. Haec omnia verisimiliter transeunt.

Ad corticem vetustum trunci arboris in insula Koh Chang (no. XXXIX).

Area: In regione tropica Asiae obvenit.

4. Arthonia (Ach.) Wain.

71. **A.** (subg. **Arthothelium**) **Ruana** Mass., Ric. Aut. Lich. Crost. (1852), p. 49; Willey, Syn. Arth. (1890), p. 52. *A. Ruana* Anzi, Lich. Exs. It. Sup. (1865), no. 383 (no. 5660 in herb. Nyl.). *Dermatina Ruana* Almqu., Mon. Arth. Scand. (1880), p. 8.

Thallus tenuis, laevigatus, albidus, continuus, epiphloeodes. Apothecia rotundata aut difformia confluentiave, aggregata aut approximata, long. 0,2—1 mm., latit. 0,2—0,5 mm., disco plano aut depresso-convexo, thallum aequante aut leviter superante, primum fragmentis thallinis sparsis obducta, dein nuda nigraque. Hypothecium albidum vel pallidum. Hymenium jodo intense persistenter caerulescens, ascis dilute violascentibus. Epithecium fusco-fuligineum. Asci obovoidei, parte superiore pachydermatici, long. circ. 0,060 mm., crass. circ. 0,030 mm. Sporae 8 : nae, decolores, ellipsoideae aut oblongae aut ovoideae, murales, seriebus cellularum transversalibus 10—9, jodo leviter vinose rubentes, halone nullo indutae, apicibus rotundatis aut altero apice rotundato-obtuso, long. 0,020—0,023, crass. 0,009—0,010 mm.

Ad corticem *Rhizophorae* prope Stationem navalem Lem Ngob (no. XIV).

Ab hac *A. anastomosans* (Ach.) Nyl., Lich. Scand., p. 259 (Willey, Syn. Arth., p. 53), secund. no. 5640 in herb. Nyl. thallo hypophloeode et „gelatina hymeniali jodo vinose rubente“ distinguitur. Etiam in specimine Anziano *A. Ruanae* (Anzi, l. c. no. 383) hymenium jodo caerulescens. *A. abnormis* (Ach.) Nyl., Syn. Lich. Nov. Cal., p. 64, Willey, Syn. Arth., p. 53 (Müll. Arg., Graph. Féean., p. 60), habitu huic congruens, observante Nyl. reactione jodetica ab ea differt (no. 5746 in hb. Nyl.).

Var. **phaeospora** Wain.

Sporae demum fuscescentes, long. 0,020—0,024, crass. 0,008—0,012 mm., murales, jodo leviter vinose rubentes. Hymenium jodo caerulescens. Hypothecium albidum vel pallidum.

Ad corticem *Arecae* prope Stationem navalem in insula Koh Chang (no. X).

Area: *A. Ruana* in Europa et Asia crescit.

72. **A.** (subg. **Euarthonia**) **complanata** Fée, Ess. Crypt. Écorc. (1824), p. 54; Wain., Étud. Lich. Bres. II (1890), p. 154; Willey, Syn. Arth. (1890), p. 40.

Thallus albidus, opacus, continuus. Apothecia anguloso-rotundata aut difformia, long. 1,2—0,3 mm., latit. 0,7—0,3 mm., crass. circ. 0,080 mm., disco nigro, epruinoso, opaco, plano. Hypothecium pallidum. Hymenium et hypothecium jodo persistenter caerulescentia. Epithecium fuscescens aut olivaceo-fuscescens. Asci subglobosi aut pyriformi-subglobosi, long. 0,035, crass. 0,030 mm. Sporae 8 : nae, decolores, 5-septatae, cellula apicis crassioris cellulis medianis triplo longiore, etiam cellula apicis tenuioris medianis longiore, long. 0,023—0,025, crass. 0,007—0,008 mm.

Ad corticem *Arecae* prope Stationem navalem in insula Koh Chang (no. XL, fig. 6).

Area: In regione tropica et in vicinis partibus zonae temperatae in America et in Asia crescit.

73. **A.** (subg. **Euarthonia**) **stenographella** Nyl., Lich. Nov.-Granat. (1863), p. 496 (82), ed. 3 (1863), p. 99 (Syn. Lich. Nov. Cal., 1868, p. 61), Lich. Jap. (1890), p. 85 (in Lich. Ceyl., 1900, p. 19, descriptio haud congruens: „gelatina hymenialis coerulescens, dein mox vinose rubens").

Thallus tenuis, epiphloeodes, albidus, sat opacus, laevigatus, continuus, linea hypothallina nigricante limitatus. Apothecia approximata, thallo immersa, simplicia aut ramosa, vulgo elongata, long. circ. 1—0,3 mm., latit. 0,2—0,1 mm., saepe flexuosa, apicibus obtusis aut acutis. Discus planus, fuscus aut fusco-nigricans, nudus. Hypothecium albidum aut pallidum. Hymenium jodo persistenter caerulescens, ascis dilute violascentibus. Epithecium rufescens. Sporae 8 : nae, decolores, ovoideo-oblongae, 3-septatae, cellula apicis crassioris reliquis duplo longiore, long. circ. 0,015 mm., crass. 0,006 mm.

Hymenium circ. 0,060—0,070 mm. crassum. Asci obovoidei, parte superiore membrana sat bene incrassata, long. circ. 0,038—0,030, crass. circ. 0,020—0,016 mm. Sporae jodo violascentes. In specimine orig. *A. stenographellae* in herb. Nyl. apothecia magis ramosa („dendritico-ramosa") sunt. *A. varia* (Ach.) Nyl., Lich. Nov.-Granat. (1863), p. 496, Syn. Lich. Nov. Cal. (1868), p. 60 (Müll. Arg., Graph. Féean., 1887, p. 54, Willey, Syn. Arth., 1890, p. 14), thallo minus evoluto ab ea distinguitur. In *A. variella* Nyl., Fl. 1886, p. 104, secund. annotationes Nylanderi in herb. suo (no. 5371) „sporae long. 0,012—0,014 mm., crassit. 0,005—0,006 mm., 3-septatae, ovoideo-oblongae, cellula apicali reliquis duplo longiore, et gelatina hymenialis jodo caerulescens deindeque vinose rubens" (a Willey in Syn. Arth., 1890, p. 14, inexacte descripta est).

Ad corticem arboris prope Stationem navalem Lem Ngob (n. IX).

Area: In America et Asia lecta est.

74. ***A. obscurata** Wain. (n. subsp.).

Thallus tenuis, epiphloeodes, albidus, sat opacus, laevigatus, continuus, linea hypothallina nigricante limitatus. Apothecia approximata, thallo immersa, ramosa aut rarius simplicia, elongata aut anguloso-rotundata aut subradiata difformiave, long. circ. 1,5—0,2 mm., latit. 0,5—0,1 mm., saepe flexuosa, apicibus obtusis aut acutis. Discus planus, fuscus aut fusco-nigricans, nudus. Hypothecium albidum aut pallidum. Hymenium jodo persistenter caerulescens, ascis demum vinose rubentibus. Epithecium rufescens. Sporae 8 : nae, primum decolores, demum fuscescentes, ovoideo-oblongae, 3-septatae, cellula apicis crassioris reliquis duplo longiore, long. 0,016—0,017, crass. 0,005—0,006 mm.

Gonidia chroolepoidea. Hypothecium jodo persistenter caerulescens. Hymenium circ. 0,050 mm. crassum. Epithecium KHO olivaceum. Asci obovoidei, parte superiore membrana bene incrassata, long. circ. 0,034, crass. circ. 0,016 mm. — Sporis demum obscuratis ab *A. stenographella* differt.

Ad corticem *Rhizophorae* prope Stationem navalem Lem Ngob (no. XIV).

75. **A.** (subg. **Euarthonia**) **rhizophorae** Wain. (n. sp.).

Thallus tenuis, epiphloeodes, albidus, sat opacus, laevigatus, continuus, linea hypothallina nigricante limitatus. Apothecia approximata, thallo immersa, ramosa aut rarius simplicia, elongata aut subradiata aut difformia, long. 1,2—0,3 mm., latit. 0,4—0,1 mm., saepe flexuosa, apicibus obtusis aut acutis. Discus planus, nigricans aut fusco-nigricans, nudus. Hypothecium albidum aut pallidum. Hymenium jodo persistenter caerulescens, ascis demum leviter violascentibus. Epithecium fuscum. Sporae 8 : nae, decolores, ovoideo-oblongae, septis 3—4, cellula apicis crassioris reliquis duplo longiore, long. 0,016—0,020, crass. 0,005—0,006 mm.

Hypothecium jodo intense persistenter caerulescens. Hymenium circ. 0,060 mm. crassum, jodo intense persistenter caerulescens, ascis leviter caerulescentibus, dein leviter violascentibus. Asci obovoidei, long. circ. 0,040, crass. 0,020 mm., parte superiore membrana incrassata. Sporae vulgo 3-septatae, parcius 4-septatae, halone nullo indutae, jodo vinose rubentes. — *A. radiata* (Pers.) Th. Fr. thallo hypophloeode et cellulis aequalibus sporarum differt ab hac specie, quae magis affinis est *A. variae* (Ach.) Nyl., sporis partim 4-septatis et thallo magis evoluto ab ea recedens.

Ad corticem *Rhizophorae* prope Stationem navalem Lem Ngob (no. XIV).

76. **A.** (subg. **Euarthonia**) **perpallens** Nyl., Lich. Nov.-Granat., ed. 2 (1863), p. 100 (no. 5368 in herb. Nyl.), Fl. 1867, p. 7, Lich. Jap. (1890), p. 85; Willey, Syn. Arth. (1890), p. 4.

Thallus tenuis, epiphloeodes, albidus, opacus, sat laevigatus, hypothallo nullo distincto. Apothecia sparsa, rotundata, diam. 0,7—0,3 mm., aut rarius difformia, plana aut depresso-convexa, immersa aut emergentia. Discus pallidus, nudus. Hypothecium albidum. Hymenium jodo vinose rubens. Epithecium pallidum, granulosum. Sporae 8 : nae, decolores, ovoideo-oblongae, 3-septatae, cellulis aequalibus, long. 0,014—0,017, crass. 0,0045—0,005 mm.

Hymenium circ. 0,060 mm. crassum, jodo haud caerulescens. Asci obovoidei, long. circ. 0,034, crass. circ. 0,016 mm., parte superiore membrana incrassata. Sporae ovoideo-oblongae, apicibus rotundatis.

Ad corticem arboris prope Stationem navalem Lem Ngob (no. IX). Ad corticem *Rhizophorae* eodem loco (no. XIV).

Area: In orientalibus et meridionalibus partibus Asiae provenit.

77. **A.** (subg. **Euarthonia**) **ochrodes** Nyl., Fl. 1886, p. 104 (no. 5597 in herb. Nyl.); Willey, Syn. Arth. (1890), p. 10.

Thallus tenuissimus, epiphloeodes, albidus aut albido-cinerascens aut pallescens, opacus, sat laevigatus, hypothallo nullo distincto. Apothecia approximata et parce etiam aggregata, anguloso-rotundata aut ellipsoidea, long. 0,5—0,1 mm., latit. 0,2—0,1 mm., disco plano aut planiusculo, ferrugineo-fuscescente, nudo aut plus minusve ochraceo-pruinoso, margine tenui, ochraceo-pruinoso. Hypothecium electrino-lutescens. Hymenium jodo caerulescens, dein vinose rubens. Epithecium electrino-lutescens, granulosum, KHO violascens aut rubescens. Sporae 8 : nae, primum electrino-lutescentes, demum fuscescentes, ovoideo-oblongae, 3-septatae, cellula apicis crassioris reliquis duplo vel triplo longiore, long. 0,015—0,018, crass. 0,005—0,008 mm.

Gonidia chroolepoidea, diam. circ. 0,006 mm. Perithecium (et margo) tenue, sub microscopio electrino-lutescens, KHO violascens rubescensve. Hymenium circ. 0,060 mm. crassum, dilute electrinum. Asci obovoideo-clavati, parte superiore membrana bene incrassata, long. circ. 0,034, crass. circ. 0,014 mm. Sporae apicibus rotundatis. — Huic speciei proxime affinis est *A. elegans* (Ach.) Almqu., Mon. Arth. Scand. (1880), p. 19, Willey, Syn. Arth. (1890), p. 9 (*A. ochracea* Duf., Rev. Opegr., 1818, p. 8), quae praesertim reactione jodetica hymenii ab ea differt.

Ad corticem *Arecae* prope Stationem navalem in insula Koh Chang (no. X). Ad corticem arboris prope Stationem navalem Lem Ngob (no. XXXII).

Area: In partibus tropicis Americae et Asiae lecta.

II. *Pyrenolichenes.*

1. Bottaria (Mass.) Wain.

78. **B.** (subg. **Anthracothecium**) **libricola** (Fée) Wain., Lich. Antill. (1896), p. 31. *Pyrenula* Fée, Ess. Crypt. Écorc. Suppl. (1837), p. 82; Müll. Arg., Rev. Lich. Mey. (Jahrb. K. Bot. Gart. Berl. II, 1883), p. 318. *Verrucaria* Nyl., Syn. Lich. Nov. Cal. (1868), p. 87, Lich. Lab. (1891), p. 16; Hue, Lich. Exot. (1892), p. 288. *Anthracothecium libricolum* Müll. Arg., Pyr. Cub. (Engl. Bot. Jahrb. VI, 1885), p. 415, Pyr. Féean. (Mém. Soc. Phys. et Hist. Nat. Genève XXX, 1888), p. 36.

Thallus macula pallida aut glauco-pallescente indicatus. Perithecium fuligineum, integrum, globosum, latit. 0,5—0,3 mm., immersum, apice elevato, nigricante aut cinereo-nigricante. Sporae 8 : nae, distichae, olivaceo-fuscescentes, murales, seriebus transversalibus cellularum 10—6, medianis 4 cellulas continentibus, long. 0,025—0,044, crass. 0,011—0,014 mm. Paraphyses parce ramoso-connexae aut simplices.

Ad truncum arboris in silva littorali in insula Koh Kahdat (no. XXXV) et prope Stationem navalem Lem Ngob (no. IX).

Area: In regionibus tropicis Americae, Africae, Asiae, Oceaniae provenit.

79. **B.** (subg. **Anthracothecium**) **parameroides** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 179.

Thallus endophloeodes, pallidus aut glauco-pallescens, leviter nitidus. Apothecia primum thallo substratoque immersa, dein emergentia et verrucas 0,4—0,25 mm. latas, hemisphaericas, subnudas nigrasque aut tenuissime thallodice velatas, vertice convexas formantia. Perithecium globosum, fuligineum, integrum, sat tenue. Sporae 8 : nae, distichae, ellipsoideae aut oblongae, apicibus vulgo rotundatis, olivaceo-fuscescentes, primum 4—5-septatae loculisque lenticularibus, demum submurales, seriebus cellularum transversalibus 6—5, seriebus medianis 2 cellulas continentibus, long. 0,018—0,021, crass. 0,008—0,010 mm.

Nucleus guttulas oleosas haud continens. Paraphyses simplices aut parce ramoso-connexae. — Habitu similis est *B. libricolae* (Fée) Wain. et *B. paramerae* (*Verrucaria* Nyl. in Cromb., Lich. Chall. Exp., p. 227, Nyl., Lich. Ceyl., p. 24), quae sporis majoribus ab ea differunt.

Ad corticem arboris prope Stationem navalem Lem Ngob (no. XXXII).

80. **B.** (subg. **Anthracothecium**) **rosea** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 179.

Thallus tenuis, roseus, h. e. albidus et pruina tenui rubra inspersus, opacus, linea hypothallina nigricante limitatus. Apothecia approximata, verrucas 0,2 mm. latas, conoideo-hemisphaericas, majore minoreve parte strato tenuissimo thallino rubro obductas, parte superiore demum plus minusve denudatas nigricantesque, vertice conoideas convexasve formantia. Perithecium hemisphaericum, fuligineum, integrum, basi haud dilatatum. Sporae 8 : nae, monostichae, ellipsoideae aut subgloboso-ellipsoideae, nigricantes, submurales, septis transversalibus 2, cellulis paucis, long. 0,007—0,008, crass. 0,004—0,005 mm.

Paraphyses tenues, simplices. Asci cylindrici, membrana tenui. Nucleus albidus, guttulas oleosas non continens. — *B. ochrotropa* (Nyl.) Wain., Étud. Lich. Brés. II (1890), p. 197, apotheciis et sporis majoribus ab hac specie differt. *B. albescens* (Nyl.) Wain. **B. subochracea* (Nyl.) Wain. (Cromb., Lich. Chall. Exp., 1878, p. 227) ei item valde affinis est, at sporis et materia rubra minus evoluta differens. *B. coccinea* (Müll. Arg.) Wain. (Müll. Arg., Lich. Exot. II, 1893, p. 136) perithecio subgloboso et sporis majoribus et *B. palmarum* (Krempelh.) Wain. (Krempelh., Beitr. Lich. Süds., 1873, p. 109) sporis majoribus ab ea distinguuntur.

Ad corticem arboris in capite septentrionali insulae Koh Kong (no. XI).

81. **B.** (subg. **Anthracothecium**) **denudata** (Nyl.) Wain. *Verrucaria denudata* Nyl., Énum. Gén. Lich. (1857), p. 139 (herb. Nyl.: no. 1086 e Nova Caled., no. 1088 e Ceyl.), Lich. Îles Mend. (Mém. Soc. Sc. Nat. Cherb. V, 1857) p. 302, Exp. Syn. Pyrenoc. (Mém. Soc. Ac. Maine-et-Loire IV, 1858), p. 49, Fl. 1867 p. 196, Syn. Lich. Nov. Cal. (1868) p. 90 (excl. var.), Lich. Andam. (1874), p. 21, Lich. Jap. (1890), p. 115, Sert. Lich. Lab. (1891), p. 15, Lich. Ceyl. (1900), p. 25; Nyl. et Cromb., On Collect. Lich.

East As. (Journ. of Bot. 1882), p. 60; Hue, Lich. Exot. (1892), p. 292 (excl. var.). *Anthracothecium denudatum* Müll. Arg., Lich. Afr. Occ. (Linnaea 1880), p. 45, Rev. Lich. Eschw. (Fl. 1884), p. 9, Lich. Beitr. (Fl. 1884) no. 818.

Thallus tenuis, albidus, laevigatus, leviter nitidus, KHO non reagens, linea hypothallina nigricante angusta limitatus. Apothecia sat approximata, verrucas 0,4—0,3 mm. latas, hemisphaericas, nigras, nudas, vertice convexas formantia. Perithecium hemisphaericum, integrum, basi haud dilatatum. Nucleus depresso-subglobosus, basi rotundata. Sporae 8 : nae, monostichae aut subdistichae, ellipsoideae aut parcius subglobosae, nigricantes, murales, septis transversalibus 3, cellulis paucis, long. 0,012—0,018 (—0,010), crass. 0,007—0,011 mm.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X, XXI). Ad corticem arboris prope Stationem navalem Lem Ngob (no. XXXII). — *Verr. denudata* Nyl. tantum pro parte huc pertinet.

Area: In regionibus tropicis Oceaniae, Asiae, Africae, Americae.

82. **B.** (subg. **Anthracothecium**) **confinis** (Nyl.) Wain. *Verrucaria confinis* Nyl., Addit. Fl. Chil. (Ann. Sc. Nat. 4 sér. Bot. III, 1855), p. 174 (secund. specim. orig. no. 1097 in herb. Nyl.), Exp. Syn. Pyrenoc. (1858), p. 49, Exp. Lich. Nov. Cal. (Ann. Sc. Nat. 4 sér. Bot. XV, 1861), p. 52, Fl. 1867 p. 196, Syn. Lich. Nov. Cal. (1868), p. 90 (no. 1095 e Lifu, Depl., in herb. Nyl.); Hue, Lich. Exot. (1892), p. 292. *Anthracothecium confine* Müll. Arg., Lich. Afr. Occ. (1880), p. 45.

Thallus tenuis, albidus, KHO non reagens, sat laevigatus, sat opacus aut leviter nitidus, linea hypothallina nigricante angusta limitatus. Apothecia sat approximata aut sparsa, verrucas 0,4—0,3 mm. latas, hemisphaericas, cinerascentes vel cinereo-nigricantes, strato tenuissimo thallino obductas, interdum partim denudatas, vertice convexas formantia. Perithecium depresso-subglobosum vel fere potius hemisphaericum, lateribus subrotundis, basi haud dilatatum. Nucleus depresso-subglobosus, basi rotundata. Sporae 8 : nae, monostichae, ellipsoideae aut parcius subglobosae, nigricantes, murales, septis transversalibus 3, cellulis paucis, long. 0,011—0,017, crass. 0,007—0,012 mm.

Paraphyses simplices. Asci cylindrici, membrana tenui. — Tantum apotheciis inconstanter thallodice obductis a *B. denudata* differt et in eam transire videtur.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. X). Ad corticem arboris prope Stationem navalem Lem Ngob (no. IX).

Area: In regionibus tropicis Americae, Oceaniae et Asiae obvia.

2. **Pyrenula** (Fée) Wain.

83. **P.** (subg. **Melanotheca**) **subaggregata** Müll. Arg., Pyrenoc. Cub. (Engl. Bot. Jahrb. VI, 1885), p. 410, Lich. Beitr. (Fl. 1887) no. 1212.

Thallus tenuis, olivaceo-pallescens aut olivaceus, sat laevigatus, leviter nitidus, hypothallo nullo distincto aut partim linea hypothallina nigricante limitatus. Apothecia pro parte simplicia approximataque, pro parte 2—3 (—4) confluentia, verrucas depresso-hemisphaericas, (simplices) 0,4—0,6 mm. latas, primum tenuissime thallodice subhyalino-velatas, demum denudatas, impure nigricantes formantia, ostiolo vulgo levissime umbilicato-impresso, tenuiter pallide marginato, saepe obliquo. Perithecium hemisphaericum, integrum, fuligineum. Asci cylindrici. Sporae 8 : nae, monostichae, oblongae aut ellipsoideo-oblongae, apicibus obtusis, fuscescentes, 3-septatae, loculis lenticularibus, sat aequalibus, long. 0,015—0,016, crass. 0,007 mm., halone nullo indutae.

Perithecium basi tenue, extrorsum haud anguloso-productum aut rarius anguste productum (observante Müll. Arg., Pyrenoc. Cub. p. 410, extrorsum anguloso-productum). Haec nota inconstans, sicut saepe res se habet in *Pyrenulis*. Nucleus guttulas oleosas haud continens. Paraphyses simplices. — Haec species bene demonstrat transitum *Melanothecae* in *Eupyrenulam*.

Ad corticem vestutum arboris in silva littorali in insula Koh Kahdat (no. XXXV).

Area: In regionibus tropicis Americae et Asiae lecta est.

84. **P.** (subg. **Eupyrenula** sect. **Pyramidalis**) **feracissima** Wain. (n. sp.).

Apotheciis pro parte 2(—7) confluentibus, pro parte simplicibus crebreque approximatis et loculis inaequalibus sporarum a *P. Kunthii* Fée, Ess. Crypt. Écorc. Suppl. (1837) p. 80 (Wain., Étud. Lich. Brés. II p. 201), et *P. mamillana* (Ach.) Trev. differt.

Thallus hypophloeodes aut endophloeodes, albidus, laevigatus, leviter nitidus, hypothallo nullo distincto aut partim linea plus minusve obscurata limitatus. Apothecia verrucas 0,6—0,9 mm. latas, hemisphaericas, nigras, nudas, vertice convexas formantia. Perithecium hemisphaericum, integrum, fuligineum, basi concava, latere anguloso, haud producto. Nucleus guttulas oleosas continens, latere rotundato-anguloso. Paraphyses simplices. Asci cylindrici. Sporae 8 : nae, monostichae, fuscescentes, ellipsoideae, apicibus rotundatis aut rarius obtusis, 3-septatae, loculis apicalibus reliquis multo minoribus, long. 0,016—0,021, crass. 0,009—0,013 mm. — Ad plantas inter *Melanothecas* et *Eupyrenulas* intermedias pertinet.

Ad corticem ramorum siccorum arboris in silva ad flumen Klong Prao in insula Koh Chang (no. XIX).

In specimine, ut videtur, item ad hanc speciem pertinente, ad corticem emortuum arboris in silva littorali in insula Koh Kahdat lecto (no. XXXV), apothecia 0,6—0,7 mm. lata, columella centrali brevi instructa, sporae long. 0,018—0,014, crass. 0,008—0,011 mm., loculis apicalibus reliquis multo minoribus.

85. **P.** (subg. **Eupyrenula** sect. **Pyramidalis**) **approximata** Wain. (n. sp.).

Thallus hypophloeodes, macula pallida indicatus, leviter nitidus, laevigatus, linea hypothallina obscurata nigricanteve limitatus. Apothecia majore parte crebre approximata, vulgo simplicia, parce confluentia, basi parum aut leviter substrato immersa, verrucas 0,4—0,3 mm. latas, hemisphaericas, nigras, nudas, vertice convexas

formantia. Perithecium hemisphaericum, basi convexa, latere obtuso aut rotundato, integrum, fuligineum. Nucleus subgloboso-hemisphaericus, basi convexa et latere obtuso aut rotundato. Paraphyses simplices. Asci cylindrici. Sporae 8 : nae, monostichae, ellipsoideae, apicibus rotundatis, 3-septatae, long. 0,010—0,014, crass. 0,007—0,008 mm., loculi apicales medianis multo minoribus.

Nucleus guttulas oleosas continens. Perithecium neque distincte hemisphaericum, nec distincte subglobosum. — Ad species inter *Pyramidales* et *Subglobosas* intermedias pertinet. *V. approximans* Krempelh., Fl. 1876 p. 525, secundum specimen orig. (no. 1371 in herb. Nyl.) habitu huic speciei similis est et a Nyl. ad „*V. aspisteam* Ach." ducta est. Sporis citriformibus, paullo majoribus descripta est. Sporis adhuc majoribus et perithecio globoso a Müll. Arg. in Rev. Lich. Eschw. (Fl. 1884) p. 6 descripta, cum *P. vitrea* (Eschw.) ab eo conjuncta est. *V. approximans* Krempelh., Lich. Bras. Warm. (Vid. Medd. Naturh. For. Kjøbenh. 1873) p. 396 (32), ut species autonoma a Müll. Arg. in Lich. Beitr. (Fl. 1885) no. 895 commemoratur. *P. approximata* a *P. aspistea* Ach. peritheciis haud immersis distinguitur. Una cum *P. glabriuscula* (Nyl.) Wain. crescit et ab ea apotheciis minoribus, crebre approximatis recedit.

Ad corticem arboris prope cataractam meridiem versus a Statione navali in insula Koh Chang sitam (no. IV).

86. **P.** (subg. **Eupyrenula** sect. **Pyramidalis**) **submarginata** Wain. (n. sp.).

Thallus hypophloeodes, macula albida vel pallida indicatus, leviter nitidus aut opacus, linea hypothallina nigricante partim limitatus. Apothecia sparsa aut approximata, verrucas 1,5—0,6 (—2) mm. latas, conoideo-hemisphaericas, nigras, nudas, vertice minutissime umbonatas aut conoideo-convexas formantia. Perithecium conoideo-hemisphaericum, integrum, fuligineum, latere anguste anguloso-producto. Nucleus latere rotundato aut rotundato-obtuso. Paraphyses simplices. Asci cylindrici. Sporae 8 : nae, monostichae, fuscescentes, ellipsoideae aut oblongae, apicibus obtusis aut rotundatis, 3-septatae, loculis sat aequalibus, long. 0,012—0,018, crass. 0,005—0,008 mm.

Nucleus albidus, guttulas oleosas haud continens aut in no. XXIII bene oleosus. Asci membrana tenui. Sporae loculis vulgo angulosolenticularibus, halone nullo indutae. — Apotheciis majoribus differt a *P. mamillana* (Ach.) Trev., quae secund. specim. orig. in herb. Ach. apotheciis 0,6 mm. latis instructa est.

Ad truncos arborum prope cataractam meridiem versus a Statione navali in insula Koh Chang (no. IV, XXIII). Ad truncum arboris in capite septentrionali in insula Koh Kong (no. XI).

87. **P.** (subg. **Eupyrenula** sect. **Pyramidalis**) **glabriuscula** (Nyl.) Wain. *Verrucaria* Nyl., Fl. 1886, p. 177, Bol. Soc. Brot. IV (1886), p. 13, Lich. Guin. (1889), p. 35.

Thallus hypophloeodes, macula albido-pallescente indicatus, partim linea hypothallina nigricante limitatus. Apothecia vulgo sparsa, verrucas 0,4—0,6 mm. latas, hemisphaericas aut conoideo-hemisphaericas, nigras, nudas, vertice convexas aut conoideo-convexas, leviter nitidas formantia.

Perithecium hemisphaericum aut conoideo-hemisphaericum, integrum, fuligineum, latere anguloso, haud producto. Nucleus latere obtuso angulosove. Paraphyses simplices. Asci cylindrici. Sporae 8 : nae, monostichae, fuscescentes, ellipsoideae, apicibus rotundatis, 3-septatae, loculis apicalibus mediano multo minoribus, long. 0,014—0,017, crass. 0,008—0,010 mm.

Nucleus albidus, oleosus. — Specimen orig. no. 1261 in herb. Nyl. habitu omnino simile est plantae nostrae. *P. laevigata* Pers., Ann. Wett. II (1810), p. 11, Arn., Lich. Fränk. Jur. (Fl. 1884), p. 269, Lich. Münch. (1891) p. 118 (*Verrucaria glabrata* Ach., Syn. Lich., 1814, p. 91, Nyl., Exp. Syn. Pyrenoc., 1858, p. 47, Garov., Tent. Lich. Longob. III, 1866, tab. VII fig. 3, Leight., Lich. Great Brit. 3. ed., 1879, p. 479, Hue, Lich. Exot., 1892, p. 291, Harmand, Cat. Lich. Lorrain., 1894, p. 477; *Pyrenula glabrata* Mass., Ric. Aut. Lich., 1852, p. 163, Hepp, Flecht. Eur. no. 227, Müll. Arg., Lich. Beitr., 1885, no. 898), perithecio basi tenuiore, thallo albo, magis evoluto et sporis paullo majoribus ab ea differt.

Ad corticem arboris prope cataractam meridiem versus a Statione navali in insula Koh Chang sitam (no. IV).

Area: In partibus tropicis Africae et Asiae obvia.

88. **P.** (subg. **Eupyrenula** sect. **Subglobosa**) **aspistea** Ach., Syn. Lich. (1814), p. 123 (emend.); Müll. Arg., Lich. Beitr. (Fl. 1885), no. 894. *Verrucaria* Ach., Meth. Lich. (1803), p. 121 (secund. specim. orig. in herb. Ach. et no. 1353 in herb. Nyl.); Nyl., Syn. Lich. Nov. Cal. (1868), p. 88, Lich. Nov. Zel. (1888), p. 131. *Pyrenula Bonplandiae* Fée, Ess. Crypt. Écorc. (1824), p. 74; Müll. Arg., Pyr. Féean. (1888), p. 31.

Thallus macula pallida indicatus. Apothecia substrato immersa, apice parvulo (circ. 0,2 mm. lato in hoc specimine) emergente, verruculam hemisphaericam, nigricantem aut cinereo-nigricantem, tenuissime thallodice obvelatam aut subnudam formante. Perithecium subglobosum aut depresso-subglobosum, integrum, fuligineum (circ. 0,280—0,350 mm. latum in hoc specimine), latere rotundato, haud producto. Nucleus depresso-subglobosus aut subglobosus. Sporae 8 : nae, monostichae, fuscescentes, ellipsoideae, apicibus rotundatis, 3-septatae, loculis sat aequalibus aut mediis paullo majoribus, long. 0,016—0,019, crass. 0,008—0,009 mm.

Nucleus haud oleosus. Paraphyses simplices. Sporae loculis lenticularibus. — In specimine orig. *V. aspisteae* Ach. e Guinea in herb. Ach. (cujus fragmentum sub no. 1353 in herb. Nyl.) verrucae externae apotheciorum 0,2 mm. latae et sporae ex annotatione Nylanderi long. 0,016—0,017, crass. 0,006—0,007 mm.

Ad corticem arboris prope Stationem navalem Lem Ngob (n. IX).

Area: In regionibus tropicis Americae, Oceaniae, Asiae, Africae provenit.

3. **Pseudopyrenula** (Müll. Arg.) Wain.

89. **Ps.** (subg. **Trypethelium**) **ochroleuca** (Eschw.) Wain., Étud. Lich. Brés. II (1890), p. 209.

Var. **subdissocians** Nyl. *Trypethelium ochroleucum* var. *subdissocians* Nyl., Fl. 1864, p. 618; Hue, Lich. Exot. (1892), p. 300.

Apothecia crebre approximata, at maxima parte simplicia, parce seriatim 2 vel plura connata. Pseudostromata nulla distincta.

Ad corticem arboris vigentis in capite septentrionali insulae Koh Kong (no. XI).

Area: *Ps. ochroleuca* in regionibus tropicis Americae, Oceaniae, Asiae, Africae crescit.

90. **Ps.** (subg. **Heterothelium** sect. **Homalothecium**) **endoxanthoides** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 180.

Thallus endophloeodes, albidus, laevigatus, leviter nitidus, linea hypothallina nigricante limitatus. Apothecia sat approximata, simplicia, elevata, verrucas circ. 0,3 (—0,25) mm. latas, hemisphaericas aut rarius conoideo-hemisphaericas, atras, nudas, parum nitidas formantia, vertice convexo aut minutissime subconoideo-umbonato. Perithecium depresso-subglobosum aut elevato-hemisphaericum, fuligineum, integrum, latere abrupto, haud attenuato-producto, basi tenui, fuliginea, applanata aut depresso-convexa. Nucleus depresso-subglobosus aut elevato-subhemisphaericus, latere rotundato aut obtuso, materiam luteam, KHO non reagentem continens. Paraphyses ramoso-connexae. Asci subcylindrici. Sporae 8 : nae, distichae, decolores, 3-septatae, loculis lenticularibus aut demum sphaeroideis, long. 0,018—0,022, crass. 0,006—0,008 mm.

Materia lutea in nucleo inclusa KHO haud violascens, at tantum diluta. Sporae oblongae, altero apice rotundato, altero apice vulgo paululum attenuato obtusoque, halone nullo indutae. — *Ps. endoxanthae* Wain., Lich. Antill. (Journ. of Bot. 1896), p. 32 (292), et *Ps. subgregariae* Müll. Arg., Pyrenoc. Cub. (1885), p. 408, Wain., Étud. Lich. Brés. II (1890), p. 213, subsimilis, at sporis minoribus et reactione nuclei ceterisque notis ab iis differens.

Ad corticem emortuum in silva prope cataractam in insula Koh Chang (no. XVI).

91. **Ps.** (subg. **Heterothelium** sect. 3. **Hemithecium**) **diluta** (Fée) Müll. Arg., Lich. Beitr. (Fl. 1883), no. 602, Pyrenoc. Cub. (1885), p. 408, Pyrenoc. Féean. (1888), p. 28. *Verrucaria* Fée, Ess. Crypt. Écorc. Suppl. (1837), p. 85; Nyl., Syn. Lich. Nov. Cal. (1868), p. 91; Hue, Lich. Exot. (1892), p. 294.

Var. **degenerans** Wain.

Thallus evanescens, albidus. Apothecia sat approximata, simplicia, elevata, verrucas circ. 0,35—0,25 mm. latas, hemisphaericas aut conoideo-hemisphaericas, atras, nudas, opacas aut parum nitidas formantia, vertice convexo aut conoideo-convexo. Perithecium hemisphaericum aut conoideo-hemisphaericum, fuligineum, dimidiatum, basi deficiens aut tenue, latere abrupto, haud attenuato-producto. Nucleus hemisphaericus, latere rotundato, basi vulgo plana, albidus. Paraphyses ramoso-connexae. Asci subcylindrici aut medio leviter incrassati, membrana tenui. Sporae 8 : nae, distichae, deco-

lores, 3-septatae, loculis lenticularibus, long. circ. 0,020, crass. circ. 0,006 mm.

Ab hac *Ps. Bengoana* Wain., Catal. Welw. Afr. Pl. II, Part II (1901), p. 457, apotheciis minoribus differt, et *Ps. illota* (Nyl.) Wain. (*Verrucaria illota* Nyl., Fl. 1876, p. 364, „*V. diluta*" in Nyl., Lich. Antill., 1869, p. 24) secund. specim. orig. no. 418 in herb. Nyl. apotheciis majoribus, 0,5—0,7 mm. latis et perithecio subgloboso vel leviter depresso, integro, basi tenuiore distinguitur.

Secundum annotationem Nylanderi in herb. suo pycnoconidia in *Ps. diluta* (Wright, Pyr. Cub., no. 133, no. 1031 in herb. Nyl.) cylindrica, long. 0,004, crass. 0,0005 mm. In specimine no. 1029 (e Nova Granata) pycnoconidia long. 0,0045 mm. observante Nyl.

Area: *Ps. diluta* in regionibus tropicis Americae, Oceaniae et Asiae crescit.

4. **Thelenella** (Nyl.) Wain.

92. **Th.** (subg. **Euthelenella** sect. **Microglaena**) **interrupta** Wain., Lich. Nov. Rar. IV (Hedwigia 1907), p. 180.

Thallus crassitudine mediocris, stramineo-glaucescens, sat laevigatus aut verrucoso-inaequalis, leviter aut parum nitidus. Apothecia sparsa, simplicia, verrucas formantia 1,5—0,7 mm. latas, mammaeformes, basi vulgo abruptas, haud constrictas, latere strato thallino thallo concolore obductas, vertice albido-pallescente, decorticato, opaco inaequalique, ostiolo nigricante, 0,2 mm. lato, rarius paululum elevato. Perithecium subglobosum, fuligineum, sat tenue. Nucleus albidus, gonidia hymenialia non continens, jodo non reagens. Paraphyses parce evolutae, ramoso-connexae. Sporae 8:nae, distichae, decolores, murales, cellulis numerosissimis, oblongae, apicibus rotundatis aut obtusis, jodo non reagentes.

Thallus epiphloeodes et partim endophloeodes, maculis difformibus, tenuioribus, albido-pallescentibus, hypothallinis, pycnoconidangia fusconigra, hemisphaerica, minutissima, imperfecte evoluta, continentibus interruptus, gonidiis chroolepoideis, concatenatis, circ. 0,008 mm. crassis. Nucleus guttulas oleosas continens. Asci subclavati, membrana sat tenui, long. 0,300, crass. 0,065 mm. Sporae halone nullo indutae, jodo fulvescentes, juveniles pluriseptatae loculisque anguloso-lenticularibus, long. 0,130—0,140 mm., crass. 0,030—0,036 mm. Thallus KHO leviter fulvescens. Apothecia vertice decorticato pallescenteque, KHO intense fulvescente. — Affinis *Th. fulvae* Wain., Cat. Welw. Afr. Pl. II, Part II (1901), p. 451, et habitu ei subsimilis, at praesertim colore thalli et verrucarum ab ea differens.

Ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (no. XVII).

5. **Microthelia** (Koerb.) Wain.

93. **M. Asiatica** Wain., l. c.

Thallus tenuissimus, hypophloeodes, evanescens, macula subalbida indicatus. Apothecia sparsa, simplicia, verrucas 0,4—0,5 (—0,3) mm. latas, depresso- aut conoideo-hemisphaericas, nigras, nudas, vertice con-

vexas aut conoideo-convexas formantia. Perithecium fuligineum, dimidiatum. Paraphyses ramoso-connexae. Asci subcylindrici. Sporae 8 : nae, distichae aut subdistichae, demum obscuratae aut pro parte decolores, ovoideae, 1-septatae, septo fere in medio sporae aut cellula crassiore etiam paullo longiore, halone nullo indutae, long. 0,014—0,015, crass. 0,005—0,006 mm.

Apothecia opaca. Perithecium lateribus acutis, at non attenuato-productis, basi deficiens, at columella centrali fuscescente instructum. Nucleus albidus, lateribus acutis, guttulas oleosas haud continens. Paraphyses tenues. Asci long. circ. 0,070, crass. 0,010 mm., apice membrana incrassata. Sporae medio leviter constrictae, altero apice rotundato, altero obtuso. Thallus in hoc specimine evanescens, forsan gonidiis chroolepoideis instructus, at talia non satis distincte observavi.

Ad corticem arboris prope cataractam meridiem versus a Statione navali Lem Dan in insula Koh Chang sitam (no. IV).

Didymella Sacc.

Genus ad fungos pertinens.

D. cinchonae (Ach.) Wain., Étud. Lich. Brés. II (1890), p. 233, Lich. Antill. (Journ. of Bot. 1896), p. 36, Cat. Welw. Afr. Pl. II, Part II (1901), p. 462. *Verrucaria* Ach., Syn. Lich. (1814), p. 90; Nyl., Lich. Nov.-Gran. ed. 2 (1863), p. 122; Hue, Lich. Exot. (1892), p. 296. *Arthopyrenia* Müll. Arg., Lich. Beitr. (Fl. 1883), no. 615, Pyrenoc. Cub. (1885), p. 404, Pyrenoc. Féean. (1888), p. 26. *Verrucaria prostans* Mont., Cent. Pl. (Ann. Sc. Nat., 2 sér., Bot. XIX, 1843), p. 53, no. 81, Syll. Cr. (1856), p. 365; Nyl., Exp. Syn. Pyrenoc. (1858), p. 57.

Thallus hypophloeodes, macula pallida aut partim subalbida indicatus, linea nigricante hypothallina limitatus, gonidiis carens. Apothecia sparsa, rarissime parce confluentia, maculas rotundatas, nigras, 1—0,5 mm. latas, medio in verrucam hemisphaericam aut conoideam elevatas, formantia. Perithecium fuligineum, dimidiatum, latere attenuato-producto aut acutato. Nucleus depresso-hemisphaericus, albidus. Paraphyses ramoso-connexae. Asci subcylindrici. Sporae 8 : nae, distichae aut subdistichae, decolores, ovoideo-oblongae aut oblongae, apicibus obtusis aut rotundatis, 1-septatae, septo fere in medio, long. 0,014—0,027, crass. 0,006—0,008 mm.

Apothecia nigra, strato tenuissimo substrati, tantum sub microscopio viso, obducta. Perithecium fuligineum, basi deficiens patensque, at in centro columella rudimentaria verrucaeformi instructum. Paraphyses sat numerosae. Asci long. circ. 0,090 mm., crass. circ. 0,012—0,014 mm. Sporae membrana modice incrassata, halone tenui interdum indutae, medio haud aut parum constrictae.

Ad corticem *Carapae obovatae* in insula Koh Saket (no. XXXVIII).

Area: In regionibus tropicis Americae, Oceaniae, Asiae et Africae crescit.

Lichenes imperfecti.

1. Dictyonema Ag.

94. **D. sericeum** (Sw.) Hariot, Bull. Soc. Myc. de France VII (1891), p. 41 (Bot. Centralbl. 1892, Beibl., p. 19).

Supra *Parmeliam latissimam* Fée in trunco *Rhizophorae* ad flumen Klong Prao in insula Koh Chang in statu juvenili parce fortuito lectum. Ad var. *laxam* (Müll. Arg.) Hariot, l. c. (*Dictyonema laxum* Müll. Arg., Exp. Gazell., 1883, p. 57; *Laudatea caespitosa* Johow, Hymenolich., 1884, p. 386), forsan pertinet.

Area: *D. sericeum* in regionibus tropicis Americae, Oceaniae, Asiae et Africae crescit.

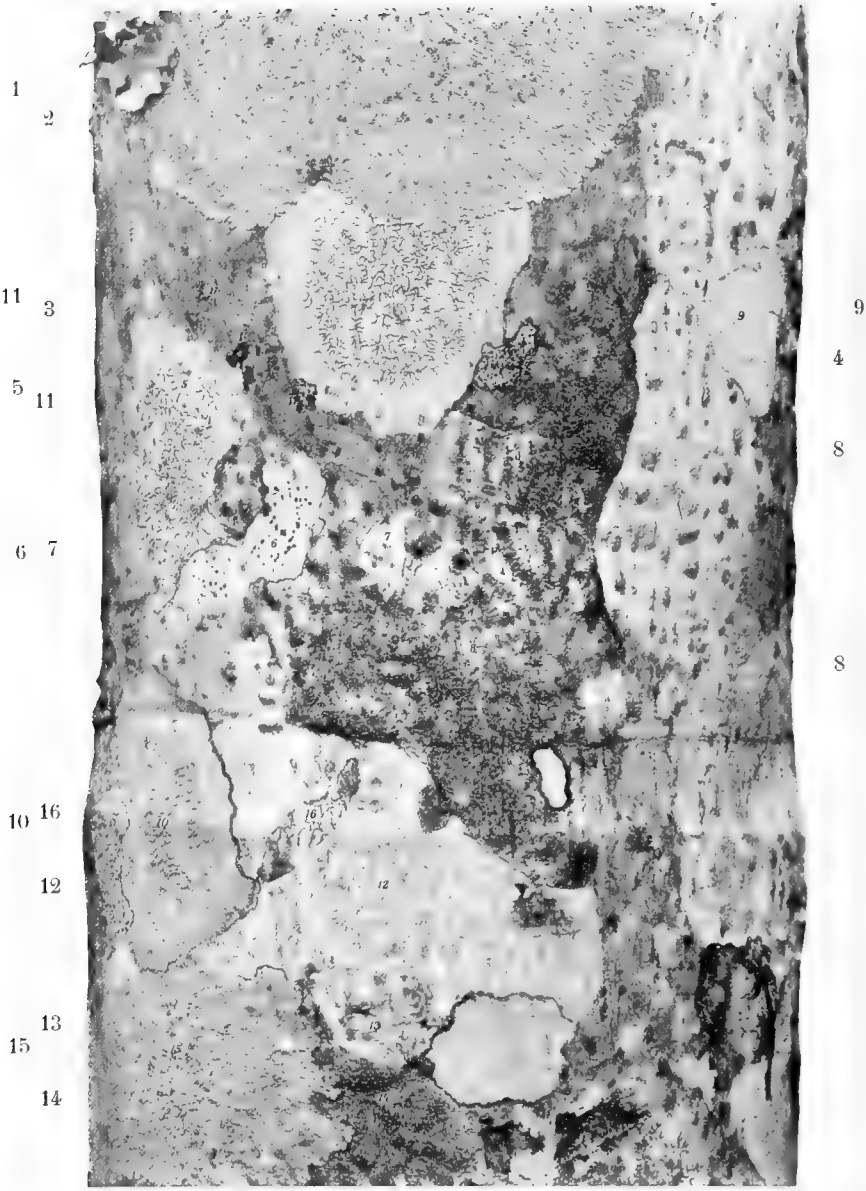
2. Lepraria Ach.

95. **L. xanthina** Wain., Catal. Welw. Afr. Pl. II, Part II (1901), p. 463.

Una cum *Arthonia ochrode* Nyl. ad corticem *Arecae catechu* prope Stationem navalem in insula Koh Chang (n. X).

Area: In regionibus tropicis Americae, Africae et Asiae lecta est.

25—12—1908.



Stem of *Areca catechu* Linné covered by Lichens. Abt. 3/4 nat. size. Reprod. of a photo by Johs. Schmidt, taken at Lem Dan, Koh Chang, Febr. 1900.

1. Parmelia Claudelii (Harm.) Wain. — 2. Physcia picta (Sw.) Nyl. — 3. Graphis sauroidea Leight. — 4. Buellia subdives Wain. — 5. Graphis consimilis Wain., male evoluta, sine sporis. — 6. Arthonia complanata Fée. — 7. Graphis sericea (Eschw.) Wain. — 8. Graphis heterocarpoides Nyl. — 9. Graphis concolor Nyl. — 10. Pertusaria pustulata (Ach.) Nyl. — 11. Physcia (nimis juvenilis), forsan Ph. picta (Sw.) Nyl. — 12. Graphis concolor Nyl. — 13. Graphis chlorocarpoides Nyl. — 14. Graphis heterocarpoides Nyl. — 15. Physcia picta (Sw.) Nyl. — 16. Graphis (male evoluta).

CONTENT OF PRECEDING PARTS.

Flora of Koh Chang.

Contributions to the knowledge of the vegetation in the Gulf of Siam.

By

Johs. Schmidt.

Copenhagen · 1900—1916.

Part	I	reprinted	from »Botanisk	Tidsskrift«,	vol. 24, November 1900.
-	II	—	—	—	24, January 1901.
-	III	—	- —	—	24, April 1901.
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	V	—	—	—	24, January 1902.
	VI	—	—	—	24, June 1902.
	VII	—	—	—	- 25, August 1902.
	VIII	—	—	—	26, June 1904.
	IX	—	—	—	29, January 1909.
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Contributions to the knowledge of the vegetation in the Gulf of Siam.

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Part X. (Conclusion.)

(Arranged by **Carl Christensen**)

(**C. B. Clarke:** Ochnaceae. — **E. Gilg:** Loganiaceae. — **F. Pax:** Euphorbiaceae. — **L. Radlkofer:** Sapindaceae. — **R. Schlechter:** Asclepiadaceae. — **C. H. Ostenfeld:** Various families. — **O. Warburg:** Various families. — **W. G. Craib:** Various families. — Various families determined by different botanists. — **Carl Christensen:** Filices. — Additamenta to the earlier parts. — **Johs. Schmidt:** Concluding remarks. — Index to genera and new species).

Having received from the botanists who determined the rest of his Siamese collections, the mere names only of the determined specimens, together with descriptions of the new species, Dr. Johs. Schmidt asked me to arrange this last part of the "Flora of Koh Chang" in order to bring it into accordance with the scheme followed in the earlier parts. I have quoted J. Hooker: Flora of British India throughout, receding from that standard work in nomenclature and delimitation of species only in such cases where the botanist who had determined the species has had a different view.

Since the first parts of "Flora of Koh Chang" were issued (1900—4) not a few important contributions to the Siamese flora have been published; a list of these is to be found in Craib: Contributions to the Flora of Siam, Aberdeen University Studies no. 57, 1912,

which paper is a reprint (with additions) of papers published by the author in Kew Bulletin 1911 pp. 7—60 and 385—474, while the second part, containing the Monocotyledones, is published in Kew Bull. 1912, pp. 397—435. In these papers the majority of the species found by Dr. Schmidt are listed with references to newer works relating to the flora of Siam and Indo-China, and I have, therefore, found it unnecessary to repeat these references, but have confined myself to quote Craib: Contr. Fl. Siam.

Carl Christensen.

Ochnaceae.

Determined by **C. B. Clarke**, Kew.

Ochna Linné.

1. **O. Wallichii** Planch. in Hook. Lond. Journ. Bot. V. 650; Bennett in Hook. Fl. Br. Ind. I. 524; Craib, Contr. Fl. Siam 34.
Koh Chang, on rocks near the sea (no. 627 b); Koh Saket in the littoral zone (no. 335); Koh Chang Noi (no. 698 g).

Area: Burma and Siam.

2. **O. sp.** perhaps **O. parviflora** Griff. Notul. IV. 464.
Klong Majum on rocks in the jungle.

Gomphia Schreb.

3. **G. angustifolia** Vahl, Symb. II. 49; Bennett in Hook. Fl. Br. Ind. I. 525.
Klong Majum (no. 600 and 603); Nipple (no. 667 a).

Area: South India, Ceylon, Singapore, Philippines.

4. **G. Hookeri** Planch. in Hook. Lond. Journ. Bot. VI. 3; Bennett in Hook. Fl. Br. Ind. I. 525.
Klong Son, in the jungle (no. 665); Klong Majum, river-bank (no. 614).

Area: Penang, Malacca.

Loganiaceae.

Determined by **E. Gilg** — Berlin.

Fagraea Thunbg.

1. **F. auriculata** Jack. Clarke in Hook. Fl. Br. Ind. IV. 83.
Rocky shore at the north end of Koh Kong (no. 354).

Area: Burma to Singapore, Malaya.

2. **F. obovata** Wall. Clarke in Hook. Fl. Br. Ind. IV. 83.
Klong Majum, on rocks in jungle (no. 607 d).

Area: India, Malay Peninsula and Archipelago.

Strychnos L.

3. **S. Schmidtii** Gilg, nov. spec. — Frutex scandens cirrhosus, cirrhis superne valde incrassatis atque involutis, caule ramisque glaberrimis obsolete tetragonis, fuscis. Folia 4—5 mm., longe petiolata, ovata vel ovali-ovata usque ovalia, apice manifeste vel longiuscule latiuscule acutissime acuminata, basi subrotundata vel rarius latissime subcuneata, subchartacea vel chartacea, glaberrima, utrinque nitidula, laevia, supra nigrescentia, subtus fuscescentia, 5—7 cm. longa, 2,5—3,5 cm. lata, nervis 3 vel si mavis 5, sed jugo infimo fere marginali tenuissimo vix conspicuo, jugo superiore valido, sed costa manifeste tenuiore, a basi abeunte et fere usque ad apicem margini stricte subparallelo, costa nervisque supra parce, subtus alte prominentibus, venis paucis laxissime reticulatis supra inconspicuis, subtus parce prominentibus. Flores parvi in cymas axillares pluries dichotomas multifloras densifloras subcapitatas vel pseudoumbelliformes usque ad 1,5 cm. longas dispositi, pedunculo 6—7 mm. longo, pedicellis fere nullis, bracteis bracteolisque ovatis vel ovato-oblongis, acutis, sessilibus usque ad 1 mm. longis, glabris vel hinc inde parcissime brevissime pilosis; sepalis 5 subliberis ovatis vel late ovatis, c. 1 mm. longis, fere idem latis, apice acutiusculis, margine ciliolatis; corollae c. 3 mm. altae, tubus cylindraceus, c. 2 mm. longus, fere idem crassus, lobis 5 ovatis acutis c. 1 mm. longis, fere idem latis, superne valde incrassatis, basi intus corona pilorum elongata densa ornatis; antherae parvae in parte superiore tubi insertae, sessiles; ovarium globosum, stylo brevi crasse filiformi.

Rocks in jungle at Klong Prao (no. 703).

Ich kenne keine Art von *Strychnos,* die mit dieser sehr charakteristische Art als verwandt zu bezeichnen wäre.

4. **S. myrioneura** Gilg, nov. sp. — Frutex scandens cirrhosus, cirrhis superne valde incrassatis atque involutis, caule ramisque obsolete tetragonis glaberrimis, fusco-flavescentibus. Folia 3—4 mm. longe petiolata, oblonga vel saepius ovato-oblonga vel obovato-oblonga, apice breviter late acuminata, apice ipso rotundata, basin versus sensim late vel latissime cuneata vel saepius subrotundata, chartacea vel subcoriacea, glaberrima, utrinque

nitidula, laevia, fuscescentia, 5—8 cm. longa, 3—4 cm. lata, nervis 3 vel si mavis 5, sed jugo infimo fere marginali tenuissimo, jugo superiore valido, sed costa manifeste tenuiore, 2—3 mm. supra laminae basin abeunte et fere usque ad apicem margini stricte subparallelo (superne margini sensim approximato), costa nervisque supra parce, subtus alte prominentibus, venis numerosissimis angustissime reticulatis utrinque subaequaliter alte prominentibus. Flores .... Fructus globosi, 1,6—2,7 cm. diam., nigrescentes, laeves, pericarpio tenui crustaceo, seminibus paucis (3—4) planis (c. 1 mm. altis), 1,2—1,4 cm. diam., griseis.

Lem Dan (no. 411).

Diese neue Art ist mit *Strychnos laurina* Wall. verwandt.

Euphorbiaceae.

Determined by **F. Pax**, Breslau.

Galeria Zoll. & Moritz.

1. **G. affinis** (R. Br.) Miq. Fl. Ind. Bat. I. II. 430; Hook. Fl. Br. Ind. V. 379.
Jungle at Klong Son (no. 644).

Area: Malacca, Singapore, Siam, Malaya.

Chaetocarpus Thwait.

2. **C. castanocarpus** Thwait.; Hook. Fl. Br. Ind. V. 460; Craib, Contr. Fl. Siam 184.
Jungle near Klong Munsé (no. 440) and near Lem Dan (no. 594 and 834).

Area: Assam, Burma, Indo-China, Malay Peninsula, Ceylon.

Macaranga Thouars.

3. **M. denticulata** (Bl.) Müll. Arg.; Hook. Fl. Br. Ind. V. 446; Craib, Contr. Fl. Siam 194.
Plains at Lem Dan (no. 423 a).

Area: Himalaya, Indo-China, Malaya.

4. **M.** sp. an **M. minutiflora** Müll. Arg.; Hook. Fl. Br. Ind. V. 450?
Plains at Lem Dan (no. 473).

Area of *M. minutiflora:* Burma.

Cleistanthus Hook. f.

5. **C.** sp.?
Edge of jungle on river-bank (no. 795).

Sapindaceae.

Determined by **L. Radlkofer**, Munich.

Cardiospermum Linné.

1. **C. Halicacabum** L. sp. ed. I. 366; Hiern in Hook. Fl. Br. Ind. I. 670; Craib, Contr. Fl. Siam 44. — var. *microspermum.*
Klong Sarlakpet (no. 739 a).

Area: Most tropical and subtropical regions.

Erioglossum Blume.

E. rubiginosum Bl.; Craib, Contr. Fl. Siam 46. *E. edule* Bl.; Hiern in Hook. Fl. Br. Ind. I. 672.
Lem Ngob (no. 6); Koh Chang: Klong Munsé (no. 104), Klong Majum (no. 789).

Area: India, Indo-China to N. Australia.

Guioa Cav.

3. **G. pleuropteris** (Bl.) Radlk. Sitzber. math.-phys. Classe Akad. München 1879: 611; *Cupania pleuropteris* Bl.; Hiern in Hook. Fl. Br. Ind. I. 677.
Rocks on sea-shore (no. 627 c).
— forma **apiculata** (Hiern); *Cupania pleuropteris* var. *β. apiculata* Hiern in Hook. Fl. Br. Ind. I. 677.
Klong Munsé, river-bank (no. 244).

Area: Malayan Peninsula, Borneo, Sumatra.

Mischocarpus Blume.

4. **M. sundaicus** Bl. Bijdr. 238; *Cupania Lessertiana* Camb.; Hiern in Hook. Fl. Br. Ind. I. 678.
Klong Prao, river-bank (no. 711).

Area: Burma to Malay Archipelago.

Litchi Sonn.

5. **L. chinensis** Sonn. Voy. Ind. III. 255; *Nephelium Lit-chi* Camb.; Hiern in Hook. Fl. Br. Ind. I. 687.
Plains near Lem Dan, cultivated (no. 117).

Area: S. China, widely cultivated in India.

Nephelium Linné.

6. **N. hypoleucum** Kurz, Journ. As. Soc. Beng. 1871, II. 50; *N. Longana.* Hiern in Hook. Fl. Br. Ind. I. 680.

Lem Dan (no. 507).

Area:

Harpullia Roxb.

7. **H. cupanioides** Roxb. Hort. Beng. 86; Hiern in Hook. Fl. Br. Ind. I. 692; Craib, Contr. Fl. Siam 46.

Koh Kahdat, in the jungle (no. 571).

Area: Indo-China.

Asclepiadaceae.

Determined by **R. Schlechter**, Berlin.

Dischidia R. Br.

1. **D. benghalensis** Coleb.; Hook. Fl. Br. Ind. IV. 50.
Koh Saket, epiphytic in the littoral zone (no. 332).

Area: Himalayas southwards to Malacca, Java, Borneo.

Finlaysonia Wall.

2. **F. obovata** Wall.; Hook. Fl. Br. Ind. IV. 7.
Klung, in the interior of the mangrove (no. 370).

Area: From the Sunderbunds to Malacca.

Gymnanthera R. Br.

3. **G. paludosa** (Bl.) K. Schum. Engl. u. Prantl, Nat-Pflanzenfam. IV. 2. 213; *Dicerolepsis paludosa* Bl. Mus. Bot. Lugd. Bat. I. 146.
Sea-shore at Klong Son (no. 660).

Area: Java.

Toxocarpus Wight et Arn.

4. **T. siamensis** Schltr. in Fedde: Repert. **3**: 307, 1907.

Volubilis, alte scandens; ramis flexuosis elongatis, juvenilibus pilis brevibus rubiginosis reversis strigillosis, demum glabratis, teretibus, distanter foliatis; foliis patulis, anguste oblongo-ellipticis acuminatis, subtus reticulato-nervosis, textura subcoriaceis, juvenilibus subtus rubiginoso-puberulis, demum glabratis, superne glabratis, 10—13 cm. longis, medio fere 4—5,5 cm. latis; inflorescentiis extraaxillaribus laxe cymosis, foliis fere aequilongis, ramulis saepius divaricatis; pedicellis filiformibus 0,5—0,7 cm. longis, tenuiter rubiginoso-strigillosis; calycis segmentis ovatis obtusis, ciliatis, basi tenuiter rubiginoso-strigillosis, 0,2 cm. longis; corolla alte 5-fida 0,5—0,6 cm. longa, lobis tubo duplo longioribus e basi lanceolata lineari-elongatis obtusis, intus fauce puberulis; coronae foliolis carnosulis lanceolatis obtusiusculis, antheris paulo brevioribus: stigmatis capite fusiformi-cylindrico obtuso antheras duplo excedente glabro, corollae tubum haud excedente.

Klong Sarlakpet (no. 725).

Infolge ihrer schlanken Infloreszenzen muss diese Art neben *T. gracilis* Dcne. von den Philippinen untergebracht werden. Sie ist infolge der kleineren Blüten und längeren Infloreszenzen unschwer zu erkennen.

Tylophora R. Br.

5. **T. asthmatica** (Willd.) Wight et Arn.; Hook. Fl. Br. Ind. IV. 45; Craib, Contr. Fl. Siam 133.

Koh Kahdat, littoral zone (no. 570).

Area: India, Burma, Malay Archipelago.

6. **T. Schmidtii** Schltr. in Fedde: Repert. sp. nov. **3**: 315, 1907.

Gracillima, flexuosa, alte scandens; ramis filiformibus, teretibus glabris, laxe foliatis; foliis patentibus patulisve, oblongo-lanceolatis acuminatis, nervo medio marginibusque tenuissime ciliatis, caeterum glabris, 2—3 cm. longis, medio fere 0,8—1 cm. latis, petiolo semitereti minute puberulo, c. 0,5 cm. longo; cymis gracillimis perlaxis, ramosis, folia multo excedentibus, ramis divaricatis; floribus illis *T. tenuis* Bl. fere aequimagnis, ut videtur violaceis; pedicellis filiformibus, c. 2 cm. longis, glabris; calycis segmentis lanceolatis acutis, 0,1 cm. longis, pilis sparsis ornatis; corollae rotatae alte 5-fidae lobis oblongis obtusis, 0,2 cm. longis, medio vix 0,1 cm. latis; coronae foliolis abbreviatis, gynostegio duplo brevioribus, carnosulis, triangulis obtusis; antheris subquadratis, appendice hyalino rotundato obtusissimo, in stigmatis caput impresso; polliniis minutissimis oblongis utrinque obtusis, translatoribus brevibus, retinaculo rotundato-oblongo polliniis bene majore; stigmatis capite depresso.

Klong Sarlakpet, scandent at river-bank (no. 727).

Eine sehr zierliche Art, welche an *Tylophora tenuis* Bl. erinnert. Sie ist gekennzeichnet durch die breiten einander sich fest berührenden, kurzen Coronaschuppen und die im Verhältnis zu den Pollinien auffallend groszen Klemmkörper.

Hoya R. Br.

7. **H. parasitica** (Roxb.) Wall.; Hook. Fl. Br. Ind. IV. 57; Craib, Contr. Fl. Siam 134.

Lem Dan, mangrove, on *Bruguiera* (no. 138).

Area: India, Burma, Malay Peninsula.

8. **H.** sp.

A specimen (no. 168) was collected in the littoral jungle N. of Lem Dan, growing epiphytically on *Heptapleurum venulosum* (W. et A.) Seem.; another on rocks at Klong Majum (no. 607 b).

Various families.

Determined by **C. H. Ostenfeld**, Copenhagen.

Liliaceae.

Peliosanthes Andr.

1. **P. violacea** Wall.; Hook. Fl. Br. Ind. VI. 266.
On rocks at Klong Majum (no. 607).

Area: Eastern Himalaya, Burma.

Dracaena L.

2.? **D. Helferiana** Wall.; Hook. Fl. Br. Ind. VI. 330.
Lem Dan (no. 202).

Area: Burma.

Cordyline Commers.

3. **C. terminalis** Kunth, var. **ferrea** (L.) Bak.; Hook. Fl. Br. Ind. VI. 331.
Lem Dan (no. 317).

Area: India to Malacca and eastwards to Polynesia.

Gloriosa L.

4. **G. superba** L.; Hook. Fl. Br. Ind. VI. 358.
Lem Ngob, in the jungle (no. 52).

Area: India to Ceylon and Malacca, Indo-China, tropical Africa.

Araliaceae.

Heptapleurum Gaertn.

H. venulosum (W. et A.) Seem.; Clarke in Hook. Fl. Br. Ind. II. 729.
Jungle in the littoral zone, Lem Dan (no. 77 and 165), Koh Saket (no. 343), Koh Kahdat (no. 814).

Area: Subtropical and tropical Asia to tropical Australia.

Basellaceae.

Basella L.

B. alba L.; *B. rubra* L.; Hook. Fl. Br. Ind. V. 20.
Klong Sarlakpet (no. 739 bis).

Area: Tropical Asia and Africa.

Amarantaceae.

Achyranthes L.

A. aspera L.
Lem Ngob (no. 39); a weed.

Area: Tropics.

Piperaceae.

Piper L.

1. **P. nigrum** L.; Hook. Fl. Br. Ind. V. 90.
Cultivated at Lem Dan (no. 216).

Area: A native of India, widely cultivated in the tropics.

2. **P.** sp.
Without locality (no. 868).

Peperomia L.

3. **P. pellucida** (L.) Kunth.
Lem Dan (no. 483).

Area: Tropical America and Africa. No doubt introduced in Siam.

Casuarinaceae.

Casuarina Forst.

C. equisetifolia Forst.; Hook. Fl. Br. Ind. V. 598.
Sandy sea-shore at Klong Prao (no. 892) and Koh Kahdat (no. 322).

Area: India, Malaya, Australia, Polynesia.

Various families.

Determined by **O. Warburg**, Berlin.

Capparidaceae.

Pedicellaria Schrank.

1. **P.** (Gynandropsis) **pentaphylla** (D. C.) Schrank; *Gynandropsis pentaphylla* D. C. Prodr. I. 238; Hook. Fl. Br. Ind. I. 171; Craib, Contr. Fl. Siam II.
Klong Sarlakpet (no. 869).

Area: Common in Tropics.

Crataeva Linné.

2. **C. Roxburghii** R. Br.; *C. religiosa* var. 2. *Roxburghii* Hook. Fl. Br. Ind. I. 172.
Jungle near Lem Dan (no. 593).

Area: India.

Capparis Linné.

3. **C. micracantha** D. C.; Hook. Fl. Br. Ind. I. 179; Craib, Contr. Fl. Siam 12.
Koh Saket (no. 339).

Area: Burma, Cambodia, Malaya, Philippines.

4. **C. sepiaria** L.; Hook. Fl. Br. Ind. I. 177; Craib, Contr. Fl. Siam 12.
Koh Lam, sandy sea-shore (no. 871).

Area: India, Malaya. Philippines.

Aizoaceae.

Sesuvium Linné.

1. **S. portulacastrum** L.; Clarke in Hook. Fl. Br. Ind. II. 659.
Sandy sea-shore at Klung opposite Koh Chick (no. 380).

Area: Tropical and subtropical sea-shores.

Mollugo Linné.

2. **M. stricta** L.; Clarke in Hook. Fl. Br. Ind. II. 663.
Edge of jungle near Lem Dan (no. 285).

Area: Japan, China, India to Malacca, Fiji.

Portulacaceae.

Portulaca L.

P. oleracea L.; Dyer in Hook. Fl. Br. Ind. I. 246; Craib, Contr. Fl. Siam 15.
Lem Dan (no. 22 and 817).

Area: All warm countries.

Malvaceae.

Sida Linné.

1. **S. acuta** Burm.; Craib, Contr. Fl. Siam 20; *S. carpinifolia* L.; Masters in Hook. Fl. Br. Ind. I. 323.
Lem Ngob, edge of jungle (no. 32).

Area: S. E. Asia.

2. **S. rhombifolia** L.; Masters in Hook. Fl. Br. Ind. I. 323.
Plains near Lem Dan (no. 203).

Area: Tropics of both hemispheres.

Abutilon Gaertn.

3. **A. indicus** Don, Gen. Syst. I. 504; Masters in Hook. Fl. Br. Ind. I. 326; Craib, Contr. Fl. Siam 21.
Plains near Lem Dan (no. 304). Lem Ngob, edge of jungle (no. 49).

Area: Tropics.

Urena Linné.

4. **U. lobata** L.; Masters in Hook. Fl. Br. Ind. I. 329.
Plains near Lem Dan (no. 156).

Area: Tropics.

Hibiscus Medik.

5. **H. surattensis** L.; Masters in Hook. Fl. Br. Ind. I. 334; Craib, Contr. Fl. Siam 23.
Mainland opposite Koh Kong, on sandy soil (no. 358).

Area: Tropics of Asia, Australia and Africa.

6. **H. rosa sinensis** L.; Masters in Hook. Fl. Br. Ind. I. 344; Craib, Contr. Fl. Siam 22.
Rather commonly cultivated, Lem Dan (no. 310).

Area: Tropics, often cultivated.

7. **H. tiliaceus** L.; Masters in Hook. Fl. Br. Ind. I. 343.
Lem Dan, at sea-shore (no. 114), "ton baa" of the Siamese.

Area: Tropics of both hemispheres.

Abelmoschus Moench.

8. **A. moschatus** Moench; Wight, Ic. t. 399; *Hibiscus Abelmoschus* L.; Masters in Hook. Fl. Br. Ind. I. 342; Craib, Contr. Fl. Siam 22.
Lem Ngob, edge of jungle (no. 31).

Area: India, Cultivated in most tropical countries.

Thespesia Corr.

9. **T. populnea** Corr. Ann. Mus. IX. 290; Masters in Hook. Fl. Br. Ind. I. 345; Craib, Contr. Fl. Siam 23.
Koh Chang, littoral jungle near Lem Dan (no. 181); Koh Kahdat, sandy sea-shore (no. 552 f).

Area: Tropical Africa, Asia and Polynesia.

Gossypium Linné.

10. **G. barbadense** L.; Masters in Hook. Fl. Br. Ind. I. 347.
Plains near Lem Dan (no. 112).

Area: Cultivated in tropics and subtropics.

Bombaceae.

Ceiba Medic.

C. pentandra (L.) Gaertn.; *Eriodendron anfractuosum* DC.; Masters in Hook. Fl. Br. Ind. I. 350.
Lem Dan (no. 113 and 886), generally cultivated, "ton noon" of the Siamese.

Area: Trop. America, Asia and Africa (?).

Sterculiaceae.

Helicteres Linné.

1. **H. spicata** Colebr.; Masters in Hook. Fl. Br. Ind. I. 366.
Klong Majum (no. 91).

Area: From Sikkim to Penang, Malaya.

Pentapetes Linné.

2. **P. phoenicea** L.; Masters in Hook. Fl. Br. Ind. I. 371.
In the mangrove near Lem Dan (no. 739 b).

Area: India.

Oxalidaceae.

Averrhoa L.

A. carambola L.; Hook. Fl. Br. Ind. I. 439.
Plains at Lem Dan (no. 407).

Area: India, a garden-plant. Native country unknown.

Rutaceae.

Glycosmis Correa.

1. **G. cochinchinensis** (Lour.) Pierre, Fl. Indo-Chine I. 653; Craib, Contr. Fl. Siam 32. *G. pentaphylla* Correa; Hook. Fl. Br. Ind. I. 499.
In the jungle, Klong Majum (no. 601), Klong Munsé (no. 468); Koh Kahdat (no. 872).

Area: India, Malaya, Australia.

2. **G. sapindoides** Lindl.; Hook. Fl. Br. Ind. I. 501.
Klung (mainland opposite Koh Chik) (no. 377); Koh Kahdat, sandy sea-shore (no. 547).

Area: Penang, Java.

Clausena Burm.

3. **C. excavata** Burm. Fl. Ind. 87; Hook. Fl. Br. Ind. I. 504; Craib. Contr. Fl. Siam 33.
Jungle near Lem Dan (no. 694).

Area: From E. Himalaya and Yunnan to Malaya and Philippines.

Citrus Linn.

4. **C. medica** L.; Hook. Fl. Br. Ind. I. 514.
Lem Dan (no. 508).

Area: India.

5. **C. hystrix** DC. Prodr. I. 539; Hook. Fl. Br. Ind. I. 515.
Islet N. of Koh Kahdat (no. 582 a).

Area: Khasia Mts.

Aegle Correa (det. C. H. Ostenfeld).

6. **A. marmelos** (L.) Correa; Hook. Fl. Br. Ind. I. 516; Craib, Contr. Fl. Siam 33.
Without locality.

Area: India, Assam, Java.

Rhamnaceae.

Zizyphus Juss.

1. **Z. oenoplia** (L.) Mill.; Lawson in Hook. Fl. Br. Ind. I. 634; Craib, Contr. Fl. Siam 40.
Lem Ngob, edge of jungle (no. 10); plains at Lem Dan (no. .

Area: Tropical Asia and Australia.

An indeterminable species of *Zizyphus* was growing in the jungle at Lem Dan (no. 533), a very tall tree.

Colubrina Rich.

2. **C. asiatica** (Lam.) Brongn.; Lawson in Hook. Fl. Br. Ind. I. 642; Craib, Contr. Fl. Siam 40.

Koh Kahdat in the littoral jungle (no. 805) and on sandy sea-shore (no. 549 and 560a).

Area: Tropical Asia, Australia and Africa.

Onagraceae.

Jussiaea L.

J. suffruticosa L.; Clarke in Hook. Fl. Br. Ind. II. 587; Craib, Contr. Fl. Siam 91.

Rice-field north of Lem Dan (no. 238).

Area: Tropics.

Caricaceae.

Carica Linn.

C. papaya L.; Craib, Contr. Fl. Siam 93.

Lem Dan, cultivated (no. 265).

Area: Cultivated throughout India.

Goodeniaceae.

Scaevola L.

S. Koenigii Vahl; Clarke in Hook. Fl. Br. Ind. III. 421.

Rocky sea-shore at Koh Kong (no. 352); Cape Liant (no. 832).

Area: Tropical E. Asia, Australia, Polynesia.

Plumbaginaceae.

Plumbago L.

P. zeylanica L.; Clarke in Hook. Fl. Br. Ind. III. 480; Craib, Contr. Fl. Siam 122.

Plains at Lem Dan (no. 415).

Area: Tropics.

Pedaliaceae.

Sesamum L.

S. indicum DC.; Clarke in Hook. Fl. Br. Ind. IV. 387; Craib, Contr. Fl. Siam 151.

Klong Sarlakpet (no. 734), a weed.

Area: Tropics, often cultivated.

Flagellariaceae.

Flagellaria L.

F. indica L.; Hook. Fl. Br. Ind. VI. 391.

Klong Prao, river-bank (no. 713).

Area: Tropical Asia and Africa.

Various families.

Determined by **W. G. Craib**, Kew.

Anonaceae.

Artabotrys R. Brown.

1. **A. Harmandii** Finet et Gagnepain, Bull. Soc. France LIII, Mém. IV. 102 (1906), *var. foliis parum majoribus.*
Klong Son, in the jungle (no. 638).

Area: Cambodia.

Polyalthia Blume.

2. **P. suberosa** (Roxb.) Benth. et Hook. f., Fl. Br. Ind. I. 65.
Klung, dry jungle (no. 371).

Area: India, Ceylon, Burma, Java.

3. **P.** sp. (vel forsan *Disepalium* sp.)
Klong Majum, tall tree in the jungle (no. 602).

Anaxagorea St. Hilaire.

4. **A. luzonensis** A. Gray, Hook. Fl. Br. Ind. I. 68.
Koh Kahdat (no. 552).

Area: Ceylon, Andamans, Burma, Malacca, Philippines.

Melodorum Dunal.

5. **M. latifolium** (Bl.) Dunal; Hook. Fl. Br. Ind. I. 79.
Plains at Lem Dan (no. 218).

Area: Malacca, Malaya, Philippines.

Sageraea Dalz.

6. **S. elliptica** Hook. f. et Th., Fl. Ind. I. 93; *Bocagea elliptica* Hook. Fl. Br. Ind. I. 92.
Jungle at Lem Dan (no. 459 and 532 b).

Area: Burma to Malacca.

7. **Uvaria** sp.
Jungle at Klong Munsé (no. 587).

Menispermaceae.

Tiliacora Colebr.

1. **T. triandra** (Roxb.) Diels; Craib, Contr. Fl. Siam 9; *Limacia triandra* Miers, Hook. Fl. Br. Ind. I. 100.

Plains near Lem Dan (no. 500); jungle at Klong Munsé (no. 472); plains at Klong Son (no. 656 a).

Area: Indo-China-Malay Peninsula.

Cocculus DC.

2. **C. sarmentosus** Diels in Engl. Pflanzenreich, Menisperm. 233; Craib, Contr. Fl. Siam 10.
Sandy sea-shore at Lem Ngob (no. 364) and Koh Kahdat (no. 555).

Area: E. Asia, Mascarene Isl.

3. **Tinospora** sp.; conf. V. A. Poulsen in Vid. Medd. Naturh. For. 1902, 235 (det. V. A. Poulsen).
Lem Dan, liana in the jungle.

4. **T.** sp.
Koh Kahdat, jungle (no. 564).

Violaceae.

Alsodeia sp. forsan sp. nov., sed floribus deficientibus.
A smaller tree growing at Klong Majum (no. 619 d).

Guttiferae.

Garcinia Linné.

1. **G. Hanburyi** Hook. f., Journ. Linn. Soc. XIV. 485.
Jungle at Lem Dan (no. 438), "ton rong" of the Siamese.

Area: Malaya.

2. **G. Loureiri** Pierre, Fl. For. Cochinchine t. 66.
Jungle at Lem Dan (no. 624).

Area: Cochinchina.

3. **G. merguensis** Wight; Anders. in Hook. Fl. Br. Ind. I. 267; Craib, Contr. Fl. Siam 16.
Klong Majum, on rocks at river-bank (no. 613).

Area: Burma, Malacca, Cambodia.

4. **G. nigro-lineata** Planch.; Anders. in Hook. Fl. Br. Ind. I. 263.
Jungle at Klong Majum (no. 599) and Klong Son (no. 647 a).

Area: Malacca.

Calophyllum Linné.

5. **C. inophyllum** L.; Anders. in Hook. Fl. Br. Ind. I. 273; Craib, Contr. Fl. Siam 16.
Koh Kahdat, sandy shore (no. 546).

Area: China, India, Indo-China, Malaya.

6. **C. saigonense** Pierre, Fl. For. Cochinchine t. 105.
Jungle, alt. 1200 ft. (no. 668).

Area: Cochinchina.

7. **C.** sp.
Jungle at Klong Munsé (no. 528) and Klong Majum (no. 603 a).

Ternstroemiaceae.

Ternstroemia Linné.

1. **T. Wallichiana** (Griff.); *T. penangiana* Choisy; Dyer in Hook. Fl. Br. Ind. I. 281.
Jungle at Lem Dan (no. 523), and at Klong Majum (no. 615).

Area: Burma to Malacca, Java.

Adinandra Jack.

2. **A. integerrima** (Wall.) T. Anders. et Dyer in Hook. Fl. Br. Ind. I. 282; Craib, Contr. Fl. Siam 17.
Klong Majum, river-bank in jungle (no. 617).

Area: Yunnan, Cambodia, Malay Peninsula.

Eurya Thunbg.

3. **E. japonica** Thbg. var. **nitida** Korth.; Dyer in Hook. Fl. Br. Ind. I. 17; Craib, Contr. Fl. Siam 17.
Plains at Lem Dan (no. 292); jungle at Klong Majum (no. 601 a and 616 b), at Klung Munsé (no. 836).

Area: India, Indo-China, Malay Archipelago.

Schima Reinw.

4. **S. Noronhae** Reinw. et Bl. Bijdr. 130.
Jungle near Klong Munsé (no. 66); Klong Sarlakpet (870).

Area: Malaya.

Meliaceae.

Chisocheton Blume.

1. **C. divergens** Bl. var. **robusta** Valeton; Craib, Contr. Fl. Siam 36.
Jungle at Lem Dan (no. 478).

Area of the species: Java; the variety was introduced to Buitenzorg Gardens from Siam.

Aglaia Lour.

2. **A. odorata** Lour.; Hiern in Hook. Fl. Br. Ind. I. 554; Craib, Contr. Fl. Siam 36.
Koh Kahdat, sandy sea-shore (no. 559) and jungle (no. 810). No. 875 from the same island is perhaps the same.

Area: China to Malaya, often cultivated.

Walsura Roxb.

3. **W. robusta** Roxb., Hiern in Hook. Fl. Br. Ind. I. 565; Craib, Contr. Fl. Siam 36.
Lem Dan (no. 833).

Area: Indo-China.

Xylocarpus Koenig (det. Johs. Schmidt).

4. **X. granatum** Koenig; Johs. Schmidt, Bot. Tidsskr. XXVI, 68; *Carapa moluccensis* Roemer; Hiern in Hook. Fl. Br. Ind. I. 567.
Mangrove of Lem Ngob (no. 36). Common in the mangroves.

Area: Mangroves of tropical Africa, Asia and Australia.

5. **X. obovatus** (Bl.) A. Juss. Mém. Mus. Paris XIX. 244; Harms in Engler u. Prantl, Nat. Pflanzenfam. III[4]. 278 f. 157; Johs. Schmidt, Bot. Tidsskr. XXVI, 68.
With the mangroves; seems to be less common than the preceding.

Area: As the preceding.

Olacaceae.

Ximenia Linné.

1. **X. americana** Willd., Masters in Hook. Fl. Br. Ind. I. 574.
Koh Kahdat, littoral jungle (no. 575).

Area: Tropical America, Africa and Asia.

Olax Linné.

2. **O. scandens** Roxb.; Masters in Hook. Fl. Br. Ind. I. 575; Craib, Contr. Fl. Siam 37. *Forma nervis paulo conspicioribus.*
Koh Saket, littoral zone (no. 342).

Area: China, India, Burma, Java.

3. **Opilia?** sp.
Klong Prao, river-bank (no. 711).

4. **Gonocaryum** sp.
Klong Son, river-bank (no. 686).

Ampelidaceae (Vitaceae).

Cissus Linné.

1. **C. discolor** Bl. Bijdr. 181; Craib, Contr. Fl. Siam 42; *Vitis discolor* Dalz.; Lawson in Hook. Fl. Br. Ind. I. 647.
Jungle at Klong Son (no. 647).

Area: India, Assam to Malaya.

Ampelocissus Planchon.

2. **A. arachnoidea** (Hassk.) Planchon in DC. Mon. V. 375.
Koh Chang Noi, sandy sea-shore (no. 698).

Area: Java.

3. **A. polythyrsa** (Miq.) Gagnep. in Lecomte, Fl. gén. de l'Indo-Chine I. 990?
Jungle at Klong Munsé (no. 396).

Area: Indo-China, Malay Peninsula, Sumatra, Borneo.

Leea Linné.

4. **L. sambucina** Willd.; Lawson in Hook. Fl. Br. Ind. I. 667.
Edge of jungle at Lem Dan (no. 388); river-bank at Klong Son (no. 636).

Area: Tropical Asia from China to Australia.

5. **Tetrastigma** sp.
Liana in jungle near Lem Dan (no. 409); Koh Kahdat (no. 579f).

Anacardiaceae.

Mangifera Linné.

1. **M. siamensis,** Warbg. *mss.,* sp. nov., *M. reba,* Pierre facie similis sed foliis acumine graciliore instructis distinguenda.

Ramuli primo puberuli, mox glabri, angulati, cortice stramineo vel fusco-stramineo pauci-lenticellato obtecti. *Folia* lanceolata ad oblonga, apice acute acuminata, basi cuneata, 11—19 cm. longa, 2,9—5,1 cm. lata, coriacea, glabra, nervis lateralibus utrinque 16—22 supra conspicuis subtus prominentibus, nervulis supra conspicuis subtus uti reticulatione prominulis, margine recurva, petiolo ad 2,7 cm. longo suffulta. *Paniculae* sessiles, ad 14 cm. longae, rhachi ramulisque fuscis parcius puberulis; bracteae 1,5 mm. longae, acutae. *Sepala* 2 mm. longa, 1,5 mm. lata, dorso parce breviter pubescentia. *Petala* quinque, oblonga vel oblongo-lanceolata, 2,75 mm. longa, 1,5 mm. lata, jugis tribus basi confluentibus apice haud excurrentibus. *Stamen* solitarium, filamento vix 1 mm. longo, anthera vix 0,75 mm. longa. *Discus* conspicuus, 5-lobatus, minute arcteque tuberculatus. *Ovarium* 0,75 mm. altum, glabrum, stylo 1,5 mm. longo. (Craib descripsit.)

Koh Chang, Klung, *Schmidt,* 374! Fruits edible; perhaps cultivated.

This proposed new species is very close indeed as regards habit to *M. reba* but unfortunately the writer has found no description of that species. From *M. indica,* to some of the forms of which it is rather similar, it differs in the solitary stamen and the entire absence of staminodes.

Buchanania Roxb.

2. **B. florida** Schauer, Nova Acta XIX, Suppl. I. 481.
Jungle at Lem Dan (no. 526 and 623a).

Area: Malaya.

Odina Roxb.

3. **O. Wodier** Roxb., Hook. Fl. Br. Ind. II. 29; Craib, Contr. Fl. Siam 48.
Plains at Lem Dan (no. 297); N. end of Koh Chang on rocks (no. 628).

Area: India, Burma, Malaya.

Myrtaceae.

Melaleuca Linné.

1. **M. leucadendron** L.; Duthie in Hook. Fl. Br. Ind. II. 465.
Klong Son, near the sea (no. 658). "ton samit" of the Siamese.

Area: Burma-Malay Islands, Australia.

Psidium Linné.

2. **P. guayava** L.; Duthie in Hook. Fl. Br. Ind. II. 468; Craib, Contr. Fl. Siam 84.
Lem Dan, cultivated (no. 386 and 623 e),

Area: Naturalised throughout India and Indo-China.

Eugenia Linné.

3. **E. cymosa** Lam.; Duthie in Hook. Fl. Br. Ind. II. 482; Craib, Contr. Fl. Siam 84.
Jungle at Lem Dan (no. 419); Nipple, alt. 2000 ft. (no. 669).

Area: Assam, Burma, Malaya.

4. **E. grandis** Wight, Ill. II. 17; Duthie in Hook. Fl. Br. Ind. II. 475.
Jungle at Klong Munsé (no. 418).

Area: From Himalaya to Malaya.

5. **E. grata** Wight; Duthie in Hook. Fl. Br. Ind. II. 486; Craib, Contr. Fl. Siam 84.
Littoral at Lem Dan (no. 263); Klong Sarlakpet, inner edge of mangrove (no. 726 e).

Area: From Assam (China?) to Malaya.

6. **E. javanica** Lam.; Duthie in Hook. Fl. Br. Ind. II. 474.
Klung (no. 373).

Area: Malacca, Andaman and Nicobar Islands, Malaya.

7. **E. lineata** (Bl.) Duthie in Hook. Fl. Br. Ind. II. 487. *Myrtus lineatus* Bl.
Jungle at Klong Munsé (no. 293 and 591 a); Klong Son, river-bank in jungle (no. 822).

Area: Malacca, Penang, Malaya.

8. **E. oblata** Roxb.; Duthie in Hook. Fl. Br. Ind. II. 492; Craib, Contr. Fl. Siam 85.
River-bank near Lem Dan (no. 255); plains at Lem Dan (no. 410).

Area: Assam to Malay Peninsula.

9. **E. operculata** Roxb.; Duthie in Hook. Fl. Br. Ind. II. 498.
Jungle at Klong Munsé, river-bank (no. 588).

Area: S. China, India, Indo-China and Malaya.

10. **E. polyantha** Wight; Duthie in Hook. Fl. Br. Ind. II. 496.
Klong Son, river-bank in jungle (no. 691 e).

Area: Burma, Java.

11. **E. siamensis** Craib, Kew Bull. 1912: 153, Contr. Fl. Siam 85.
Jungle at Klong Munsé (no. 391, 445, 593 c); Klong Majum, near outlet (no. 614).

Area: Siam.

12. **E.** sp. near **E. xanthocarpa** Thw.
Koh Chang Noi (no. 698 d).

Barringtonia Forst.

13. **B. serrata** Miq. Fl. Ind. Bat. I. 488.
Plains at Lem Dan (no. 187).

Area: Java.

14. **B.** sp. conf. **B. angusta** Kurz.
S. W. of Sarlak (no. 726 b).

15. **B. Schmidtii**, Warbg. mss., ramulis junioribus rhachique spicarum longarum ferrugineo- vel brunneo-ferrugineo-tomentosis distinguenda.

Ramuli primo densius ferrugineo- vel brunneo-ferrugineo-tomentelli, mox puberuli, dein omnino glabri. *Folia* oblanceolata vel obovato-oblanceolata, apice acute acuminata, basi in petiolum attenuata, 8—17 cm. longa, 2,8—6 cm. lata, chartacea, glabra, subtus pallidiora, nervis lateralibus utrinque 12—14 supra conspicuis subtus prominentibus, nervulis supra conspicuis subtus prominulis, serrulata, petiolo ad 7 mm. longo suffulta. *Spicae* ad 42 cm. longae, pedunculo communi vix 2 cm. longo ut rhachi ramulisque juvenilibus tomentoso suffultae; bracteae mox reflexae, circiter 4 mm. longae, dorso ut rhachis tomentosae. *Receptaculum* 2 mm. altum, apice vix 3 mm. diametro, indumento ut in rhachi tectum. *Calycis* segmenta 2 mm. longa, 2,75 mm. lata, imbricata, pilis brevibus crassiusculis ciliata, intra glabra. *Petala* circiter 4 mm. longa et 4,5 mm. lata, ciliolata. *Filamenta* inferne connata. (Craib descripsit).

Koh Chang, plains at Lem Dan, *Schmidt*, 186 (Type!), 110; 689 a (specimina sterilia, foliis usque ad 24 cm. longis et 10,3 cm. latis); 29 (verosim. varietas tantum *B. Schmidtii*, foliis floribusque paulo majoribus).

Cordiaceae.

Cordia L.

C. subcordata Lam.; Clarke in Hook. Fl. Br. Ind. IV. 140; Craib, Contr. Fl. Siam 128.
Sandy sea-shore on Koh Kahdat (no. 543).

Area: Tropical Asia, Australia and E. Africa.

Ebenaceae.

Maba J. R. et G. Forst.

1. **M. buxifolia** Pers.; Clarke in Hook. Fl. Br. Ind. III. 551; Craib, Contr. Fl. Siam 125.

Outlet of Koh Majum (no. 536).

Area: S. E. Asia, Australia, Tropical Africa.

Diospyros Linné.

2. **D. Schmidtii**, *Craib*, sp. n., calyce fructescente parvo quadrato distinguenda.

Ramuli primo adpresse ferrugineo-pubescentes, mox glabri, cortice fusco vel brunneo obtecti. *Folia* lanceolata vel angustius oblonga, apice obtuse acuminata, basi cuneata vel late cuneata, ad 13,5 cm. longa et 4,4 cm. lata, coriacea vel tenuiter coriacea, pagina inferiore pilis brunneis inconspicuis adpressis hic illic sed costa densius instructa, superiore glabra, nervis lateralibus utrinque circiter 10 intra marginem anastomosantibus supra subconspicuis vel fere obscuris subtus plerumque prominulis sed interdum subobscuris, costa supra immersa, petiolo ad 1,3 cm. longo supra canaliculato suffulta. *Fl.* ♂: *Calyx* 3,5 mm. longus, extra parce adpresse ferrugineo-pubescens, lobis deltoideis acutiusculis vix 2 mm. longis. *Corolla* extra ima basi excepta breviter adpresse ferrugineo-pubescens; tubus 11 mm. longus; lobi 4, late lanceolati, acuti, 7 mm. longi, 4 mm. lati. *Stamina* 12, glabra, antheris acuminatis. *Fructus* 2,3 cm. altus, 2,8 cm. diametro, 8-locularis, calyce plano quadrato 9 mm. lato adpresse ferrugineo-pubescente.

Jungle near Lem Dan (no. 522, ♂; 532 a, ♀); Klong Majum (no. 874, ♂; 607 c, ♂).

3. **D. sp.** forsan nova.

River-bank in jungle near Lem Dan (no. 592).

Sapotaceae.

Sideroxylon L.

1. **S. ferrugineum** Hook. et Arn.; Clarke in Hook. Fl. Br. Ind. III. 537.

Jungle at Klong Majum (no. 619 c) and Klong Prao (no. 718); littoral jungle on Koh Kahdat (no. 574); islet off Koh Kahdat (no. 584).

Area: Tropical Asia, Seychelles.

Gesneraceae.

Boea sp.

On rocks in the jungle (no. 676); also at Klong Majum.

Pandanaceae.

Pandanus L.

P. similis Craib, Kew Bull. 1912: 417.

Very common in the ground in the jungle (no. 287).

Area: Siam.

Various families.

Determined by different botanists.

Dilleniaceae.

Dillenia Linné (det. O. Warburg).

1. **D. aurea** Sm. Hook. Fl. Br. Ind. I. 37.
Jungle at Lem Dan (no. 417); Klong Son (no. 648) "ton mesân" of the Siamese.

Area: India, Indo-China, Java, Borneo.

Tetracera Linné (det. Craib).

2. **T. sarmentosa** (L.) Willd.; *Delima sarmentosa* L.; Hook. Fl. Br. Ind. I. 31.
S.W. of Sarlak (no. 724).

Area: Assam to Singapore, Eastern Archipelago(?).

Bixaceae.

Bixa L. (det. Warburg).

1. **B. orellana** L.; Hook. Fl. Br. Ind. I. 190; Craib, Contr. Fl. Siam 13.
Cultivated at Lem Dan (no. 873).

Area: Generally cultivated in the tropics.

Scolopia Schreber (det. Craib).

2. **S. chinensis** Clos, Ann. sc. nat. ser. 4. VIII. 249; *S. crenata* part. Hook. Fl. Br. Ind. I. 191.
Plains of Lem Dan (no. 488).

Area: China, India.

Hypericaceae.

Cratoxylon Blume.

1. **C. polyanthum** Korth.; Dyer in Hook. Fl. Br. Ind. I. 257; Craib, Contr. Fl. Siam 15.
Klong Sarlakpet (no. 735). (det. Warburg).

Area: China, Indo-China, Malaya, Philippines.

2. **C. formosum** Benth. et Hook. f.; Dyer in Hook. Fl. Br. Ind. I. 258.
Koh Chang Noi (no. 696). (det. C. B. Clarke).

Area: Malacca, Borneo, Philippines.

Tiliaceae.

Grewia Linné (det. S. R. Drummond, Kew).

1. **G. microcos** L. Syst. (ed. 12) vol. II. 602 (1767)!; Masters in Hook. Fl. Br. Ind. I. 392; Craib, Contr. Fl. Siam 28.
S. W. of Sarlak (no. 723).

Area: China, Indo-China, Malaya.

Triumfetta Linné.

2. **T. rhomboidea** Jacquin; Masters in Hook. Fl. Br. Ind. I. 395.
Plains at Lem Dan (no. 242). (det. C. B. Clarke).

Area: China, India, Malaya, Tropical Africa.

3. **T. semitriloba** L.; Masters in Hook. Fl. Br. Ind. I. 396.
Rayong, sandy sea-shore (no. 885). (det. Warburg).

Area: Tropics.

Simarubaceae.

Eurycoma Jack (det. Craib).

1. **E. longifolia** Jack. Bennett in Hook. Fl. Br. Ind. I. 521; Craib, Contr. Fl. Siam 34.
Jungle at Lem Dan (no. 509); N. End, on rocks at the sea (no. 628b).

Area: Burma, Malaya, Philippines.

Brucea Mill. (det. O. Warburg).

2. **B. sumatrana** Roxb.; Bennett in Hook. Fl. Br. Ind. I. 521; Craib, Contr. Fl. Siam 34.
Plains at Lem Dan (no. 28, 164 and 185).

Area: S. China, India, Burma, Malaya.

Irvingia Hook. f. (det. Craib).

3. **I. Olivieri** Pierre, Fl. for. Cochinchine t. 263 B.
Jungle at Klong Munsé (no. 614 a and 842).

Area: Annam.

Hippocrateaceae.

Salacia L.

1. **S. prinoides** (Willd.) D. C.; Lawson in Hook. Fl. Br. Ind. I. 626; Craib, Contr. Fl. Siam 40.
Littoral N. of Lem Dan (no. 174). (det. Th. Loesener).

Area: India, Burma, Malaya.

2. **S.** sp. (det. Craib).
A shrub in the jungle near Lem Dan (no. 144 and 466).

Connaraceae.

Connarus Linné.

1. **C. semidecandrus** Jack; Hook. Fl. Br. Ind. II. 52, *vel sp. affinis* (det. E. Gilg).
Edge of jungle at Klong Munsé (no. 487).

Area (*C. semidecandrus*): Burma, Penang.

2. **C. quocensis** Pierre, Fl. Cochinch. t. 377 A.
Plains at Klong Son (no. 828) (det. Craib).

Area: Cochinchina.

Rosaceae.

Rubus L. (det. R. A. Rolfe, Kew).

R. angulosus Focke, Bibl. Bot. LXXII (1909). 90.
Plains at Klong Munsé (no. 233 and 450).

Area: Malay Peninsula and Islands.

Cucurbitaceae.

Trichosanthes Linné (det. Craib).

1. **T. cucumerina** L., Clarke in Hook. Fl. Br. Ind. II. 609; Craib, Contr. Fl. Siam 93.
Jungle at Klong Prao (no. 718 b).

Area: India, Malaya, N. Australia.

Benincasa Savi (det. Warburg).

2. **B. hispida** (Thunbg.) Cogn. in D.C. Monogr. Phaner. III. 513. *B. cerifera* Savi, Fl. Br. Ind. II. 616.
Jungle near Lem Dan (no. 436).

Area: Tropical Asia and Africa; cultivated.

Oleaceae.

Jasminum L.

1. **J. sambac** (L.) Ait.; Clarke in Hook. Fl. Br. Ind. III. 591.
Mainland opposite Koh Kong; cultivated (no. 330) (det. Warburg).

Area: Cultivated in the tropics of both hemispheres.

2. **J. syringaefolium** Wall.; Clarke in Hook. Fl. Br. Ind. III. 595.
var. (det. Craib).
Lem Ngob (no. 50).

Area: Assam, Burma.

Apocynaceae.

Rauwolfia Linné (det. Craib).

1. **R. sumatrana** Jack; *var. vel sp. valde affinis.*
Koh Kahdat (no. 572 b).

Area of *R. sumatrana*: Sumatra.

Cerbera Linné.

2. **C. Odollam** Gaertn.; Hook. Fl. Br. Ind. III. 638; Craib, Contr. Fl. Siam 130.
In the jungles of the littoral zone, Lem Dan (no. 85) and N. end of Koh Chang (no. 629 a) (det. Stapf); on rocks at the sea (no. 353) (det. Craib).

Area: S.E. Asia, Australia.

Alstonia R. Br. (det. O. Warburg).

3. **A. scholaris** (L.) R. Br.; Hook. Fl. Br. Ind. III. 642.
Plains at Lem Dan (no. 290).

Area: Tropical Asia, Australia, Africa.

Ervatamia Stapf (det. O. Stapf).

4. **E. graciliflora** (Wall.) Stapf; *Tabernaemontana graciliflora* Wall.; Hook. Fl. Br. Ind. III. 647. (Determination doubtful).
Jungle at Klong Son (no. 675 b).

5. **E. malaccensis** (Hook. f.) Stapf; *Tabernaemontana malaccensis.* Hook. Fl. Br. Ind. III. 649, *vel species affinis.*
Plains at Klong Prao (no. 717 e); jungle at Klong Munsé (no. 811 a); Koh Kahdat, jungle (no. 579 a).

Area: Malacca.

Parsonsia R. Br. (det. O. Stapf).

6. **P. spiralis** Wall.; Hook. Fl. Br. Ind. III. 650.
River-bank at Klong Prao (no. 713).

Area: Tropical Asia.

Aganosma Don (det. Craib).

7. **A. marginata** Don; Hook. Fl. Br. Ind. III. 663. Craib, Contr. Fl. Siam 131. *forma aff. A. macrocarpae* Wall. Cat.
Klung (no. 375); Plains at Lem Dan (no. 719 b).

Area: S.E. Asia.

Strophanthus D.C. (det. O. Stapf).

8. **S. Wallichii** D. C.; Hook. Fl. Br. Ind. III. 655.
Jungle at Klong Son (no. 639).

Area: Assam, Burma.

Solanaceae.

Solanum L. (det. U. Dammer).

1. **S. torvum** Sw.; Clarke in Fl. Br. Ind. IV. 234; Craib, Contr. Fl. Siam 143.
Plains at Lem Dan (no. 111 and 389).

Area: Widely spread in tropical and subtropical countries.

2. **S. trilobatum** L.; Clarke in Fl. Br. Ind. IV. 236, var. *tomentosum*.
Koh Chick, on rocks at sea-shore (no. 268).

Area: S. India, Malay Peninsula.

Physalis L. (det. O. Warburg).

3. **P. minima** L.; Clarke in Hook. Fl. Br. Ind. IV. 238.
A weed in banana-plantations near Lem Dan (no. 519).

Area: Tropics.

Capsicum L. (det. O. Warburg).

4. **C. annuum** L.
Outlet of Klong near Lem Dan (no. 274); also cultivated.

Area: Tropics.

Datura L. (det. O. Warburg).

5. **D. alba** Nees; *D. fastuosa* var. *alba* Clarke in Hook. Fl. Br. Ind. IV. 243.
Sandy sea-shore at Klong Prao (no. 700).

Area: Tropics.

Nyctaginiaceae.

Pisonia L.

1. **P. aculeata** L.; Hook. Fl. Br. Ind. IV. 711 (det. Warburg).
Koh Kahdat, sandy sea-shore (no. 558 and 804).

Area: Tropics.

2. **P. excelsa** Bl.; Hook. Fl. Br. Ind. IV. 711 (det. Craib).
Koh Kahdat (no. 551).

Area: Malaya, Andaman Islands.

Myristicaceae.

Knema Lour.

1. **K. conferta** (King) Warbg. Nova Acta LXVIII. 578; Craib, Contr. Fl. Siam 176.
var. (det. Craib).
River-bank at Klong Son (no. 690).

Area (*K. conferta*): Malaya, Tonkin.

2. **K. glauca** (Bl.) Warbg. Nova Acta LXVIII. 594 (det. Ostenfeld). Islet near Koh Kahdat (no. 581).

Area: Malay Peninsula, Java, Sumatra, Andamans and Nicobars.

3. **K. missionis** (Wall.) Warbg. Nova Acta LXVIII. 602 (det. Ostenfeld).

Jungle near Lem Dan (no. 516 and 831); jungle at Klong Sarlakpet (no. 880).

Area: Malay Peninsula, Borneo.

4. ? **Horsfieldia glabra** (Bl.) Warb. Specimen mancum, flores desunt (det. Ostenfeld).

Plains near Lem Dan (no. 300).

Lauraceae.

Cinnamomum L. (det. C. H. Ostenfeld).

1. **C. iners** Reinw.; Hook. Fl. Br. Ind. V. 130; Craib, Contr. Fl. Siam 176.

Jungle near Lem Dan (no. 489).

Area: Burma, Malaya.

Hernandia (det. Craib).

2. **H. ovigera** L.

Without locality (no. 882).

Area: West-Indies.

Cassytha L. (det. O. Warburg).

3. **C. filiformis** L.; Hook. Fl. Br. Ind. V. 188; Craib, Contr. Fl. Siam 177.

Mainland opposite of Koh Chick (no. 378).

Area: Tropical Africa, Asia, Australia.

Litsea Lam. (det. Craib).

4. **L.** sp. an *L. polyantha*? Juss. Fl. Br. Ind. V. 162; Craib, Contr. Fl. Siam 176.

Jungle near Lem Dan (no. 518).

Area of *L. polyantha*: N. India, Honkong, Assam, Burma, Malay Peninsula.

Another(?) species of *Litsea* was found in Koh Kahdat (no. 579 e); the material is unfortunately insufficient for a sure determination.

Filices.

Revised by **Carl Christensen** — Copenhagen.

While preparing Part X of the Flora of Koh Chang I found, on sorting the material, that several of the ferns collected by Dr. Johs. Schmidt, and determined by Dr. H. Christ in 1900 and published in Part III of the Flora (Bot. Tidsskr. **24**: 102—113), were apparently incorrectly named. I therefore undertook a thorough revision of the determinations, and the result was somewhat surprising. On my informing Dr. Schmidt of this he asked me to prepare a revised list of the ferns of Koh Chang. In the following list, all the ferns collected are enumerated, with the numbers of the specimens added (these being unfortunately omitted in the first parts of the Flora of Koh Chang). I have throughout referred to Christ's list, where informations of localities, area of the species, etc. can be found. I use of course the nomenclature of my Index Filicum; as will be seen, it differs greatly from that followed by Christ 15 years ago.

1. **Trichomanes sublimbatum** K. Müll.; C. Chr. Ind. 650; *Microgonium sublimbatum* v. d. B. Hym. Jav. 6 t. 2; *Trichomanes muscoides* Christ, Bot. Tidsskr. **24**. 104.

Klong Son (no. 769).

Area: Malaya, Assam. An Asiatic representative of the American *T. hymenoides* Hedw. (*T. muscoides* Sv.).

2. **T. javanicum** Bl.; Christ l. c. 103.

Not the true *T. javanicum*, but a variety or subspecies closely allied to *T. rhomboideum* J. Sm.; *Cephalomanes rhomboideum* v. d. B. Hym. Jav. 33 t. 24.

Klong Munsé (no. 133, 774, 778).

3. **T. bipunctatum** Poir., C. Chr. Ind. 636; *T. filicula* Bory, non Christ l. c. *T. pyxidiferum* Christ, l. c. (non L.).

A form with narrow, lanceolate fronds; spurious vein rather close to the margin, continuous, rather obscure. Resembles in habit not a little *T. humile* Forst., but it is evidently a form of the variable *T. bipunctatum*; very different from *T. pyxidiferum* L.

Klong Sarlakpet, on rocks in the jungle (no. 803).

Area: Tropical Africa, Australia, Polynesia and Asia, northwards to Japan and Corea.

4. **T. bilabiatum** Nees et Bl.; C. Chr. Ind. 636. *T. Filicula* Christ, l. c.

Differs from *T. bipunctatum* by its short-stalked, broad, deltoid fronds and by the presence of short spurious veins in the cell-tissue within the marginal spurious vein. The form collected is small, with few spurious veins.

Klong Son, epiphytic on trees (no. 768).

Area: Malaya, Melanesia.

5. **T. siamense** Christ, l. c.

Klong Munsé (no. 401).

Christ incorrectly makes this a subspecies of *T. rigidum* Sw.; it resembles that species by its tufted fronds, rigid texture and brown colour, but otherwise it is very different, *e. g.* its rachis being distinctly winged throughout. Christ's description is somewhat inadequate. The lobes are not finely denticulate, but entire, the sori not free, but fully immersed to the mouth in an anterior tertiary lobe, leaving only a narrow margin of the lobe free as a wing to the sorus. The erect, short, branched rhizome is clothed at the growing apex with numerous dark-brown, cylindrical, articulated hairs.

The affinity of this species is probably with *T. hispidulum* Mett. from Malacca and Borneo.

To this species probably belong some small tufts of a little young fern found in the jungle on rocks near Klong Munsé (sine num.). It was determined by Christ as *T. nanum* v. d. B., Christ, l. c. = *T. Kurzii* Bedd., C. Chr. Ind. 643, but this, belonging to the subgenus *Hemiphlebium*, has nothing to do with our plant. Unfortunately, the small plants are all sterile, but in many characters: the tufted fronds, the hairs, the colour and texture, etc., they resemble very much *T. siamense*, of which I therefore consider them to be young plants.

(*T. rigidum* Sw.; Christ, l. c. Specimens not found in the collection, the species must be excluded.)

6. **Cibotium barometz** (L.) J. Sm.; Christ, l. c. 111, — (no. 619 e).

7. **Alsophila glabra** (Bl.) Hook.; C. Chr. Ind. 43.

Klong Munsé, river bed in the jungle (no. 594 d); a single sterile pinna only collected.

Area: Tropical Asia.

8. **Alsophila kohchangensis** n. sp.

A. podophylla Christ, l. c. 111 (non Hook).

A. ex affinitate *A. glabrae* (Bl.) Hook. vel subspecies hujus speciei caudice epigaeo breve vel subnullo. *Stipite* atropurpureo nitido, vix 10 cm. longo, 5—7 mm. crasso, superne late canaliculato, ad basin squamis luteo-brunneis parvis lanceolato-acuminatis non dense obtecto, sursum squamis sensim paucioribus et minoribus, anguste linearibus instructo, pilis destituto, non muricato. *Lamina* ambitu late lanceolata vel elliptico-lanceolata, e medio utrinque attenuata, in siccitate brunnea (rachi atropurpurea), costis pinnarum supra ferrugineo-crispato-hirtulis exceptis omnino glabra, bipinnatifida vel subbipinnata. *Pinnis supremis* late adnatis, sursum decurrentibus confluentibusque, subintegris versus apicem abrupte

et breviter acuminatum serratis, *sequentibus* (versus basin laminae) sessilibus, basi truncatis, alternis, oblongis, acuminatis, 6—10 cm. longis, 1½—2 cm. latis, lobatis vel ad medium pinnatifidis; lobis 5—6 mm. latis, apice rotundatis, dentatis, dentibus brevibus obtusis circiter 6—8 pro lobo; *pinnis medialibus* maximis (maxima in specimine 20 cm. longa, medio 10 cm. lata), late lanceolatis, breviter petiolatis, utrinque e medio attenuatis, parte inferiore pinnatis (pinnulis liberis 2—3 jugis), parte mediali ad costam pinnatifidis, versus apicem abrupte attenuatis, lobatis; apice lobato (= tertia parte pinnae) pinnis superioribus lobatis simili; pinnulis liberis infimis 1—2 cm. longis, obtusis, leviter serratis, sequentibus sensim majoribus; segmentis medialibus maximis, 5 cm. longis, 1,2 cm. latis, basiscopicis saepe quam acroscopicis longioribus, late adnatis vel decurrentibus vel confluentibus, pinnis supremis serratis similibus, marginibus infra subintegris versus apicem abrupte acuminatum serratis; *pinnis inferioribus* sensim reductis pinnatifidis vel lobatis vel serrulatis, petiolatis (petiolo 3—4 mm. longo), basi cordatis, infimis 2—3 cm. longis, 6—8 cm. distantibus. *Venis tertiariis* distinctis, in pinnis lobatis indivisis, ca. 5-jugis, ad dentes intrantibus, basali posteriore saepe e costa pinnae excurrente, anteriore e costula curvatim ad sinum inter lobos excurrente; venis tertiariis in pinnis pinnatifidis furcatis vel bifurcatis, soriferis. *Soris* parvis, medialibus; receptaculo globoso, parvo.

Klong Munsé, river bed in the jungle (no. 720).

It is possible that this fern may be a very small form of *A. glabra*; the upper part of the leaf resembles very much the outer part of a pinna of that species, still I believe that it is specifically distinct. I am convinced that it is not identical with the South Chinese *A. podophylla* Hook., as Christ suggested. This is said to have black basal scales and a muricate stem. The rows of sori in *A. kohchangensis* are not shaped like an inverted V as in *A. glabra*, and its much reduced lower pinnæ and pinnulae are a character not mentioned in the descriptions of *A. glabra* and *A. podophylla* to which I have access. *A. dubia* Bedd. is an allied species, but according to description and figure rather different. *Cyathea Bonii* Christ, referred by Christ himself to *A. podophylla*, is according to the description very near to our species, but Christ describes the pinnæ: e basi *dilatata* late lanceolatis.

9. **Dryopteris sagenioides** (Mett.) O. Ktze.; C. Chr. Ind. 290; *Aspidium sagenioides* Christ, l. c. 108, — (no. 228).

10. **D. setigera** (Bl.) O. Ktze.; C. Chr. Ind. 292; *Aspidium setigerum* Christ, l. c. 108 (no. 775).

This species, common from Japan through tropical Asia and Polynesia, has been collected fairly frequently in later years in South Brazil and adjacent countries. Probably it has been introduced there and escaped from gardens.

11. **D. latipinna** (Hook.) O. Ktze.; C. Chr. Ind. Suppl. 108. — *Aspidium pennigerum* Christ, l. c. 109 (non Bl. nec Bedd.).

Klong Sarlakpet, — (no. 745 b).

The form collected is larger than the Chinese type (pinnæ 6 cm. long by 2 cm. broad), but in technical and minute characters not very different. From the following species it differs by its short but broad, little incised pinnæ, the lamina with a long pinnatifid apex, and the very short pubescence of both surfaces. *Nephrodium pennigerum* Bedd., now called *D. indica* v. A. v. R., to a variety of which: *malayense* Bedd. Christ referred our specimens, differs by having 5—8 pairs of anastomosing veins.

Another specimen collected at Klong Son (no. 771) I provisionally also refer to *D. latipinna*. It looks very different, in general habit much more like *D. parasitica*, from which it differs by its less cut pinnæ; in this character as in others (pubescence and the long pinnatifid apex of the lamina) it agrees with no. 745 b, but its pinnæ are narrower (1 cm. by 6 cm. long), more acuminate, and the under-surface is dotted with large red glands. It is not unlikely an undescribed species.

Area: China, Java(?).

12. **D. parasitica** (L.) O. Ktze.; C. Chr. Ind. 282 ex parte; *Aspidium parasiticum* Christ, l. c. 109. (no. 771 bis).

The form collected certainly belongs to the collective species *D. parasitica*. It is a very hairy, didymosorous form that with approximate certainty can be identified with *Nephrodium tectum* (Wall.) Bedd. Handb. Suppl. 79, although the rhizome is short-creeping. Beddome refers to *N. tectum* his *N. didymosorum* Parish, Ferns br. Ind. t. 200 from Burma, which I have shown is apparently exactly the same form as the true *D. parasitica* from China (Arkiv för Bot. **9** no. 11: 26—28). I am not nearly so convinced that the Koh Chang form, like *A. tectum* Wall. from Singapore and Perak, is typical *D. parasitica*.

13. **D. extensa** (Bl.) O. Ktze.; C. Chr. Ind. 264; *Aspidium extensum* Christ, l. c. 109, — (no. 627).

14. **D.** (*Meniscium*) **triphylla** (Sw.) C. Chr. Ind. 298; *Meniscium triphyllum* Christ, l. c. 109, — (no. 650, 777 part.).

15. **Aspidium variolosum** Wall.; Christ, l. c. 108, — (no. 626 a, 772).

16. **Polybotrya appendiculata** (Willd.) J. Sm.; C. Chr. Ind. 503. var. *marginata* (Bl.). — *P. marginata* Bl. Fl. Javae t. 3.; *P. appendiculata* Christ, l. c. 109 cum var. *Helferiana* (Ktze.) Christ, l. c.

Differs from the varieties recognized by Beddome by its naked rachis, which (in the sterile leaves) is margined on both sides by a green wing about 1 mm. broad. Some of the sterile leaves have a prolongated, rooting apex.

Area (of variety): Java (Malaya?).

17. **Leptochilus heteroclitus** (Pr.) C. Chr. Ind. 385.

Klong Sarlakpet (no. 777 part; mixed with *Dryopteris triphylla*).

Area: Tropical and subtropical Asia; Melanesia.

18. **L. scalpturatus** (Fée) C. Chr. Ind. 387 (excl. syn. omnibus, *Heteronevron scalpturatum* Fée exceptum), var. *undulatus* var. nov. *Gymnopteris costata* var. *undulata* Christ, l. c. 109, — (no. 891).

The nomenclature of certain species of *Leptochilus § Heteronevron* (Fée) is confused. In Ind. Fil. 387 I have identified *Acrostichum costatum* Wall. = *Gymnopteris costata* Bedd. with *Heteronevron scalpturatum* Fée, Acrost. 95 t. 56, because Fée himself, although with doubt, referred *A. costatum* Wall. to his described and well illustrated species. A comparison of Fée's illustration (Acrost. t. 56) with specimens of *A. costatum* Wall. from Assam, leg. G. Mann, shows at once that we have here two widely different forms. The form illustrated by Fée is, according to authentical specimens examined by me, collected near Manila by Gaudichaud; it is in venation not materially different from *Acr. contaminans* Wall. = *Leptochilus virens* C. Chr. Ind. 388, but it has broader and shorter sterile pinnæ with red veins, and much broader fertile pinnæ. *Acrost. virens* Hook. et Grev. Ic. t. 221 has similar pinnæ, but the venation is very different, about as in *A. costatum* Wall.; *A. crispatulum* Wall., Clarke, Ferns of N. India t. 84 B, D, has often red veins, but its pinnæ are much narrower. I am inclined to believe that the following three species may be maintained.

Leptochilus costatus (Wall.) C. Chr. comb. nov.; *Acrostichum costatum* Wall.; *Gymnopteris costata* Bedd. etc. (see Ind. Fil. under *L. scalpturatus*), with var. *Meniscium deltigerum* Wall. —? *Nothochlaena undulata* Wall.

North India.

L. virens C. Chr. Ind. 388. *A. contaminans* Wall.; *Gymnopteris contaminans* Bedd.; *A. crispatulum* Clarke, Ferns N. Ind. 580 (an Wall.?; includes both *A. contaminans* Wall. and *A. crispatulum* Wall.).

South India, Ceylon, Birma.

var. **crispatula** (Wall.) Clarke l. c.; Bedd. Handb. Suppl. 105.

Khasia Hills.

The specific name of this species I have not changed, although it is an open question, what *A. virens* Hook. et Grev. may be; probably it is a form allied to *L. costatus*. The proper name of the species is perhaps *contaminans*; still some other forms now referred to the present species have been described and illustrated before *contaminans*.

L. scalpturatus (Fée) C. Chr. Ind. 17, 387 part.; *Heteronevron scalpturatum* Fée, Acrost. 95 t. 94.

Philippines, Malaya, Siam.

In all three species a form occurs, which is marked by its fertile pinnæ being sporangiferous along the margins only, leaving a broad disk in the centre of the pinnæ free of sporangia. The first of these forms was named *Nothochlaena undulata* by Wallich, and

came probably from Burma; it is by Beddome referred as a variety to *L. costatus*; it is, however, possible, that it should rightly be referred to *L. scalpturatus*. It was figured by Beddome, F. Br. Ind. t. 115.

A similar form of what I name *L. virens* is called var. *pseudundulata* Clarke, Ferns N. Ind. 581.

The third form is that which Dr. Schmidt has collected in Siam and which beyond doubt is the same species as I here name *L. scalpturatus*. In all characters, the marginal soriferation excepted, it closely agrees with specimens from Manila, leg. Gaudichaud.

19. **Nephrolepis exaltata** (L.) Schott, C. Chr. Ind. 454. *N. acutifolia* Christ, l. c. 110, — (no. 627 a).

Although sterile the specimen may with approximate certainty be referred to *N. exaltata*; certainly it is not *N. acutifolia*. Christ has also (l. c. 109) *N. exaltata* in his list; no specimens so named by him are to be found in the collection.

20. **Humata repens** (L. fil.) Diels; C. Chr. Ind. 754; *Davallia repens* Christ, l. c. 111.

Klong Majum (no. 102); Nipple (no. 679 a).

21. **Davallia denticulata** (Burm.) Mett.; C. Chr. Ind. 209; *D. elegans* Sw.; Christ, l. c. 110, — (no. 766).

22. **D. solida** (Forst.) Sw.; Christ, l. c. 110, — (no. 783).

23. **Odontosoria chinensis** (L.) J. Sm.; C. Chr. Ind. 464; *Stenoloma tenuifolia* Christ, l. c. 110, — (no. 649).

24. **Tapeinidium pinnatum** (Cav.) C. Chr. Ind. 631; *Microlepia pinnata* Christ, l. c. 111, — (no. 272, 764, 780).

25. **Schizoloma Griffithianum** (Hook.) Fée; *Lindsaya Griffithiana* Hook. sp. 1. 219 t. 68 B. *Diplazium Bantamense* (sic!) Christ, l. c., 108, — (no. 782).

Commonly referred to *S. ensifolium* (Sw.) as a variety; still it seems essentially different from the typical form of that species and may as well as many others be dealt with as a distinct species.

Area: Burma.

S. ensifolium (Sw.) J. Sm. is in Christ's list (under *Lindsaya*, l. c. 110); no specimens so named are, however, in the collection.

26. **S. heterophyllum** (Dry.) J. Sm.; C. Chr. Ind. 618; *Lindsaya heterophylla* Dry.; Christ, l. c. 110, — (no. 666).

27. **Lindsaya cultrata** Sw.; Christ, l. c. 110, — (no. 779).

28. **L. orbiculata** (Lam.) Mett.; Christ, l. c. 110, — (no. 283).

Small but fertile plants, with pinnate leaves not more than 4—5 cm. long.

29. **Diplacium silvaticum** (Bory) Sw.; Christ, l. c. 108, — (no. 781).

30. **Asplenium Schmidtii** n. sp.

Aspl. vulcanicum Christ, l. c. 108 (non Bl.).

Rhizomate? *Stipite* subquadrangulari, superne tricanaliculato, fusco-stramineo vel viridi-stramineo ad basin nigricante, glabro, versus basin squamis lanceolatis, opaco-brunneis sparse obtecto, 35 cm. longo, 3 mm. crasso. *Lamina* ambitu ovata vel ovato-oblongo, 50 cm. longa, 25—30 cm. infra medium lata, pinnata cum impari, in siccitate brunneo-viridi, firmo-herbacea vel submembranacea, glaberrima. *Pinnis* 14-jugis, alternis, 3 cm. distantibus, lineari-oblongis, e medio versus apicem acuminatum serratum sensim attenuatis, marginibus obscure repandulo serrulatis, inferioribus petiolulatis (petiolo 2—3 mm. longo), superioribus sessilibus (rachi non alata), basi inaequalibus — superiore truncata rachi parallela, inferiore rotundato-truncata vel rotundato-cuneata —, maximis 15 cm. longis, 2 cm. latis, terminali conformi sed profundius serrulata. *Venis* sub angulo 55° excurrentibus, 4 mm. distantibus, ad basin furcatis; ramo anteriore semper indiviso, sorifero, posteriore furcato vel bifurcato, omnibus marginem attingentibus. Soris utrinque ad 30, partem tertiam rami anterioris occupantibus, costam plerumque attingentibus. Indusio angusto (vix 1 mm. lato), integro, pallide brunneo.

Koh Chang, jungle near Lem Dan. Johs. Schmidt no. 776.

Closely allied to the Malayan *A. persicifolium* J. Sm., and perhaps not specifically different from that species; it differs by its nearly entire and longer pinnæ, its short sori and its very regular venation. The lateral veins are nearly always in groups of four: from a very short secondary vein or, more often, from the costa of the pinnæ itself, spring out two veins, of which the upper is always simple and soriferous, while the lower is forked 2—5 mm. above the costa; the lower fork of these is simple, while the anterior one is forked again once or twice.

Christ has referred the specimen to *A. vulcanicum* Bl., which differs from our new species by its coriaceous texture, pale colour, and equally cuneate base of the pinnæ.

31. **A. pellucidum** Lam.; Christ l. c. 108, — (no. 78).

32. **A. laserpitiifolium** Lam.; Christ, l. c. 107, — (no. 566).

33. **A. Grevillei** Wall.; Christ, l. c. 108. Not found in the collection. Probably *A. nidus* L.

34. **Blechnum orientale** L.; Christ, l. c. 107, — (no. 65, 480).

35. **Brainea insignis** (Hook.) J. Sm.; Christ, l. c. 107, — (no. 663 a).

36. **Stenochlaena palustris** (Burm.) Bedd.; Christ, l. c. 107, — (no. 162, 718, 773).

37. **S. aculeata** (Bl.) Ktze.; C. Chr. Ind. 624. *Lomariopsis sorbifolia* Christ, l. c. 107, — (no. 402).

Although the specimen is sterile it doubtless belongs to this species, that is distinguished by a spiny rhizome and the pinnæ articulated to the rachis. The specimen differs from the typical form by having the pinnæ irregularly toothed. Some authors consider *S. aculeata* an anormal form of *S. sorbifolia* sp. coll., others of *S. palustris.*

Area: Tropical Asia.

38. **Onychium siliculosum** (Desv.) C. Chr. Ind. 469; *O. auratum* Klf.; Christ, l. c. 106 (no. 68).

39. **Adiantum flabellulatum** L.; C. Chr. Ind. 26; *A. Bonii* ex parte Christ, l. c. 106.

Nipple, 2000 ft., on rocks in open jungle (no. 678).

Area: Tropical Asia and northwards to Japan.

40. **Adiantum fragiliforme** n. sp.

A. Bonii ex parte Christ, l. c. 106 (non Journ. de Bot. 8: 150).

Although I have not seen the original *A. Bonii* from Tonkin I am convinced, after a close comparison of the Koh Chang plant with Christ's original description, that our plant can not be *A. Bonii.* It belongs to a group of which several species have been described in recent years, but as it differs from all these in some points I propose it as new.

Rhizomate breve, erecto, dense radicante. *Stipitibus* atro-castaneis, nitidis, strictis, ad 10 cm. longis. *Lamina* ambitu late ovata, 10—13 cm. longa et lata, tripinnata, glaberrima, rigida, infra paulo glaucescente. Pinnis primariis utrinque 3—4, 4—8 cm. distantibus, infimis maximis, longe petiolatis (petiolo 3—4 cm. longo), 6—8 cm. longis. Pinnis secundariis in pinna infima 2-jugis, in pinna sequente unijugis; pinnis superioribus atque terminali simpliciter pinnata. Segmentis breve petiolulatis (petiolo $1^1/_2$ mm. longis), ad petiolum distincte articulatis et facile decedentibus, 5—8 mm. longis et latis, basi aequaliter cuneatis vel saepe utrinque rotundatis, margine exteriore integro vel obsolete dentato indivisis vel plus minusve profunde bi- (raro tri-) lobatis, segmento terminali vix majore. Soris in segmento uno vel binis, rarissime ternis; margine segmenti sorifero paulo emarginato. Indusio atro-brunneo, subquadrangulari vel saepe semicirculari, 1—$1^1/_2$ mm. lato.

Koh Chang, Klong Son, 1000 ft., on rocks in the jungle (no. 677).

This species seems to differ from all species of *Adiantum* from tropical Asia by its distinctly articulated segments, which in the dried specimens are very apt to fall off as in the West Indian *A. fragile* Sw., a species with different sori. In general habit, branching and shape of segment our new species is very similar to *A. Wattii* Bak., which species Beddome (Suppl. 18) has referred to *A. capillus veneris* as a variety. If he is right in this our species is not *A. Wattii. A. Bonii* is described as having the stipe scarcely glossy, segments not articulated to the petiole, the terminal larger than the lateral ones, sori reniform and 3—5 to a segment. By these characters and in others *A. Bonii* is certainly widely different from *A. fragiliforme.*

41. **Pteris longifolia** L.; Christ, l. c. 106 (no. 549 e).

Hieronymus has recently (Hedwigia **54**: 290—294, 1914) separated out from the true *P. longifolia* L., which is American, the Old Worlds forms of *P. longifolia* as a distinct species *P. vittata* L., to which the Koh Chang specimens consequently belong.

42. **P. biaurita** L. *P. quadriaurita* var. *biaurita* Christ et var. *Grevilleana* Christ, l. c. 106 (non *P. Grevilleana* Wall.), — (no. 19 and 254).

43. **P. quadriaurita** Retz.; Christ, l. c. 106 (excl. var.).

Hieronymus has recently (Hedwigia **55**: 325—375. 1915) elaborately dealt with the Asiatic forms of the cosmopolitic collective species *P. quadriaurita*. He gives very long and detailed descriptions of no fewer than 20 Asiatic species, the majority of them founded on a single or a couple of specimens. I have tried to determine the two forms collected in Koh Chang after the descriptions of Hieronymus. As could be expected, the specimens do not agree in all details with so detailed descriptions, and I cannot, therefore, with certainty determine the two forms.

The first of these is possibly *P. Blumeana* Ag.; Hieron., l. c. 360, with which it agrees in its obtuse, subemarginate segments. It is a form with a whitish band along the midrib of the pinnæ, a peculiarity found in several of the species (no. 785).

The second form is probably identical with

44. **P. aspericaulis** Wall.; Hieron. l. c. 348. *P. asperula* Christ, l. c. 107 (non J. Sm.), — (no. 632). Known from N. India only.

45. **P. tripartia** Sw.; Christ, l. c. 107, — (no. 578).

46. **Vittaria elongata** Sw.; Christ, l. c. 104, — (no. 76 and 722).

47. **Antrophyum reticulatum** (Forst.) Klf.; Christ, l. c. 104, — (no. 745).

48. **Drymoglossum heterophyllum** (L.) C. Chr. Ind. 246; *D. piloselloides* (L.) Pr.; Christ, l. c. 105, — (no. 128, 179, 416, 660 a).

49. **Taenitis blechnoides** Sw.; Christ, l. c. 104, — (no. 400).

50. **Polypodium punctatum** L.; Christ, l. c, 105, — (no. 234, 358, 745c).

51. **P. nigrescens** Bl.; Christ, l. c. 105, — (no. 765).

52. **P. sinuosum** Wall.; Christ, l. c. 105, — (no. 97).

53. **Cyclophorus adnascens** (Sw.) Desv.; C. Chr. Ind. 197; *Niphobolus adnascens* Klf.; Christ, l. c. 105, — (no. 806).

54. **C. acrostichoides** (Forst.) Pr.; C. Chr. Ind. 197; *Niphobolus acrostichoides* Rich.; Christ, l. c. 105, — (no. 476).

55. **Drynaria sparsisora** (Desv.) Moore; C. Chr. Ind. 249; *D. Linnaei* (Bory) Bedd.; Christ, l. c. 106, — (no. 227, 726).

Differs from *D. quercifolia* mainly by the scales of the rhizome being peltately fixed.

56. **Acrostichum aureum** L. var. *Schmidtii* Christ; *Chrysodium aureum* var. *Schmidtii* Christ, l. c. 104, — (no. 718 h).

57. **Platycerium coronarium** (König) Desv.; C. Chr. Ind. 664; *P. biforme* Sw.; Schmidt, Bot. Tidsskr. **24**: 105. (Specimens not seen.)

58. **Ceratopteris thalictroides** (L.) Brongn.; Christ, l. c. 113, — (no. 226).

59. **Gleichenia linearis** (Burm.) Clarke; Christ, l. c. 111, — (no. 770).

var. **subpectinata** (Christ); *G. subpectinata* Christ, l. c. (no. 619 f).

Christ's new species can hardly be other than a local form of the variable *G. linearis*. The reduction of the lower segments of the pinnæ, believed by Christ to be a characteristic feature of *G. subpectinata*, is not rarely seen in *G. linearis* and is, moreover, not found in all pinnæ of the type-specimens.

60. **G. laevigata** (Willd.) Hook.; Christ, l. c. 111, — (no. 770 bis).

Area: Malaya. Specifically different from the Mascarene *G. flagellaris* Spr.

61. **Schizaea digitata** (L.) Sw.; Christ, l. c. 112, — (no. 679).

62. **S. dichotoma** (L.) Sm.; Christ, l. c. 112, — (no. 710).

63. **Lygodium circinnatum** (Burm.) Sw.; Christ, l. c. 112, — (no. 269).

64. **L. scandens** (L.) Sw.; *L. microphyllum* Christ, l. c. 112, — (no. 153).

65. **L. salicifolium** Pr.; C. Chr. Ind. 413. *L. flexuosum* Christ, l. c. 112 (non Sw.), — (no. 11 [Lem Ngob], 830 [Koh Chang Noi]).

Area: India, Malaya.

66. **Angiopteris evecta** (Forst.) Hoffm. sp. coll.; Christ, l. c. 112, — (no. 767).

The form collected is abundantly different from the true *A. evecta* from Tahiti. It belongs to the section *Pseudangiopteris* Pr. to which de Vriese referred about 30 "species", most of them from India. I have tried to determine the Siamese form after de Vriese's monograph; it does not agree exactly with any of the forms described by de Vriese, but it comes very near to *A. repandula* de Vriese, Mon. 30 t. 3, f. 4, t. 4, f. 4, differing from that form by the presence of very short recurrent veinlets and fewer sporangia in the sori. The pinnæ are remarkably long-stalked (petiole 10 cm. l. by a blade about 30 cm. l.); pinnules 5—7 jugate

below the terminal one, 12—15 cm. long by $3^1/_2$ cm. broad at the middle, pale yellowish-green beneath, the margins dentate throughout, the abruptly acuminate apex serrulate, unequally cuneate at base, the upper (inner) side nearly parallel to rachis, the lower cuneate; some minute scales on the flattened midrib beneath. Veins simple or more often once or twice furcate; short recurrent veins present. Sori well within the margin with 13—16 sporangia. By its long-stalked pinnæ with few but proportionally very broad pinnæ of a yellowish-green colour it seems to deserve a name of its own; I propose to name it **A. siamensis** n. sp.

Additamenta.

Supplement to some families dealt with in earlier parts of the "Flora of Koh Chang".

Leguminosae.

Conf. Bot. Tidsskr. **24**: 264—267 (Fl. of Koh Chang, part V).

Parkia R. Br. (det. Craib).

4. **P. streptocarpa** Hance, Journ. of Bot. XIV. 259.
Jungle near Lem Dan (no. 470).

Area: Siam.

Cassia L.

8. **C. occidentalis** L. (see part V) (det. Craib).
Plains at Lem Dan (no. 452).

Saraca L. (det. H. Harms).

25. **S. minor** Miq. Fl. Ind. Bat. I. 84; *S. indica* part. Baker in Hook. Fl. Br. Ind. II. 271.
River-bank at Klong Prao no. 705).

Area: Java.

Derris Lour. (det. Craib).

26. **D. uliginosa** (D. C.) Benth.; Fl. Br. Ind. II. 241.
Rayong (no. 878).

Area: From China through tropical Asia, Australia, Polynesia and East Africa.

Combretaceae, det. C. H. Ostenfeld.

Conf. Bot. Tidsskr. **26**: 168 (Fl. of Koh Chang, part VIII).

Terminalia Linné.

7. **T. citrina** Roxb.; Clarke in Hook, Fl. Br. Ind. II. 446.
Klong Son (no. 657).

Area: N. India, Assam, Burma, Malacca.

Combretum Linné.

8. **C. extensum** Roxb.; Clarke in Hook. Fl. Br. Ind. II. 458; Craib, Contr. Fl. Siam 83.
Rocks at sea-shore (no. 629).

Area: India, Indo-China, Malaya, Philippines.

Melastomaceae.

Conf. Bot. Tidsskr. **24**: 344—345 (Fl. of Koh Chang, part VI).

Memecylon L. (det. Craib).

7. **M. costatum** Miq. Clarke in Hook. Fl. Br. Ind. II. 558.
Jungle at Klong Munsé, river-bank (no. 532).

Area: Malacca, Java, Sumatra, Borneo.

8. **M.** sp. near *M. coeruleum* Jack; Clarke in Hook. Fl. Br. Ind. II. 559.
A small tree growing at Klong Majum, alt. ca. 700 ft. (no. 613 a); Koh Saket, inside littoral zone (no. 341).

Area of *M. coeruleum*: Malay Peninsula, Philippines.

An indeterminable species of *Memecylon* was collected at Klong Majum (no. 598).

Convolvulaceae.

Conf. Bot. Tidsskr. **26**: 170 (Fl. of Koh Chang, part VIII).

Erycibe Roxb.

E. Schmidtii Craib, sp. n., ramulis lenticellatis, inflorescentia terminali brevi racemiformi cognoscenda.

Ramuli graciles, cortice primo fuscescente mox brunnescente lenticellato obtecti. *Folia* saepius oblongo-elliptica angusteve elliptica, apice obtuse acuminata, basi cuneata, 6—8,5 cm. longa, 2—3,5 cm. lata, subcoriacea, pagina utraque glabra, nervis lateralibus utrinque circiter 8 pagina utraque subconspicuis et inferiore vix subprominulis, nervis transversis sparsis sub oculo armato tantum visis, integra, petiolo ad 1,3 cm. longo supra canaliculato puberulo fusco suffulta. *Inflorescentia* terminalis, racemiformis, 3 cm. longa, pedunculo communi circiter 1 cm. longo simul ac rhachi sparse ferrugineo-puberulo suffulta; pedicelli fusci, 5 mm. longi. *Sepala* 2,75 mm. longa, ciliolata. *Corolla* generis, tubo circiter 3 mm. longo, lobis quam tubo saltem duplo longioribus. *Fructus* haud maturus, ellipsoideus, apiculatus, circiter 10 mm. longus et 7 mm. diametro, ater, glaber.

River-bank at Klong Son, a shrub, perhaps a liana (no. 686 b).

Rubiaceae.

Conf. Bot. Tidsskr. **24**: 329—341 (Fl. of Koh Chang, part VI).

Psychotria sp. verisimiliter *P. angulata* Korth.; Hook. Fl. Br. Ind. III. 172.
Jungle at Klong Munsé (no. 394) det. Craib).

Area of *P. angulata*: Burma to Malacca, Java, Borneo.

An indeterminable specimen of *Diplospora* was collected in the jungle at Klong Munsé (no. 590), and another of *Coffea* at Koh Kahdat (no. 554), a shrub with white fruits.

Gentianaceae.

Conf. Bot. Tidsskr. **24**: 263 (Fl. of Koh Chang, part V).

Canscora Lam. (det. C. B. Clarke).

C. ? diffusa (Vahl) R. Br.; Clarke in Hook. Fl. Br. Ind. IV. 107; Craib, Contr. Fl. Siam 138.
On rocks in jungle (no. 284).

Area: Tropical Asia, Australia, Africa.

Loranthaceae.

Conf. Bot. Tidsskr. **24**: 256—257 (Fl. of Koh Chang, part V).

7. **Loranthus** sp. near *L. ampullaceus.*
Koh Sahket, at the sea (no. 332 a).

Urticaceae, det. Craib.

(Incl. *Moraceae* et *Ulmaceae.*)

Conf. Bot. Tidsskr. **24**: 352—354 (Fl. of Koh Chang, part VI).

1. **Artocarpus lakoocha** Roxb.; Hook. Fl. Br. Ind. V. 543.
Koh Kahdat (no. 556).

Area: From Himalaya through Burma to Malacca.

Streblus Loureiro (Moraceae).

2. **S. asper** Lour.; Fl. Br. Ind. V. 489; Craib, Contr. Fl. Siam 196.
Plains at Lem Dan (no. 431).

Area: E. Asia.

Trema Loureiro (Ulmaceae).

3. **T. amboinensis** Bl.; Fl. Br. Ind. V. 484; Craib, Contr. Fl. Siam 195. *T. velutina* Planch. in Ann. sc. nat. ser. 3. X. 327.
Near Lem Dan, river-bank (no. 243), dry river-bed (no. 447), plains (no. 301).

Area: Sikkim, Assam to Malaya.

4. **T. virgata** Bl., Mus. Bot. II. 60. *T. timorensis* Hook. f., Fl. Br. Ind. V. 483, an Dcne.?
Plains N. of Lem Dan (no. 303).

Area: China, Indo-China, Malaya.

Fagaceae.

Conf. Bot. Tidsskr. **24**: 255 (Fl. of Koh Chang, part V).

4. **Quercus**? **Reinwardtii** Korth.; Miquel, Fl. Ind. Bat. I, 1, p. 859; Wenzig, Die Eichen Ost- und Südasiens; Jahrb. Bot. Garten Berlin IV

1886, p. 234; Geo King: The Indomalayan Sp. of Quercus and Castanopsis. Ann. roy. bot. Garden Calcutta II. 1889 p. 63, tab. 57 A.

The material is not sufficient for a sure identification, ripe fruits being absent. The late Mr. Otto v. Seemen, of Berlin, to whom I had sent the material, remarked that in *Q. Reinwardtii* the young fruits are more narrowed towards the base than in No. 586. Besides, the leaves should be grey beneath, but they are glabrous, brownish and dim. According to Mr. v. Seemen, the young fruits and the leaves of No. 586 show some features calling to mind *Q. costata* Bl., whose catkins are however much longer than those of No. 586. (O. Paulsen.)

A tall tree in the jungle on river-bank (no. 586).

Araceae.

Conf. Bot. Tidsskr. **24**: 272—276 (Fl. of Koh Chang, part V).

Colocasia L. (det. Craib).

16. **C. antiquorum** Schott; Hook Fl. Br. Ind. VI. 523.
Koh Kahdat in the jungle (no. 808).

Area: Cultivated in all hot countries.

Orchidaceae.

Conf. Bot. Tidsskr. **24**: 6—13 (Fl. of Koh Chang, part I).

Aerides Lour. (det. Craib).

31. **A.** sp. probably *A. falcatum* Lindl., Hook. Fl. Br. Ind. VI. 46.
Koh Kahdat, epiphytic in the littoral jungle (no. 577).

Area of *A. falcatum*: Burma.

Podochilus Bl.

32. **P. sciuroides** Rchb. f. in Bonplandia V. 41. (det. Warburg).
Klong Majum, epiphytic on *Boea* sp. (no. 823).

Area: Java.

Adactylus Rolfe.

33. **A. nudus** (R. Br.) Rolfe, Orch. Rev. IV. 329; *Apostasia nuda* R. Br.; Hook. Fl. Br. Ind. VI. 175.? (material inadequate).
Nipple (no. 881).

Area: From Assam to Malacca, Sumatra, Java.

Microstylis Nutt.

34. **M. congesta** Reichb. f., Hook, Fl. Br. Ind. V. 689.?
Islet n. of Koh Chang (no. 698 e).

Area: Tropical Asia and Australia.

Concluding remarks.

The "Flora of Koh Chang", publication of which was commenced in the year 1900 (with Part I), is now, with the present issue of Part X, brought to a close.

The first eight parts appeared in the course of a few years (1900—1904), after which, however, five years elapsed before the issue of Part IX, and a further period of years before the present concluding part was ready for print. This delay, due to circumstances beyond my control, I very much regret.

Of the botanical collections brought home, all, save for a single group, have now been worked up. The exception is that of the perforating algæ, the investigation of which, entrusted to the care of M. Maurice Gomont of Paris, was brought to a standstill upon his decease.

The following botanists have taken part in the work of dealing with the collections:

O. Beccari, Firenze.
F. Brotherus, Helsingfors.
H. Christ, Bâle.
Carl Christensen, Copenhagen.
† C. B. Clarke, Kew.
W. G. Craib, Kew.
U. Dammer, Berlin.
A. Engler, Berlin.
† M. Foslie, Trondhjem.
E. Gilg, Berlin.
† M. Gomont, Paris.
E. Hackel, St. Pölten.
H. Hallier, Leiden.
H. Harms, Berlin.
F. Heim, Paris.
F. Kränzlin, Berlin.
G. Massee, Kew.
Carl Mez, Halle.
O. Nordstedt, Lund.
C. H. Ostenfeld, Copenhagen.
Ove Paulsen, Copenhagen.
F. Pax, Breslau.
V. A. Poulsen, Copenhagen.
L. Radlkofer, Munich.
F. Kölpin Ravn, Copenhagen.
Th. Reinbold, Itzehoe.
† E. Rostrup, Copenhagen.
R. Schlechter, Berlin.
† K. Schumann, Berlin.
O. Stapf, Kew.
F. Stephani, Leipzig.
Edw. A. Wainio, Helsingfors.
O. Warburg, Berlin.
Eug. Warming, Copenhagen.
G. S. West, Birmingham.
† W. West, Bradford.
E. Ostrup, Copenhagen.

It is now my pleasant duty to express my hearty thanks to each of the gentlemen above mentioned, for their obliging readiness in undertaking the work, as well as for the care with which they have carried it out.

The ten parts of which the "Flora of Koh Chang" consists, includes in all 1513 plants determined as to species, of which 194 were new to science. These species may be systematically divided as follows:

Phanerogams 521 of which 57 new; pteridophyta 72, of which 6 new; mosses (Bryales and Hepaticæ) 61, of which 23 new; algæ 669, of which 38 new; lichens 95, of which 39 new, and fungi 95, of which 31 new.

In addition, a number of species are noted under the different genera as not identified with certainty.

The material having been distributed among numerous specialists, the work upon the different sections naturally could not progress at a uniform rate, in consequence of which it was impossible to let the various groups appear in systematic order, and again, I have not always succeeded in placing all the species belonging to one family in the same part of the publication. To the present Part X is therefore appended an index, drawn up by Carl Christensen, M. Sc., which will, it is hoped, in some degree obviate the difficulties thus arising.

Especial thanks are due to my friend Dr. C. H. Ostenfeld, Inspector of the University Botanical Museum at Copenhagen, for the valuable assistance which he has afforded me in the placing and treatment of the material.

Finally, I beg to thank the Danish Botanical Society for according space to the "Flora of Koh Chang" in their Journal, and also the Carlsberg Fund, who have, besides granting me financial support towards my stay in Siam 15 years ago, and during the subsequent treatment of the material, also borne the printing expenses.

Carlsberg Laboratory, Copenhagen,
December 14, 1915.

Johs. Schmidt.

Index

to Families, Genera and New Species.

(The figures in the first column refer to volume and page of "Botanisk Tidsskrift"; those in the second to the part of the "Flora of Koh Chang" and the page of the separate reprints).

CONTENT OF PRECEDING PARTS.