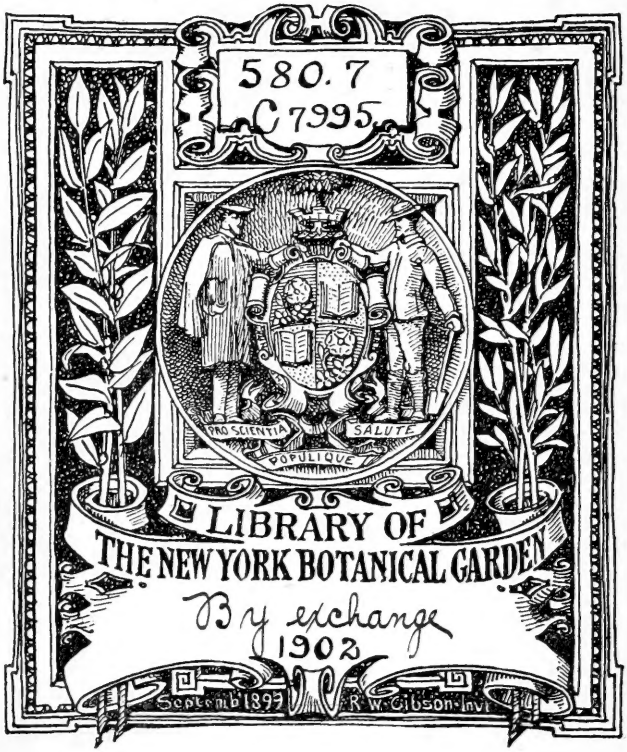
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Særtryk af Botanisk Tidsskrift 24. Bind 3. Hefte. København 1902.

Arbejder fra den Botaniske Have i København. Nr. 1.

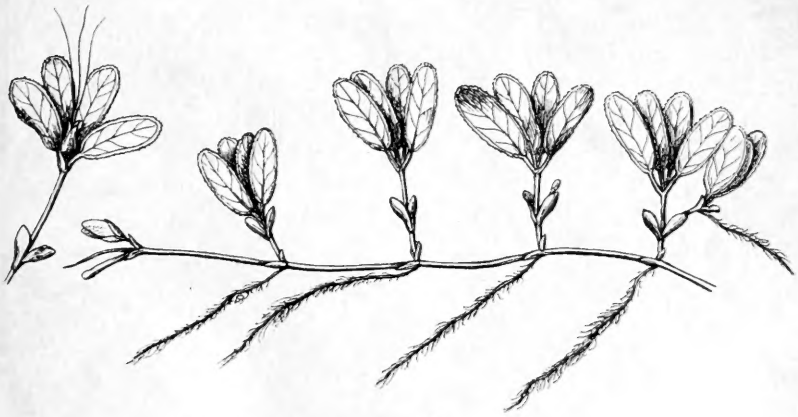
Halophila Aschersonii, n. sp.

By

C. H. Ostenfeld.

Halophila Aschersonii, n. sp. Rhizome creeping, with scales in pairs. Shoots erect, issuing from the upper scale of each pair; one pair of scales on the middle of the shoots and on the top two pairs of leaves forming a verticillaster or false whorl; a rhizome of lower order issues often from the base of the upper scale of the shoots. Leaves shortstalked, petiole about $^1/_3$—$^1/_2$ of the leaf, lamina simple, elliptic, 8—15 mm. long, 4—7 mm. broad, with finely dentate margin, one midvein and two veins within the margins connected with 3—5 pairs of transversal veins. Only the female plant is known, female flower terminal, sessile, with a spathe formed by two perfoliate, acute bracts, ovary globose with a 5 mm. long linear upper part, sepals very minute, stigmas 3, linear, 15—20 mm. long, with rather conspicuous papillae.

Habitat. 1) West-Indies: St. Croix, the lagoon of Christianssted, creeping in mud at about 1 Meter's depth together with *H. Baillonis* Aschs.



Halophila Aschersonii Ostf. — Natural size.

February 26, 1892, collected by H. Lassen. 2) Between algae from St. Croix collected in 1896 by F. Börgesen. 3) Also older specimens of this plant

are to be found in the Herbarium of the Botanic Garden at Copenhagen labelled by Hornemann: „Sub nom. Lemnae accepi ex Ind. occid. — an Marsilea vel Azolla?“

This pretty little *Halophila* which I have named in honour of the German botanist professor P. Ascherson who has added so much to the knowledge of the genus, is nearest to *H. Engelmanni* Aschs. from Florida, but the latter is taller and has lanceolate to linear-lanceolate leaves, 3 pairs together on the top of the shoot, and many more transversal ribs.

As I am preparing a little monograph of the genus *Halophila*, I should be very glad if botanists would send me plants for revision, as well as specimens dried up as specimens prepared in alcohol. — The genus consists only of 8 species, but they are very interesting both from a morphological and from a geographical point of view. I should think that the following division of the genus would prove to be a natural one:

1. *Spinulosae*. Rhizome with scales, the erect shoots with numerous pairs of leaves, arranged as in *Potamogeton densus*, leaves sessile elliptic or obovate with oblique base and with dentate margins.

H. spinulosa (R. Br.) Aschs., China to Australia.

2. *Americanae*. Rhizome with scales, the erect shoots with one pair of scales and 2 or 3 pairs of leaves, arranged in a verticillaster; leaves stalked, lanceolate or elliptic with dentate margins.

H. Engelmanni Aschs., Florida; *H. Aschersonii* Ostf., St. Croix.

3. *Typicae*. Rhizome with scales, the erect shoots with one pair of leaves and without scales; leaves stalked, lanceolate or ovate with dentate or entire margin.

H. ovalis (R. Br.) J. D. Hook., from the Red Sea to the Pacific Ocean; *H. stipulacea* (Forsk.) Aschs., the Red Sea and the Western Part of the Indian Ocean; *H. decipiens* Ostf., n. sp., the Gulf of Siam[1]); *H. Baillonis* Aschs., West Indies.

4. *Pusillae*. Rhizome without scales, but with leaves; leaves stalked „with sheathing, auricled base“ (according to Ascherson & Gürcke in Engler, Natürl. Pflanzenfam. II, 1, p. 249). *H. Beccarii* Aschs., Arakan and Borneo.

The Botanic Museum of Copenhagen, November 1901.

(Separates issued January 10, 1902.)

[1]) v. p. 260.

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Arbejder fra den Botaniske Have i København. Nr. 2.

(No. 2—6 are reprinted from Johs. Schmidt: Flora of Koh Chang.)

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

[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 direction 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).

[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

[1]) In Java, *B. eriopetala* 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.

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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. Fan. 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.

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Arbejder fra den Botaniske Have i København. Nr. 4.

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.

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Arbejder fra den Botaniske Have i København. Nr. 5.

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.

Særtryk af Botanisk Tidsskrift 24. Bind 3. Hefte. København 1902.

Arbejder fra den Botaniske Have i København. Nr. 6.

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.

Særtryk af Vidensk. Medd. fra den naturh. Foren. i Kbhvn. 1901.

Arbejder fra den Botaniske Have i København. Nr. 7.

Ranunculaceae collected by Ove Paulsen during the Danish Expedition to Asia Media in 1898—1899.

By

C. H. Ostenfeld.

During the Danish scientific expedition to Asia Media in the years 1898—1899 the botanist, Mag. sc. Ove Paulsen brought home a very large collection of plants especially from Pamir. The Ranunculaceae of his collection were given me for determination, and I publish here the result of my researches. The species are 33 in number, of which one *Ranunculus* is new.

It is not easy to determine plants from Asia because it is very difficult to use the Russian literature; there are numerous small lists scattered in various papers, some of which are written in Russian language and others are not present in the libraries of Copenhagen. But we have rather large collections from Asia Media in the Herbarium of the Botanic Museum at Copenhagen, so that I think my determinations will prove to be almost correct.

In the following list I have quoted the principal lists from Asia Media as well as the floras of Ledebour, Hooker & Thomson and of Boissier after the name of the species.

I. Trollius L.

1. ***T. songaricus*** Regel, Acta Horti Petropolitani VII, 1883 p. 383 („T. dschungaricus"); *T. europaeus* var. *songorica*

Regel, Suppl. II ad enum. pl. a Semenov. collect., Fasc. I, in Bull. Soc. Nat. Moscou XLIII, 1870 p. 243; O. & B. Fedtschenko, Ranunculaceen d. russisch. Turkestans in Engler, Botan. Jahrb., XXVII, 1899 p. 419.

N. 456. Alai-Mountains, in the juniper forests by Olgin Lug, alt. 2900 m.; June 21., 1898 (fl.).

Area: Siberia, Altai, Songaria, Tjanschan.

II. Eranthis L.

2. ***E longistipitata*** Regel, Supp. Semenov, 1870 p. 244; Acta Horti Petropol., V p. 224; V. Komarow: Materialy po flore turkestanskago nagorja. Bassein Serawschana, Trav. Soc. Natur. de St. Petersbourg. XXVI, 1896 p. 69; O. & B. Fedtschenko, l. c. p. 420.

N. 1660. Ferghana, on a mountain near Osh; April 18., 1899. (fr).

Area: Tjanschan, Alai, Pamir.

III. Isopyrum L.

3. ***I. grandiflorum*** Fisch. in DC., Prodromus I p. 48; Royle, Illustr. of the Botany etc. of the Himalayan Mountains, 1839, p. 54, tb. 11; Ledeb., Fl. Ross., I p. 53; Maximowicz, Diagn. plant. nov. asiat. V, in Bull. de l'Acad. Imp. des Sciences de St. Petersbourg, XI, 1883 p. 627; Hook., Fl. of British India I p. 23; Aitchison, Flora of the Kuram-Valley, Journ. of the Linnean Soc., Bot. XVIII 1880—81 p. 31; Komarow, l. c. p. 68; O. & B. Fedtschenko, l. c. p. 420.

N. 453. Alai-Mountains, in the juniper forests by Olgin Lug, alt. 2900 m.; June 21., 1898 (fl.).

N. 560. Alai-Mountains, on the mountains near Olgin Lug, alt. 3200 m.; June 24., 1898 (fl.).

Area: Altai, Tjanschan, Pamir, West-Himalaya.

4. ***I. anemonoides*** Kar. & Kir., Enum. pl. Songor., Bull. Nat. Moscou 1842, p. 135; Maximowicz, l. c. p. 633; O. & B. Fedtschenko, l. c. p. 421; Komarow, l. c. p. 68; *I. thalictroides*

Hook., Fl. of British India, I, p. 23; Aitchison, l. c. p. 31; not Linné.

N. 432. Alai-Mountains, in the juniper forests by Olgin Lug; alt. 2700 m.; June 20., 1898 (fl.).

N. 989. Pamir, in moist ground in the clefts in the mountains near Jashil Kul, alt. 3900 m., July 29., 1898 (fl.).

Area: Afghanistan, Pamir, Alai, Tjanschan, Mongolia, West-Himalaya.

IV. **Nigella** L.

5. ***N. integrifolia*** Regel, Suppl. Semenov., 1870 p. 246; Aitchison, Bot. of the Afghan Delimination Commiss., Transact. Linn. Soc. London, Sec. Series, Vol. III, Botany, Part I, 1888, p. 30; Komarow, l. c. p. 69; O. & B. Fedtschenko, l. c. p. 421; *N. diversifolia* Franchet, Pl. du Turkestan, Ann. sc. nat. 1883, XV p. 220, tb. 10; *Komaroffia diversifolia* O. Kuntze, Pl. orient. Ross., Acta Horti Petropol., X, 1887 p. 144.

N. 244. Samarkand, on the steppe at Ujimawut, May 22., 1898 (fl.)

Area: Transcaspia, Turkestan, Afghanistan.

V. **Delphinium** L.

6. ***D. cashmirianum*** Royle, l. c. p. 55, tb. 12; Hook. Fl. of British India I. p. 26; E. Huth, Monographie der Gattung Delphinium in Engler, Botan. Jahrb., XX, 1884 p. 394; O. & B. Fedtschenko, l. c. p. 424; *D. cashmirianum* var. *Jacquemontianum*, Duthie, Pl. coll. on the Pamirs, in A. W. Alcock, Report on the Natural History results of the Pamir Boundary Commiss., Calcutta 1898, N. 5.

Differs from the type: bracteolae opposite, close to the sepals; spur only a little shorter than the sepals.

N. 1065, 1066. Pamir, in the dry bed of a little stream near Jashil Kul, alt. 3800 m., August 8., 1898 (fl. and fr.).

Area: Tibet, Kashmir, West-Himalaya, Pamir.

7. ***D. speciosum*** M. Bieberstein, Fl. taur.-caucas., II, 1808 p. 12; Ledeb., Fl. Ross., I p. 64; Boiss. Fl. Orient. I p. 93; Huth, Monographie, p. 415; Komarow, l. c. p. 73; O. & B. Fedtschenko, l. c. p. 425.

Differs from the type: bracts and bracteolae small, linear; bracteolae often removed from the sepals; upper petals sparingly hairy at the top, lower petals without yellow spot.

N. 1176. Pamir, on moist ground in a valley near Bulung Kul; alt. 3800 m., August 27., 1898 (fl.).

Area: Caucasus, Persia, Turkestan, Pamir, Himalaya.

8. ***D. persicum*** Boiss., An. sc. nat. XVI, 1841, p. 362; Fl. orient. I p. 76; Huth, Monographie, p. 370; Aitchison, Afghan Deliminat. Comm., 1888, p. 30; Komarow, l. c. p. 71; O. & B. Fedtschenko, l. c. p. 423.

var. *Regelianum* Huth, l. c.

N. 182. Buchara, on the steppe at Kujumasar, May 13., 1898 (fl.).

Area: Buchara; Area of the main species: Transcaucasia, Mesopotamia, Persia, Turkestan, Afghanistan.

9. ***D. rugulosum*** Boiss., l. c. p. 361, Fl. orient. I p. 76; Aitchison, 1888 p. 30; Komarow l. c. p. 71; O. & B. Fedtschenko, l. c. p. 423.

N. 147. West Turkestan, on the steppe at Kunikud between Djisak and Syrdaria, May 10., 1898 (fl.).

Area: Persia, Turkestan, Buchara, Afghanistan.

VI. Ceratocephalus Moench.

10. *C.* ***orthoceras*** DC.; Boiss., Fl. Orient. I p. 58; Ledeb. Fl. Ross. I p. 26; Komarow, l. c. p. 52; O. & B. Fedtschenko, l. c. p. 410; *Ranunculus falcatus* v. *orthoceras* Aitchison, Journ. Linn. Soc. XVIII, p. 30.

N. 76. Samarkand, in cultivated ground; May 3., 1899 (fl. and fr.).
N. 593. Alai-Steppe, common, alt. 3300 M., July 27., 1898 (fr.).
N. 1652. Ferghana, on a mountain near Osh, April 18., 1899 (fl.).
Area: South-Eastern Europe, Caucasus, Persia, Beluchistan to Altai.

11. *C.* ***falcatus*** (L.) Pers; Boiss., Fl. Orient. I p. 58; Ledeb., Fl. Ross. I p. 26; Komarow, l. c. p. 52; O. & B. Fedtschenko, l. c. p. 410; *Ranunculus falcatus* Hook. f. Fl. of British India I p. 16; Aitchison, Afghan Deliminat. Comm., 1888 p. 30.

N. 56. Transcaspia, Askabad, April 24., 1898 (fr.).

Area: South-Europe, South-Russia, Caucasus, Beludchistan to Himalaya.

VII. **Ranunculus** L.

12. ***R. paucistamineus*** Tausch, Flora XVII, 1814; *R. aquatilis* Aitchison, Journ. Linn. Soc. XIX p. 149, Afghan Deliminat. Commiss. 1888 p. 29; O. & B. Fedtschenko, l. c. p. 411; *R. aquatilis β, pantothrix*, Ledeb., Fl. Ross. I p. 27; *R. aquatilis*, var. *trichophyllus* Hook. Fl. of British India I p. 16; Duthie, Plants coll. on the Pamirs; *Batrachium paucistamineum* Gelert, Studier over Slægten Batrachium, Kjøbenhavn, Botanisk Tidsskrift, XIX p. 26; *B. aquatile β submersus* Komarow, l. c. p. 53.

Of this polymorphous species the following forms have been collected: f. *divaricata* (Schrank) Gelert, (N. 65, 1776), f. *Drouetii* (F. Schultz) Gelert (N. 1113, 1156, 1451) and f. *eradicata* (Laestad.) Gelert (N. 1445); the two latter are mountain forms of which f. *eradicata* is thinnest and smallest. The European form which has floating leaves (f. *diversifolia* (Schrank) Gelert) has not been found in Asia; all the authors (e. g. Hooker p. 16, Fedtschenko p. 411) write that they have never seen specimens from Asia with floating leaves.

N. 65. Buchara, in a pool, April 26., 1898 (fl. and fr.).

N. 1776. Merv, in a pool, June 5., 1899 (fl. and fr.).

N. 1113. Pamir, in the lake Jashil Kul. alt. 3800 m., August 15., 1898 (fl.).

N. 1156. Pamir, in pools near the lake Bulung Kul, alt. 3800 m., August 24., 1898 (fl. and fr.).

N. 1451. Pamir, Ishkashim, in a little stream near Nut, alt. 2700 m., October 3., 1898 (fl. and fr.).

N. 1445. Pamir, Ishkashim, in a pool near Rang, alt. 2700, October 1., 1898 (fl. and fr.).

Area: Common through the whole of Europe, North Africa, Siberia, Mongolia, Himalaya; the f. *eradicata* only in the Arctic and Alpine regions (Arctic Scandinavia, Finland, Siberia, Iceland, Greenland).

13. ***R. natans*** C. A. Meyer in Ledeb., Fl. Alt., II p. 315; Ledeb. Fl. Ross. I p. 34; *R. hyperboreus* Rottb., var. *natans* Hook.,

Fl. of British India I p. 18, Komarow, l. c. p. 62; O. & B. Fedtschenko, l. c. p. 414.

I do not agree with Hooker, Regel etc. in considering *R. natans* a mere variety of the Arctic *R. hyperboreus*, the leaves, the heads of achenes and the whole habit are very different.

N. 512. Alai-Mountains, in the Taldyk-stream at Olgin Lug, alt. 2600 m., June 23., 1898 (fl. and fr.).

N. 696. Pamir, in pools at Pamirsky Post, alt 3800 m., July 8., 1898 (fl. and fr.).

N. 1113 b. Pamir, in the lake Jashil Kul, alt. 3800 m., August 15., 1898 (fl. and fr.).

Area: Altai, Himalaya, Tjanschan, Pamir, Alai.

14. ***R. pulchellus*** C. A. Meyer in Ledeb. Fl. Alt. II p. 333; Ledeb., Icon. Pl. Fl. Ross. Alt., tb. 111, Fl. Ross. I p. 33; Boiss. Fl. Orient. I p. 32; Hook. Fl. of British India I p. 17; O. & B. Fedtschenko, l. c. p. 414; Komarow, l. c. p. 60.

— — var. ***pseudo-Hirculus*** (Schrenk) Trautv., Enum. Pl. Songor., Bull. Soc. Nat. Moscou 1860 p. 68; *R. pseudo-Hirculus* Schrenk in Fisch. & Meyer, Enum. pl. Schrenk II p. 65.

N. 805. Pamir, on moist ground at the Alitshur-stream by Bosala, alt. 3900 m., July 16., 1898 (fl.)

N. 1194. Pamir, at the shore of the lake Bulung Kul, alt 3800 m., August 30., 1898 (fl.).

— — var. ***longicaulis*** (C. A. Meyer) Trautv., l. c. p. 68; Duthie, Plant coll. in the Pamirs; *R. longicaulis* C. A. Meyer in Ledeb., Fl. Alt. II p. 308; Ledeb., Icon. Pl. Fl. Ross. Alt. tb. 117; Fl. Ross. I p. 33.

N. 698. Pamir, in a pool near Pamirsky Post, alt. 3800 m.. July 8., 1898 (fl. and fr.).

Area: Mongolia, Dahuria, West Tibet, Pamir, Himalaya, Tjanschan, Afghanistan, Dschungaria.

15. ***R. alaiensis*** n. sp.

Caespitosus sine stolonibus; radix fibroso-grumosa; caules adscendentes, 1 — pauciflori, adpresse pilosi vel in parte inferiori glabri; scapus primarius 5—10 cm. altus infra medium folio so-

litario, magno, obovato vel obcordato, integerrimo, sessile vel subpetiolato instructus; scapus secundarius e basi folii solitarii exiens. foliis duobus suboppositus instructus; folia radicalia petiolis breviora, subcarnosa, obovata vel elliptica, glabra vel parce pilosa, basi cuneata, apice integerrima vel (rarius) tridentata, dentibus subacutis; sepala 5, decidua, glabra, flavescentes, ovata; petala sepalis duplo vel triplo longiora, plerumque 8-10, obovato-oblonga vel spathulata, apice rotundata, basi attenuata, aurea, foveola squamulaque instructa; gynophorum glabrum; carpella glabra, oblique ovata; stylus acheno subduplo brevior (fructus maturos non vidi), apice uncinato capitula fructifera subglobosa.

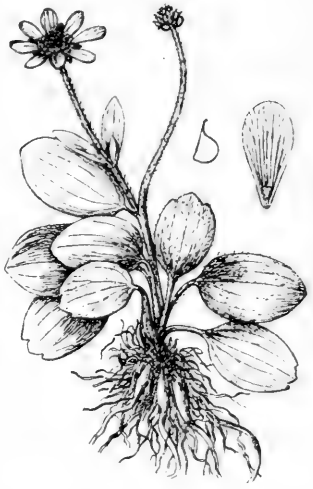

Fig. 1. *Ranunculus alaiensis* n. sp. A plant $^2/_3$ nat. size, petal and achene $1^1/_3$ nat. size.

This pretty little *Ranunculus* is allied to *R. plantaginifolius*, but differs in the wanting of stolons, the large stem-leaves, the entire root-leaves with their cuneate base, the glabrous sepals and the large petals.

From *R. pulchellus* and its varities it differs in not dilated base of the stalk-leaves, the broad obovate root-leaves, the oblong petals and their number, the subglobose fruit- and the uncinate style.

N. 596. Alai-Steppe, by Sary-tash, common at the rivers, alt. 3300 m., June 27., 1898 (with flowers and young fruits).

16. ***R. Seweržowi*** Regel, Acta Horti Petropol., V p. 221, Komarow: l. c. p. 58; O. & B. Fedtschenko, l. c. p. 413; *R. lep-*

torrhynchus Aitch. & Hemsley in Aitchison, Afghan Delimin. Commiss., 1888, p. 29, tb. 1.

I cannot see any difference between *R. Sewerzowii* Regel and *R. leptorrhynchus* Aitch. & Hemsley.

N. 117. Samarkand, common on the steppe near Chawast, May 7., 1898 (with flowers and young fruits).

Area: Afghanistan, Pamir, Alai, Chodshent, Karatau.

17. ***R. Winkleri*** Komarow, l. c. p. 59; O. & B. Fedtschenko l. c. p. 413.

N. 1526. Ferghana, on a mountain near Osh, alt. 1200 m., April 10., 1899 (fl.).

Area: Pamir, Serawschan.

18. ***R. Aucheri*** Boiss., Ann. Sc. Nat. II Sér. XVI p. 351, Fl. Orient. p. 34; Aitchison, Kuram Valley, Journ. Linn. Soc. Bot. XIX 1881—82 p. 149.

The collected specimens are very young, but I had examples from the Kuram Valley (Aitchison) and from Persepolis (Boissier) for comparison and they agree very well.

N. 786. Pamir, on moist ground in the mountains near Tshatir Tash, alt. 4200 m., July 15., 1898 (fl.).

Area: Persia, Afghanistan.

19. ***R. rufosepalus*** Franchet, Ann. Sc. Nat. 1883, XV, p. 217; Komarow l. c. p. 62; Duthie, Plants coll. in the Pamirs; O. & B. Fedtschenko, l. c. p. 417.

N. 787. Pamir, on moist ground in the mountains near Tshatir Tash, alt. 4200 m., July 15., 1898 (fl.).

N. 1008, 1086 a. Pamir, on moist ground in the clefts near Jashil Kul, alt. 4000 m., August 1. and 11., 1898 (fl. and fr.).

Area: Tjanschan, Alai, Pamir.

20. ***R. rubrocalyx*** Regel in Komarow, l. c. p. 62; O. & B. Fedtschenko, l. c. p. 417.

This is closely related to the preceding species but differs in having a few whitish hairs on the outside of the dark-purple sepals and sessile segments of the root leaves; *R. rufosepalus* has densely

placed brown hairs on the outside of the dark-brown (or dark-purple) sepals and the segments of the root-leaves are petiolate.

N. 1086 b. Pamir, together with the foregoing species on moist ground in the clefts near Jashil Kul, alt. 3900 m., August 11., 1898 (fl.).
Area: Pamir, Alai.

21. ***R. songaricus*** Schrenk in Fischer & Meyer, Enum. Pl. Schrenk. II 1842, p. 67; Komarow, l. c. p. 64; O. & B. Fedtschenko, l. c. p. 416.

N. 441, 458. Alai-Mountains, in the juniper forests by Olgin Lug, alt. 2600 m., June 20. and 21., 1898 (fl. and fr.).
Area: Mongolia, Songaria, Tjanschan, Alai, Pamir.

22. ***R. Steveni*** Andrz.; Komarow, l. c. p. 65; ? *R. laetus* O. & B. Fedtschenko, l. c. p. 48 ex parte; ? *R. laetus* Aitchison, Journ. Linn, Soc. XVIII p. 30; *R. acris* Boissier, Fl. Orient. I p. 48 ex parte.

The only collected specimen (more than one Meter high) is somewhat incomplete and without fruits, but I think it belongs to this species.

N. 393. Ferghana, near Gultsha, alt. 1600 m., June 17., 1898 (fl.).
Area: Central-Europe, Caucasus, Afghanistan, Turkestan, Pamir.

23. ***R. arvensis*** L.; Boiss., Fl. Orient. I p. 57; Hook. Fl. of British India I p. 20; Ledeb., Fl. Ross. I p. 46; Aitchison, Afghan Deliminat. Comm. 1888, p. 30; Komarow, l. c. p. 65; O. & B. Fedtschenko, l. c. p. 419.

N. 103. Samarkand, in moist meadow soil, May 6., 1898 (fl. and fr.).
Area: Whole Europe, North Africa, Turkestan, Afghanistan, North-India, Persia etc.

VIII. **Oxygraphis** Bunge.

24. ***O. glacialis*** (Fisch.) Bunge, Verzeichniss, Suppl. z. Flora Altaica, 1836 p. 46; Ledeb., Fl. Ross. I p. 47; Hook. Fl. of British India I p. 21; Komarow, l. c. p. 67; *Ficaria glacialis* Fischer in DC. Prodromus I p. 44.

N. 635. North-Pamir, Kisil Kul, alt. 4000 m., June 29., 1898 (with young fruits).

Area: Altai, Dahuria, Pamir, Himalaya.

IX. Adonis L.

25. ***Adonis aestivalis*** L.; Boiss., Fl. Orient. I p. 17; Ledeb., Fl. Ross. I p. 23; Hook. Fl. of British India I p. 15; Aitchison, Journ. Linn. Soc., XVIII p. 30; Komarow, l. c. p. 51; O. & B. Fedtschenko, l. c. p. 409.

— — var. ***miniata*** Jacq.

N. 388. Ferghana, in the bed of the Kurshab-stream by Gultsha, alt. 1600 m., June 17., 1898 (fl. and fr.).

N. 500. Alai-Mountains; near Olgin Lug, alt. 2600 m., June 22., 1898 (small, flowering specimens).

Area: Central- and South-Europe, North Africa, Caucasus, Armenia, Syria, Persia, Afghanistan, Himalaya, Turkestan.

X. Thalictrum L.

26. ***T. Trautvetterianum*** Regel in Komarow, l. c. p. 48; O. & B. Fedtschenko, l. c. p. 407.

This Thalictrum is a very remarkable species, which forms a connection between *T. alpinum* and the other species.

N. 1645. Ferghana, on a mountain near Osh., April 18., 1899 (with wel-develloped fruits).

Area: Pamir.

27. ***T. minus*** L. var. ***elata*** (Jacq.) Lecoyer, Monographie du genre Thalictrum, Bull. Soc. Roy. Botan. de Belgique, XXIV, 1885 p. 199; Komarow, l. c. p. 47; O. & B. Fedtschenko, l. c. p. 406; *T. minus*, var *majus* Hook. Fl. of British India I p. 14; *T. elatum* & *T. majus* Boiss. Fl. Orient. I p. 9.

N. 1404. Pamir, Wakhan, Sermut, alt. 2900 m., September 21., 1898 (with ripe fruits).

Area: Europe, North-Africa, Asia (except the tropics), Alaska.

XI. Anemone L.

28. ***A. albana*** Stev., Mém. Soc. Nat. Moscou, III, 1812 p. 264; Boiss. Fl. Orient. I, p. 10; Hook. Fl. of British India I p. 7;

O. & B. Fedtschenko, l. c. p. 408; *Pulsatilla albana* Ledeb., Fl. Ross. I p. 22; Komarow, l. c. p. 49.

N. 455. Alai-Mountains, in the juniper forests by Olgin Lug, alt. 2600 m., June 21., 1898 (fl.).

N. 591. Alai-Steppe, alt. 3300 m., June 27., 1898 (fl.).

Area: Caucasus, Persia to Turkestan and Siberia.

29. ***A. biflora*** DC., Syst. I p. 201; Boiss., Fl. Orient. I p. 10; Hook. Fl. of British India I p. 7; Regel, Desc. Pl. Nov., IX, Acta Horti Petropol., VIII, 1884 p. 689; Aitchison, Afghan Deliminat. Comm., 1888, p. 29; Komarow, l. c. p. 50; O. & B. Fedtschenko, l. c. p. 407.

N. 354. Ferghana, Issyk Bulak near Osh, June 11., 1898 (fr.).

Area: Persia, Afghanistan, Beluschistan, Turkestan, Himalaya.

30. ***A. Tschernaewi*** Regel, l. c. p. 690, tb. XIV f. 3; Komarow, l. c. p. 49; O. & B. Fedtschenko, l. c. p. 408.

Very closely allied to the preceding species, especially the specimens from Ferghana (N. 1650) are almost intermediate having flowers like those of *A. Tschernaewi* and leaves approaching to those of *A. biflora*.

N. 586. Alai-Steppe, alt. 3300 m., June 27., 1898 (with flowers and young fruits).

N. 1650. Ferghana, on a mountain near Osh, April 18., 1899 (fl. and fr.).

Area: Buchara, Pamir, Afghanistan.

31. ***A. narcissiflora*** L.; Boiss. Fl. Orient. I p. 14; Ledeb. Fl. Ross. I p. 18; Hook. Fl. of British India I p. 10; Komarow, l. c. p. 50; O. & B. Fedtschenko, l. c. p. 408.

N. 466. Alai-Mountains, in the juniper forests by Olgin Lug, alt. 2700 m., June 21., 1898 (fl.).

Area: The Central-European Mountains, Caucasus, Ural, Persia, Kashmir, Pamir, Alai, Davuria, Turkestan, North-Western America.

XII. Clematis L.

32. ***C. alpina*** (L.) Mill., var. ***sibirica*** (L.) O. Kuntze, Monographie der Gattung Clematis, Verhandl. d. Botan. Provins Bran-

denburg, 1884, XXV p. 162; O. & B. Fedtschenko, l. c. p. 405; *Atragene alpina*, flor. ochroleucis, Ledeb. Fl. Ross. I p. 4.

N. 482. Alai-Mountains, in the juniper forests by Olgin Lug, alt. 2600 m., June 21., 1898 (fl.).

Area: From Eastern Russia through whole Siberia to Kamchatka and Japan.

33. ***Clematis orientalis*** L., Boiss., Fl. Orient. I p. 3; Hook. Fl. of British India p. 5; O. Kuntze, l. c. p. 123; Ledeb., Fl. Ross. I p. 3.

Of this very variable species the following forms have been collected.

— — var. ***acutifolia*** Hook. f. & Thoms., l. c. p. 5; *C. orientalis*, *β. graveolens*, 2. *Hookeriana* O. Kuntze, l. c. p. 124; *C. graveolens* Hook., Curtiss' Botan. Magazine 4495, non Lindl.; ? Aitchison, Journ. Lin. Soc. XVIII p. 29.

The collected specimens agree very well with the drawing of „*C. graveolens* Hooker" in Curtiss' Magazine, and I think it is the same as var. *acutifolia* in Hooker, Fl. of British India.

N. 1044. Pamir, near the lake Jashil Kul, alt. 3800 m., August 5., 1898 (fl.).

N. 1372. Pamir, Wakhan, near Langarkisht, alt. 3000 m., Septembre 13., 1898 (fr.).

— — var. ***tangutica*** Maxim., Fl. Tangutica I p. 3; *C. tangutica* Korshinsky, Fragm. Fl. Turkestan. I, Bull. Acad. Imp. Sc. St. Petersbourg, IX, 1898 p. 399; *C. tibetana* O. Kuntze, l. c. p. 172.

This very characteristic *Clematis* I think must be closely related to the preceding form, nearly all characters being identical in both, but it differs by its low stature, the solitary longstalked flowers and the entire lobes of the leaves (sometimes with few secundary lobes at the base).

N. 743. Pamir. Shatshan, alt. 3800 m., July 12., 1898 (with flowers and young fruits).

— — var. ***oblonga*** Regel apud Komarow l. p. c. 46; *C. orientalis*, var. *obtusifolia*, f. *oblongifolia* Regel in schedulis; ? *C. orientalis*, var. *obtusifolia* Aitchison, Journ. Linn. Soc., XIX p. 148.

The specimens have small flowers, leaflets tripartite or trilobate, lobes entire or sometimes with one or two teeth, oblong, obtuse; the whole plant densely villous.

Except in the villosity the specimens agree exactly with specimens collected 1877 by A. Regel at Kuldscha and labelled as above.

N. 2101. Chiwa; Chasar-asp, common in the forests along the river Amu-Darja; August 19., 1899 (with flowers and young fruits).

Area: Caucasus, Persia, Afghanistan, Himalaya, Thibet, Pamir, Turkestan, Altai, Manchuria; the var. *tangutica* is confined to Pamir, Thibet and Mongolia. —

(Separates issued January 15., 1902.)

Bianco Lunos Bogtrykkeri.

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Arbejder fra den Botaniske Have i København. Nr. 8.

Blivende Axelblade hos Bøgen.

Af

Ove Paulsen.

Bøgens Knopskæl er som bekendt Axelblade. De nederste af dem sidder tæt sammen og mangler Bladplade. Først imellem det ottende—tolvte Par Axelblade viser der sig en lille Bladplade, og ved de følgende bliver den større og større (John Lubbock S. 130, Henry S. 317). — De ydre Knopskæl er korte, brede, haarde og brune, de indre er smallere og kun haarde og brune i Spidsen, som er udsat for Luftens Indvirkning. Naar Knoppen springer ud og Bladene kommer frem for Lyset, ses disse indre Knopskæl siddende parvis ved Bladenes Grund. De sidder skævt, idet deres Tilhæftningslinje fra Bladgrunden viser skraat nedad paa Grenen. — Efter Løvspringet falder alle Axelbladene som bekendt af, de er hvad man kalder „stipulæ caducæ". Det er dog et temmelig almindeligt Fænomen, at nogle af dem udvikler sig til blivende Axelblade, men dette findes intetsteds i Litteraturen beskrevet, og jeg mener derfor, det kan have nogen Interesse at omtale det nøjere. Jeg har kun fundet det nævnt to Steder. I Botanisk Tidsskrifts 4de Bind staar der i Referatet af Mødet d. 5te November 1868, at Dr. Heiberg fremlagde nogle Grene af *Fagus silvatica*, „hvis Blade havde blivende Axelblade, af hvilke navnlig det ene var stort og læderagtigt." Dernæst siger M. Kronfeld (l. c. S. 70): „. . . . weil ein wesentlicher Unterschied zwischen bleibenden und vergänglichen Stipulen nicht besteht und solche der letzteren Art unter Umständen persistiren können. So liegt im Herbarium der hiesigen Universitätssammlung ein Zweig von Fagus silvatica (leg. dr. de Wettstein) auf, an dem jedes Hauptblatt mit rund umschnittenen, dicklaubigen Nebenblättern versehen erscheint." — Mange Andre har naturligvis set det samme: — saaledes findes

i Botanisk Museums Herbarium en axelbladbærende Bøgegren, samlet af Dr. E. Rostrup og forsynet med en Bemærkning om Axelbladene.

Paa mange kraftige Langskud, sjælden paa Kortskud eller svage Langskud, begynder alle eller nogle af Axelbladene strax ved Knoppens Udfoldelse at voxe i den nedre Del af den ene Kant, og altid i den Kant, der er Bladgrunden fjærnest. Den saaledes udvoxende Del er kendelig paa sin buede Rand og paa, at dens Nerver er grenede og har et bugtet Forløb, medens de i de normale, hindeagtige Axelblade er rette og næsten ganske ugrenede. Ofte er den udvoxende Del rødfarvet. Væxten hører snart op — den har rimeligvis samme Varighed som Løvskuddets Vækst, — og naar dette sker, er den fra Løvbladet bortvendende Del af Knopskællet færdigdannet som et blivende Axelblad, der har samme Levetid som Løvbladet, og som endog kan findes siddende dødt paa Grenen, efter at dette er faldet af. Fig. 8 fremstiller et Knopskæl, hvis ene Kant endnu er i Fremvæxt, Fig. 1 og 9 et ældre og Fig. 2 et, der snart vil falde af[1]). Paa Fig. 1 og 2 ses det, at den hindeagtige Del, det egentlige Knopskæl (*k*) er bleven siddende, skønt død, fæstet ved den levende udvoxende Del. Undertiden finder man dog ogsaa, at den hindeagtige Del i Sommerens Løb falder af, og tilbage sidder da alene den halvmaanedannede, udvoxede Del. Da denne kun er en Udvæxt fra Knopskællets Sidekant, er det klart, at den derved nærmeste Del af Knopskællet ogsaa maa blive bladagtigt og vedvarende, — ellers vilde Axelbladet ingen Basis have og maatte falde af.

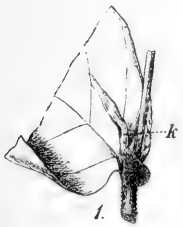

Fig. 1. Ordrup Krat 31. Maj.

Fig. 2. Store Hareskov 21. Sept. 1901. *k*, Axelbladets Knopskælsdel (naturlig Størrelse).

Paa Fig. 2 ses endvidere, at den ydre Kants Vækst har bragt hele Axelbladet til at krumme sig, saa at den knopskælagtige, døde Del (*k*), tvinges helt over til Løvbladets Side.

[1]) I Boas's Forstzoologi S. 401 er afbildet en af Phytopter angreben Bøgegren, som har blivende Axelblade. Disse er iøvrigt paa ingen Maade noget Sygdomstegn.

I Regelen finder man, at kun det ene af et Løvblads to Knopskæl danner et blivende Axelblad, medens det andet forbliver hindeagtigt og falder af. Det er da altid det Knopskæl, der staar paa Grenens opadvendte Side, der danner blivende Axelblad, medens det paa Undersiden falder af. Man kan dog ogsaa finde blivende Axelblade paa Grenens Underside, men de optræder sjældnere og er mindre.

Forekomst og Opstaaen. Som ovenfor nævnt er det kun paa kraftige Langskud, at blivende Axelblade optræder, — aldrig ses de paa typiske Kortskud. Noget Princip i den Maade, de optræder paa, har det ikke været muligt at finde, dog er nogle Planter øjensynlig mere tilbøjelige til at danne blivende Axelblade end andre, og denne Tilbøjelighed kan findes hos endog temmelig svage Bøgebuske. — Naturligvis ser man mest til dem paa Træernes nedre Grene og Buske, men ogsaa højt oppe i Bøgekronerne kan de findes. Ikke heller Sol- og Skyggeside, Vind- og Læside synes at spille nogen Rolle.

At Axelbladene kun optræder paa kraftige Grene, hænger sammen med, at de ofte findes paa Stødskud og St. Hansskud, og at de ofte ledsages af proleptiske Skud (Fig. 2. Skuddet i Hjørnet af Løvbladet er abnormt stærkt udviklet). Nogle Buske ved Alfarvej i Ordrup Krat, som aarlig bleve plyndrede for deres Grene, havde allerede i Knopperne proleptiske Skud udviklede i Løvbladenes Hjørner, og Skuddene, der kom af disse Knopper, havde mange blivende Axelblade.

Tidspunktet for Begyndelsen af Knopskællenes Vækst maa være det samme som for Løvspringet, thi i de endnu lukkede Knopper har det aldrig været muligt at se Spor af Udvækst fra de indre Knopskæls Grund, selv ikke i kraftige Endeknopper paa Træer, der baade i tidligere Aar og senere i samme Aar havde mange blivende Axelblade. Naar Knopperne har begyndt at udfolde sig, kan man derimod se det fra Knopskællets Grund udvoxende Øre endnu som lille (Fig. 8.)

Anatomi. Et Tværsnit af den nedre Del af et ungt, udvoxende Knopskæl viser, at der i anatomisk Henseende er stor Forskel mellem den udvoxende Del (det blivende Axelblad) og den hindeagtige Del (det egenlige Knopskæl). Bygningen af den sidste ses paa Fig. 3. Mellem Over- og Undersidens Epidermis ses kun eet (-to) Lag store Celler, ved Nerverne derimod mange. Mellemvæggene er temmelig tykke og paa flere Steder allerede spaltede

(*lak.* er Spalterne). Der er ingen Klorofyl i Cellerne. Epidermiscellerne er lange (Fig. 7), og der findes ingen Spalteaabninger.

Den udvoxende Del (Fig. 5) har tykkere Overhud og tyndvæggede Mesofylceller, der indeholder Klorofyl. Det ene Lag Mesofylceller er paa dette Snit palissadeagtigt, men paa andre Snit viste alle Mesofylcellerne sig runde; Epidermiscellerne (Fig. 6) er bugtede,

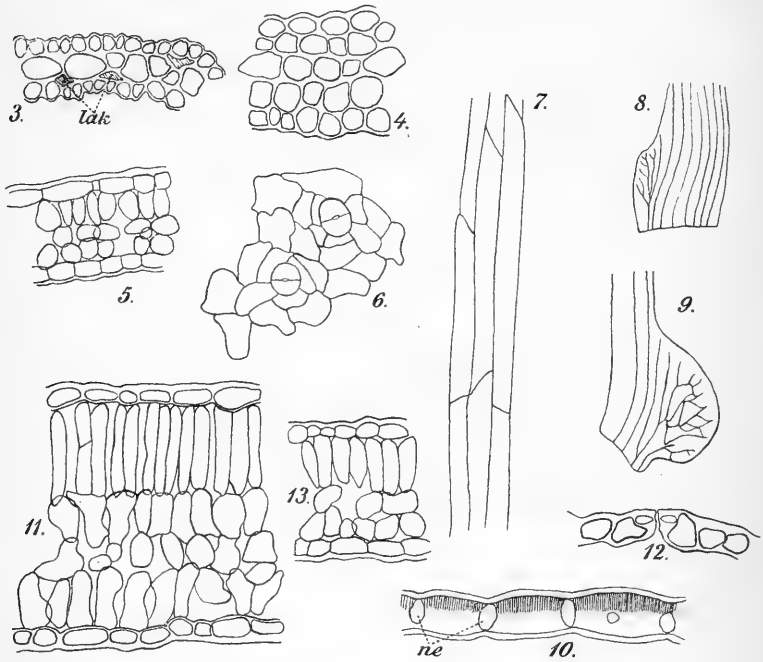

Fig. 3. Axelbladets Knopskældel. *lak.* Aabninger, fremkomne ved Spaltning af Væggene. — Fig. 4. Fra Overgangen mellem 3 og 5. — Fig. 5. Ungt blivende Axelblad (Axelbladets blivende Del) (3, 4 og 5 Boserup 3. Maj). — Fig. 6. Epidermis af Axelblad. — Fig. 7. Epidermis af Knopskæl, (Ordrup 13. Maj). — Fig. 8. Ungt udvoxende Axelblad, (Boserup 3. Maj). — Fig. 9. Ældre Axelblad, (Ordrup 31. Maj). — Fig. 10. Fuldvoxet Axelblad, *ne.* Nerver (St. Hareskov 21. Sept.) — Fig. 11 og 12. Samme, Lysblad. — Fig. 13. Fuldvoxet Axelblad, Skyggeblad (Charlottenlund 12. Okt. 1901).

undertiden langt stærkere end tegnet paa Figuren. Spalteaabninger findes paa Undersiden (Svampevævets Side). — Fig. 4 viser Bladets Bygning midt imellem de to foregaaende (3, 4 og 5 er alle af samme Blad i samme Højde), — det er altsaa Overgangsformen. Mesofylcellerne er tykvæggede og indeholder ingen Klorofyl, Spalteaabninger mangler.

Om det hindeagtige Knopskæls Anatomi[1]) skal endnu anføres følgende. Forneden ved Tilhæftningsstedet bestaar Knopskællet af helt tyndvæggede Elementer: der findes mindre Epidermisceller og 2—3 Lag større, runde Mesofylceller. Midt paa Knopskællet, ovenover den bladagtige, udvoxede Del, findes meget tyndvæggede Epidermisceller og ca. 4 Lag tykvæggede Mesofylceller, og i Spidsen bestaar hele Bladet af meget tykvæggede, bastagtige Elementer, og her er allerede i Slutningen af Maj Overhuden død og har delvis løsnet sig.

Fig. 3—5 er af et næppe endnu fuldvoxet Axelblad. Det ældre Axelblads Bygning ses af Fig. 10, 11, 12 og 13. 11 og 13 er meget forskellige. 11 er af et Blad, samlet paa et sollyst Sted, 13 paa et skyggefuldt, — man finder altsaa her en lignende Forskel mellem Sol- og Skyggeblade som hos Bøgens Løvblade. Lysbladet har store Palissader paa begge Sider, og ogsaa det løse Svampevævs Celler er palissadeagtige. De lange og tætstillede Palissader findes paa den organiske Overside, som, da Axelbladet gærne staar lodret ud fra Grenen, i Regelen (naar Grenen er vandret) vender fremad, mod Skuddets Spids. Det er værd at lægge Mærke til, at denne Overside hos det unge Axelblad ofte vender nedad (mod Grenen), og det synes altsaa, at Palissaderne her opstaar i den fra Lyset bortvendte Side af Bladet.

Omkring Nerverne ligger Sklerenkym (Fig. 10), — da de større Nervers Sklerenkym naar ud til Epidermis paa begge Sider, deles Bladet herved i Felter. — Epidermiscellerne er, sete paa Fladesnit, bugtede; deres Ydervæg er temmelig tyk og forsynet med Kutikula, men uden kutikulariseret Yderlag. Spalteaabninger (Fig. 12) findes kun paa Undersiden, de er ikke nedsænkede.

Skyggebladet (Fig. 13) har kun eet Lag Palissadeceller og er langt tyndere; Fig. 11 og 13 er forstørrede i samme Grad. Fig. 13 ligner meget Fig. 5, hvis Blad er samlet uden Hensyntagen til Sol og Skygge, men sandsynligvis altsaa i Skygge.

Blivende Axelblade er hos Bøgen et saa almindeligt Fænomen, at man aldrig forgæves vil tage i Skoven for at finde dem. For at vise deres Udbredelse anføres her de Lokaliteter, hvor de vides at være fundne:

Sjælland: Ordrup Krat, Charlottenlund, Store Hareskov,

[1]) Afbildet hos Areschoug.

Fredensborg Park, Danstrup Hegn, Hellebæk, Borreby, Boserup. Fyen: Skaarup. Jylland: Fakkegrav, Aalborg, Dronninglund. Falster: Sortsø. Bornholm: Almindingen. — Desuden: Italien: Mte Lavo (Schouw). Østrig: (Wettstein).

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Desuden er en stor Mængde Forsthaandbøger og Dendrologier blevne gennemsøgte uden at der deri er fundet noget om det her omhandlede Forhold.

Stipules persistantes chez le Fagus silvatica.

Par

Ove Paulsen.

(Résumé de l'article précédent.)

Le hêtre a, on le sait, des stipules scarieuses qui se détachent dès l'épanouissement du bourgeon. On trouve pourtant sur des pousses robustes (p. ex. les pousses des souches) assez souvent des stipules persistantes. M. Kronfeld et Heiberg (p. 281) sont à ce que je sais les seuls qui en aient fait mention, et cela assez en passant. — Les stipules persistantes naissent de la partie inférieure du bord extérieur de la stipule scarieuse. La croissance qui fait naître la stipule persistante commence quand le bourgeon s'épanouit et se continue pendant la croissance de la pousse. Dans les bourgeons on n'en trouve aucune trace. La partie scarieuse de la stipule va bientôt mourir, mais il arrive souvent qu'elle ne se détache pas, demeurant attachée à la partie développée vivante, qui a la forme d'une oreille, avec des nervures anastomosantes (fig. 1, 2, 8, 9; *k*: la partie scarieuse). — Si l'on ne trouve qu'une stipule persistante c'est parce que celle de la face inférieure de la pousse est tombée n'ayant présenté aucune accroissement.

Au point de vue anatomique la partie persistante de la stipule (fig. 4—5, 10—13) est assez différente de la partie scarieuse[1]) (fig. 3); cette dernière a des parois plus épaisses, des cellules d'épiderme allongées (fig. 7), point de stomates et ne contient pas de chlorophylle, tandis que la partie persistante a des cellules d'épiderme sinueuses (fig. 6) et contient de la chlorophylle dans les cellules du mésophylle, dont une couche sur la face supérieure de la feuille a la forme des palissades. La fig. 4 montre une partie de la passage entre 3 et 5. — Les stipules adultes a des gaines de sclérenchyme autour des nervures (fig. 10). — Il se présente entre les stipules exposées à la lumière (fig. 10, 11, 12) et celles de l'ombre (fig. 13) une différence semblable à celle entre les feuilles ordinaires exposées a la lumière et celles de l'ombre (Stahl).

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[1]) Quant à l'anatomie de celle-ci voyez Areschoug, l. c.

Bianco Lunos Bogtrykkeri.

Særtryk af Botanisk Tidsskrift 24. Bind 3. Hæfte. København 1902.

Arbejder fra den botaniske Have i København. Nr. 9.

Sur une nouvelle espèce de *Riella* (subgen. nov.: *Trabutiella*) de l'Asie centrale.

Par

Morten P. Porsild.

Le botaniste de l'expédition danoise à Pamir, M. Ove Paulsen, récolta pendant son voyage plusieurs échantillons de la vase séche des lacs, entre autres de la vase d'un étang saumâtre près de Bouchara. Deux années après environ, la vase a été remise à un zoologiste qui la plongea dans de l'eau pour en obtenir des crustacées vivantes. L'expérience lui réussit et en outre parut une culture magnifique d'un *Riella* dont M. Paulsen voulut bien me laisser l'étude. La culture originale va bien, étant seulement un peu gênée par un *Oedogonium* dont les spores se fixent et poussent sur l'aile dorsale de l'Hépatique, et j'espére bientôt pouvoir publier une étude sur le développement de cette curieuse plante.

Fig. 1. Culture: Plantes et crustacées. Grandeur naturelle.

Voici la description:

Riella Paulsenii nov. sp.

Dioique. Plantes aggrégées, normalement dressées, d'une couleur verte claire. Rhizoïdes très longues, droites, lisses, hyalines, non septées.

épaisses de 36—38 m, sortant de presque toute la tige jusqu'au point végétatif et parfois de la base des feuilles vieilles. Tige cylindrique, à la base epaisse de 0,4—0,5 mm., atténuant peu à peu vers le haut, où l'épaisseur est de 0,24—0,27 mm. Hauteur de la plante mâle 25—35 mm., de la femelle 20—25 mm. Cellules de la tige allongées presque dépourvues de chlorophylle, leur cloisons transversales quelquefois un peu obliques, longues de 100—130 μ, épaisses de 24 μ. Aile dorsale chlorophylleuse à bordure ondulée, à l'extrémité de la plante courbée en forme de crête au dessus du point végétatif, vers le haut large de 2,7—3 mm., vers la base se rétrécissant lentement, les parties inférieures ordinairement déchirées ou détachées; aile formée d'une seule assise de cellules sauf les parties entourant les anthéridies), tissu cellulaire lâche. Près de la tige les cellules sont le plus grandes, polygones—allongées, longues de 115—125 μ, larges de 45 μ, et disposées en séries parallèles qui rejoignent la tige sous un angle très aigu. Dans la bordure les cellules sont tétra- ou hexagones et presque isodiamétriques, larges de 45 μ. Vers le haut la grandeur des cellules diminue et près du point végétatif leur diamètre est de 20—25 μ environ.

Feuilles adultes larges de 0,36 mm., longues de 0,8—0.9 mm., obtuses subfalciformes, ordinairement dans toute leur largeur connées avec la tige, formées d'une seule assise de cellules, énerviées. Cellules tétra—hexagones 36—40 μ en diamètre. Les feuilles sont disposées tantôt en paires (mais jamais à la même hauteur) tantôt 4 ou 6 ensemble. Vers le haut elles deviennent plus nombreuses, et le point végétatif est tout à fait caché par elles. Des élaïosphères se trouvent dans presque toutes les parties de la plante sauf les organes reproducteurs et les rhizoides; l'involucre, la bordure de l'aile et toutes les parties embryonales en sont surtout pourvues. Elles sont incolores réfringentes, larges de 20 μ, et chaque élaïosphère est située dans une petite cellule tétragone qu'elle remplit complètement. Les grains de chlorophylle sont assez grands, de 5,5—6,5 μ, subglobuleuses—ellipsoïdiques.

Anthéridies. Ordinairement l'aile dorsale de la plante mâle est munie de deux ou trois sinuosités au fond desquelles se trouvent 10 ou 12 poches étroites, profondes de 0,4—0,6 mm., au fond larges de 90—100 μ, à l'entrée de 25—30 μ. Quelquefois il y en a plus, jusqu'à 5 ou 6, et alors le nombre des poches de chaque sinuosité est plus petit, rarement on observe des poches isolées dans de petites sinuosités, comme chez l'individu figuré dans la fig. 2. Une anthéridie ellipsoïde est située au fond de chaque poche. Les parois cellulaires des poches vieilles deviennent brunâtres. La partie supérieure de la tige de la plante femelle porte 1 ou 2, rarement 3 sporogones.

L'involucre du sporogone est long de 2 mm., et de 1,5 mm. en dia-

mètre; il est pourvu de 8 ailes qui s'écoulent en forme de méridianes du sommet jusqu'au pédicelle très court, et qui sont larges de 180 μ, richement pourvues d'élaïosphères. L'entrée de l'involucre est très étroite.

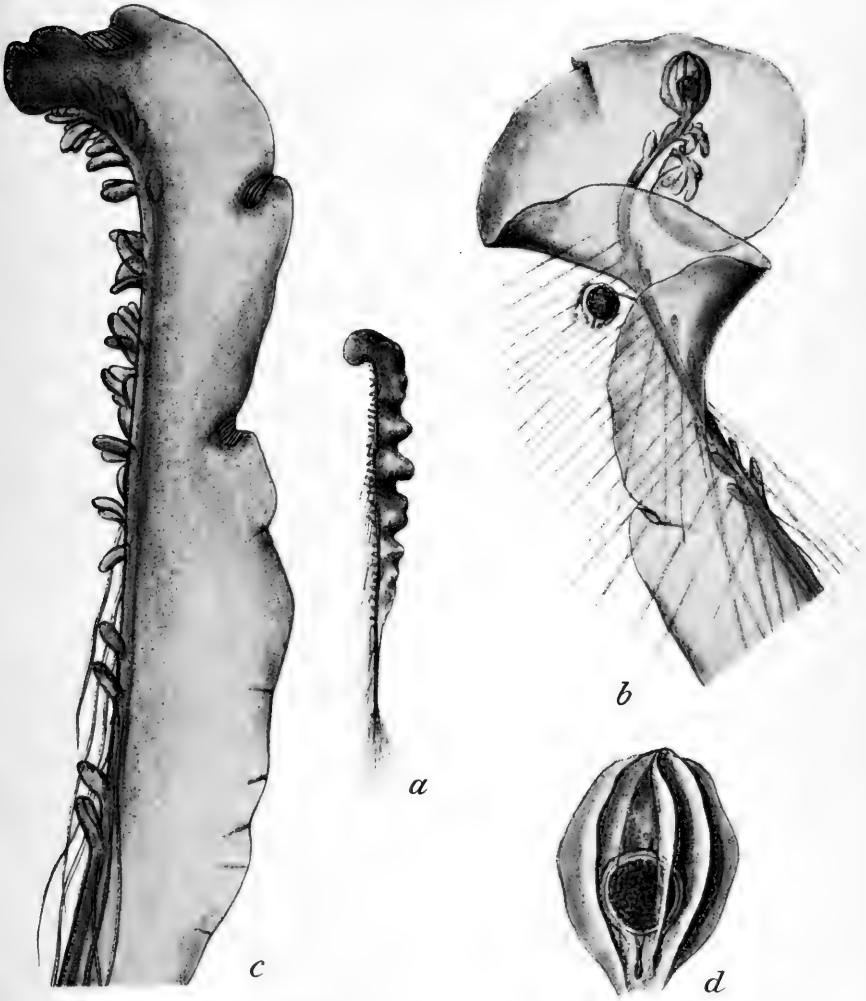

Fig. 2. a. Plante stérile, gr. nat. b. Plante femelle, gross. 8.
c. Plante mâle, gross. 8. d. Involucre et sporogone mûr, gross. 16.

Calyptra subglobuleuse, col de l'archégone („style") persistant, un peu excentrique, long de 50 μ.

Le sporogone est sphérique 0,63—0,70 de diamètre, sa paroi très mince, son pied claviforme, long de 0,3—0,32 mm., épais de 90—100 μ. Spores en nombre de 270 environ, en tétrades entre des cellules stériles

nourricières, globuleuses, ou faiblement ellipsoïdes, 80—90 μ en diamètre. L'exine est brun, épais de 3 μ, assez densement muni de tubercules coniques subobtus, longs de 3—4 μ.

Hab. Asie centrale, étangs saumâtres près de Bouchara où M. Ove Paulsen récolta en 1898 les spores avec de la vase desséchée.

A première vue, je croyais que cette plante dût appartenir au *Riella Cossoniana* Trabut (Revue Bryologique 1887, p. 12; figures: Atlas de la Flore d'Alger, Pl. 2., Revue Bryologique 1886, Pl. 2. Trabut: Révision des espèces du genre Riella et description d'une espèce nouvelle. Revue générale de Botanique, t. 3, pl. 18, fig. C.); mais après l'examination plus détaillée, il se montra que la plante asiatique différait de la description et des figures de l'algérienne dans quelques caractères, et ayant étudié des échantillons du *R. Cossoniana*, conservés en alcool, que je dois à l'obligeance de M. Trabut, je crois que les deux espèces sont bien distinctes, en outre par quelques détails du développement que ce n'est pas la place ici de discuter.

Dans sa révision l. c. p. 452, M. Trabut distribue les 7 espèces alors connues dans ces deux groupes:

A. Spores réticulées échinulées; les aiguillons coniques sont réunis à la base par une membrane formant un réseau: *R. Clausonis, R. gallica, R. Reuteri, R. Notarisii, R. Battandieri.*

B. Spores parsemées de saillies cylindriques tronquées ou même dilatées au sommet: *R. helicophylla, R. Cossoniana.*

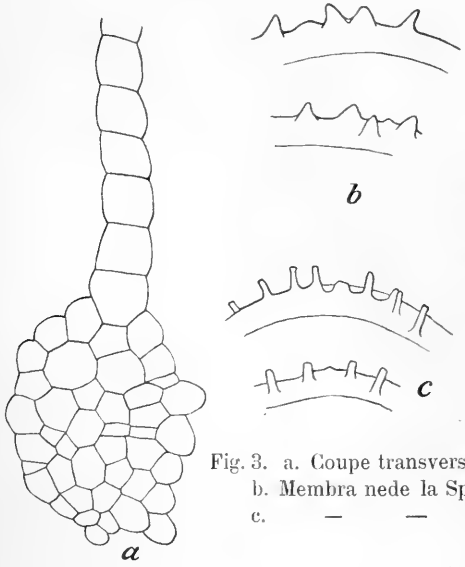

Fig. 3. a. Coupe transversale de la tige, gross. 135.
b. Membra nede la Spore du *R Paulsenii*, gross. 1000.
c. — — — - *R. Cossoniana*, gross. 1000.

Dans cet arrangement, le *R. Paulsenii* occuperait une position intermédiaire par les aiguillons de la spore coniques, non tronqués ni dilatés au sommet, mais autrement, ils ne sont pas réunis par une distincte membrane formant un réseau, et l'affinité avec le *R. Cossoniana* est si évidente, principalement par l'involucre ailé qui dif-

fère de celui de toutes les autres espèces. Pour cette raison je propose y fonder la classification des espèces, et j'oserai diviser le genre en deux sous-genres distincts:

Euriella. Involucre lisse ou papilleux, orbiculaire en section transversale.

Trabutiella. Involucre octogone, muni de 8 ailes longitudinales.

R. Cossoniana. Spores munies de saillies tronquées ou quelquefois dilatées au sommet. Anthéridies isolées occupant ordinairement toute la bordure libre de l'aile dorsale. Poches profondes de 0,3—0,4 mm., leur diamètre 120—150 μ. Ailes d'involucre larges de 120—150 μ. Algérie: Oran; Iles Canaries.

R. Paulsenii. Spores munies de tubercules coniques courts et subobtus. Anthéridies ordinairement en groupes de 10—12. Poches profondes de 0,5—0,6 mm., larges de 85—90 μ (les plantes mâles ressemblent par cette position des anthéridies aux figures de l'espèce monoïque *R. Battandieri* Trabut Rév. fig. B.). Ailes de l'involucre larges de 180 μ; les dimensions de toutes les parties végétatives sont un peu plus grandes que celles de mes échantillons de l'espèce précédente. Asie centrale.

Il est intéressant que ce curieux genre, qui jusqu'ici n'était observé que très peu de fois autour de la Méditerranée occidentale (*R. Cossoniana* en outre dans les îles Canaries: Trabut *in litt.*), à présent aussi possède un représentant dans l'Asie. Cela conjointement avec les récoltes très rares des autres — sauf les algériennes les autres espèces n'ont été trouvées qu'une seule fois — porte peut-être à croire que la distribution du genre est en réalité plus grande et que les plantes petites et peu apparentes ont échappé aux collecteurs.

Bianco Lunos Bogtrykkeri.

Særtryk af Vidensk. Meddel. fra den naturh. Foren. i Kbhvn. 1902.

Arbejder fra den Botaniske Have i København. Nr. 10.

Nogle anatomiske Studier.

Af

V. A. Poulsen.

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(Hertil Tavle IX—XII.)

I. Om nogle endodermløse Rødder.

Det er en bekendt Sag, at Rodens primære, anatomiske Bygning er ualmindelig lidet varierende; Hovedtrækkene ere fæstnede med stor Sejhed, og i systematisk vidt forskellige Familier eller Grupper ere Forskellighederne i Rodstrukturen saa smaa, at de kun knytte sig til rene Detailler. Selv biologisk forskellige Grupper have i Hovedsagen ensbyggede Rødder, og mærkelige Afvigelser fra det typiske ere rene Sjældenheder. I et Arbejde om en ejendommelig *Myristica*-Rod [1]) har jeg anført de vigtigste Tilfælde af ikke-typisk, primær Rodbygning; væsentligt nyt er senere ikke tilføjet, og da nu nogle faa Exempler yderligere ere blevne mig bekendte, kunne efterfølgende Bemærkninger maaske have Krav paa nogen Interesse.

1. Luftrødder hos *Canarium commune* L.

Om de forneden paa Stammerne af dette smukke, store Træ frembrydende Rødder [2]), der dog kun i kortere Tid blive i Luften,

[1]) Cfr. Vidensk. Meddel. for 1895; [1896, p. 188 m. Tavler]. Det kan her bemærkes, at min Bestemmelse af den mig foreliggende *Myristica*-Art senere ved Offentliggörelsen af Warburgs store, monografiske Arbejde har vist sig rigtig.

[2]) Cfr. Karsten: Ueber die Mangrove-Vegetation; [Bibliotheca botan., 1891, Heft 22, pag. 60].

inden de sænke sig skraat ned i Jorden, har jeg i min nys citerede Afhandling bemærket, at de i histologisk Henseende forholdt sig normalt. En nöjere Prøvelse af deres Bygning her i botanisk Laboratorium har imidlertid vist mig, at dette ikke er rigtigt.

Rødderne ere i yngre, endnu böjelig Tilstand 4 à 6 Mm. tykke, rødgule. Deres i Begyndelsen glatte Overflade, som mangler Rodhaar, bliver snart brun eller sortagtig og noget ujævn, fordi en nær Overfladen optrædende Peridermdannelse bringer det yderste Væv til at skalle af, efterhaanden som Tykkelsevæxten, der forøger Rodens Diameter til henimod $1^1/_2$ Ctm. eller maaske mere, lader det indre Væv presse paa. Under denne Tykkelsevæxt tiltager Rodens Stivhed meget betydelig; vel dannes der kun en temmelig tynd Vedcylinder i dens indre, men den er forholdsvis haard.

Rodspidsen selv er dækket af en lagvis skallende Hætte; i dennes yngre og inderste Partier, hvor Cellernes Ordning til en bred „Columella" er meget tydelig paa Længdesnit, findes talrige smaa Stivelsekorn; i øvrigt forekommer dette Stof ikke i selve Rodlegemet, heller ikke i Vævspidsens Histogener.

Paa et meget tyndt Tværsnit ca. 2 Mm. ovenfor Rodspidsen [som er beklædt med en afskallende Rodhætte] ere Ledningselementerne endnu ikke uddannede; indenfor den af ensartet, tyndvægget, plasmarigt Parenkym dannede Primærbark ses en ringformet Zone af endnu mindre, ligeledes plasmafyldte Celler [et „Desmogen"] udenom en temmelig mægtig Marv; i dette Væv opstaa Hadrom- og Leptomelementerne noget længere borte fra Rodspidsen, [Tab. IX, Fig. 4], men der er derimod allerede paa dette tidligere Stadium dannet en ringformet Kreds af forholdsvis store, i indbyrdes samme Afstand anlagte Balsamgange [Fig. 4, bg]. De dannes schizogent[1]). Midtvejs mellem to saadanne udvikles Hadrom-[Kar-]Straalerne, hvis første, skrueformet fortykkede Elementer ere meget snævre; Roden er saa-

[1]) Ikke schizo-lysigent, som Sieck [Sekretbehälter u. s. w.; Dissertation, Bern, 1895] angiver, og Solereder [Syst. Anat. der Dikot., 1899, Pag. 218] gentager (for Stammens Vedkommende).

ledes polyark. Samtidig hermed dannes ogsaa de temmelig snævre Leptomelementer tilhöjre og venstre for, senere ogsaa udenfor hver Balsamgang. Naar Rodens primære Struktur er færdig udpræget, c. $1^1/_2$ Ctm. ovenfor Rodspidsen, ligger altsaa hver af de nævnte Gange midt i et Leptomparti. Udenfor Ledningsstrængenes Kreds viser Tværsnittet et af polygonale, tyndvæggede Celler bestaaende Væv, der inderst vel bliver at opfatte som Pericykel, men som ganske jævnt gaar over i den inderste Bark, der atter jævnt gaar over i den ydre, uden at man paa nogen Maade vil være i Stand til at paapege noget som helst Cellelag som Endoderm; [smlg. Tab. IX, Fig. 1. 2, 3 og 4]. Man kan antyde, hvor man vilde kunne vente en saadans Beliggenhed, men den er hverken ved Indhold [f. Ex. Stivelsekorn], ved nogenlunde ensartet Form af Cellerne, ved særlig tydelige Radialvægge, endsige ved disses Beskaffenhed [Forkorkning, Caspary'ske Pletter, Fortykninger] eller andet, hvorved Endodermer ellers pleje i det mindste temmelig tydelig at markeres, udpræget som noget særligt Cellelag. Medens man ellers i Jordstængler[1]) eller i Luftrødder, hvis Endoderm kun er lidet fremtrædende, f. Ex. hos *Vanilla planifolia*, *Aeschynanthus pulcher*, *Piper nigrum*[2]) med Lethed kan göre den synlig ved Eau de Javelle eller med Svovlsyre, lykkes dette ikke her; Svovlsyren opløser alt vævet med Undtagelse af (i lidt ældre Rødder) den periferiske Kork og Intercellularsubstansen i Karstraalerne. Med farvende Stoffer, saasom Correns Reagens, Sudan III, Hæmateïn-Vesuvin, Floroglucin-Saltsyre, Klorzink-jod o. a. er Resultatet lige saa negativt. Vi staa altsaa her overfor et lignende, sjældent Tilfælde, som det tidligere hos *Myristica fatua* opdagede, og genfinde saaledes Fænomenet i en fra sidst nævnte Plante systematisk meget fjærntstaaende Familie.

Hvad i øvrigt *Canarium*-Luftrøddernes videre Udvikling angaar,

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[1]) N. Hj. Nilsson: Dikotyla Jordstammer [Lunds Univ. Aarsskrift, Tom. XXI, 1886, P. 80.

[2]) Cfr. ogsaa L. Keller: Anat. Studien über die Luftwurzeln einiger Dikotyledonen. Diss., Heidelberg, 1889.

skal her for det første strax bemærkes, at der heller ikke senere i Rodens sekundære Periode uddannes nogen Endoderm. Tykkelsevæxten indledes som sædvanligt med Dannelsen af et Kambium i Bindevævet paa Siderne af Hadromstraalerne [Tab. IX, Fig. 1]; det griber temmelig hurtig udenfor de førstdannede Kar, og lidt senere sluttes Kambiumringen indenfor Protoleptomet (og Balsamgangene). Undertiden er eet eller nogle af de (stejlt) skrueformet fortykkede, periferiske Kar adskilt fra Resten af Karstraalen ved en eller et Par Parenkymceller [Fig. 3, *pk*]. Idet nu Kambiet danner sig udenom Hadromet, kan det træffe sig, [men det finder ikke altid Sted], at netop de nævnte Parenkymceller tages med i Kambiet [Fig. 3, m] ved tangentiale Delinger; derved skæres altsaa Karstraalen igennem i sin alleryderste Del, og vi have her med et meget sjældent Fænomen at gøre, som hidindtil kun er kendt fra *Myristica fatua* [1]), hvor det er normalt.

Ved det nu dannede Kambiums Virksomhed opstaar snart en sluttet Vedcylinder, i hvis allerinderste Del Protohadromstraalerne hurtig sammenpresses næsten til Ukendelighed, hvorhos de antage en brunlig Farve. Det temmelig haarde sekundære Ved gaar paa Tværsnit jævnt over i det samtidig til stærkt Styrkevæv udviklede og forvedede, periferiske Marvvæv; Karrene ere Næt- og Ringpore-Kar med simple, kredsrunde Perforationer i Tværbundene; de ere indlejrede i stærkt fortykkede, ved tynde, lige Tværvægge delte Libriformceller [2]); Vedmassen gennemløbes af talrige, indtil 18 Celler höje, 1 á 2 Celler brede, lige Marvstraaler. Samtidig med Veddets Uddannelse er Protoleptomet bleven sat ud af Funktion ved total Sammentrykning, og i det sekundære Sivæv dannes der vis à vis Balsamgangene svage Strænge af Sejbast. I Barken udvikles talrige, uregelmæssig spredte Stenceller, især i Inderbarken, hvor de ofte samle sig til (paa Tværsnit) Tværrækker eller korte Buer udenfor

[1]) Cfr. min ovennævnte Afhandling, Tab. IV, Fig. 1.

[2]) Denne Karakter angives for Burseracé-Stammens Vedkommende ogsaa af Solereder [Lyst. Anat. d. Dikot., 1899; Pag. 219].

Balsamgangene. Krystaller synes ganske at mangle, Stivelse ligesaa. I Korken, som har dannet sig indenfor de yderste, fortykkede Barkcellelag, ere enkelte Lag meget stærkt fortykkede paa Indervæggene.

I øvrigt ligger en nærmere Beskrivelse af de sekundære Forandringer i *Canarium*roden ikke i Planen for dette Arbejde.

2. Luftrødderne hos *Tinospora crispa* Miers.

Af denne i den indiske Medicin anvendte, besynderlige Lian af Menispermaceernes Familie har den danske Expedition til Øen Koh-Chang i Siambugten hjembragt i Spiritus opbevaret Materiale, som med stor Beredvillighed har været stillet min Raadighed.

Fra de lange, tynde Stængler, om hvis mærkværdige Udvæxter der nedenfor skal blive Tale, udskyde trinde, flere Meter lange, tynde Luftrødder, der som lige Snore søge ned i Jorden og først der grene sig nævneværdig.

Medens den allerstörste Del af en saadan Rod befinder sig i primær Tilstand, er en ringe Tykkelsevæxt foregaaet i dens øverste, nærmest Grenene beliggende Partier. Epidermis, der viser Spor af Rodhaar, falder meget hurtig sammen. Indenfor denne udvikle de yderste Barklag sig tidlig til en af langstrakte, tykvæggede, forvedede, men temmelig bløde Celler bestaaende Hypoderm, hvis med spalteformede, skraat stillede Porer udstyrede Vægge vise en ret tydelig Stribning. Denne Hypoderm er adskillig fastere end den øvrige, saftrige Bark indenfor, hvorfor den let sprænges af, naar Roden böjes eller knækkes. Især vil dette let ské, naar det umiddelbart indenfor liggende Barklag ved Tangentialdelinger konstituerer sig som et Korkkambium; ved dettes Virksomhed dannes et tyndt Peridermlag [Tab. X, Fig. 2 b, *p*], der viser de sædvanlige Reaktioner.

Barken, mellem hvis paa Tværsnit afrundede Celler smaa trekantede Intercellularrum findes, er opbygget af tyndvæggede, plasmaholdige og med Grönkorn samt temmelig store Kærner udstyrede, paa Længdesnit rektangulære Celler. I de noget ældre Dele af Roden har der ved Assimilationen dannet sig en Del Stivelse i disse

Celler, hvilket Jodprøven meget tydelig viser. Imellem disse grönne Parenkymceller findes noget videre, paa Længdesnit temmelig lange, klorofylløse Slimceller, som især i Indrebarken ere meget talrige [Tab. IX, Fig. 1, sl., Tab. X, Fig. 2 a, sl.]. Krystaller har jeg ikke kunnet paavise i nogen af Barkens Celler.

Det hele Barkvæv er opbygget af disse to Elementer; det er her ikke muligt at paavise nogen Endoderm, idet hverken Form, regelmæssig Sammenslutning, eller Væguddannelse tillader at belægge noget som helst Cellelag med dette Navn [Tab. IX, Fig. 1, Tab. X, Fig. 1, 2 a, 3]. Barken er grön og stivelseførende lige ind til Ledningsstrængenes periferiske Elementer.

Centralcylinderen, der følgelig gaar jævnt over i Barken, er (paa det mig foreliggende Materiale) 8- à 10-straalet; Hadromstraalerne frembyde intet af særlig Betydning. De omslutte en stor „Marv". Protoleptomet danner paa Rodtværsnittet tangentialstrakte Vævmasser med tydelige Sirør og Annexceller imellem dem og frembyder heller intet af fremragende Interesse; Sejbast udvikles ikke.

Tykkelsevæxten indledes, efterat Parenkymet paa Indersiden af Leptomet har omdannet sig til et Kambium, med Dannelsen af eet stort Kar der strax omgiver sig med en Trakeïdebelægning [Tab. X, Fig. 4]; af Kambiet dannes der snart efter flere saadanne Kar, saa at Tværsnittet altsaa frembyder Billedet af en med de primære Karstraaler afvexlende Ring af kollaterale, aabne Karstrænge. I disses Leptom udvikler det sekundære sig hurtig ved Dannelsen af meget store, polygonale Sirør med meget tydelige Siplader og plasmafyldte Annexceller; herved fortrænges under stærk Kompression det primære Leptom udadtil, hvor det danner tydelige Buer af lysbrydende, aldeles sammenfaldent Væv, der farves dybt mørkeblaat af Hæmateïn-Vesuvin, som samtidig farver alle Hadromelementer brune. Da Kambiet ikke strax slutter sammen udenom de primære Karstraaler [Fig. 3, cb], opstaa her temmelig brede, klorofylførende „Marvstraaler", og i disse havde der paa mit Materiales ældste Stadier ikke dannet sig sekundært Ledningsvæv, efter at en Kambiumdannelse var ind-

ledet i dem i Flugt med den allerede dannede. Samtidig med Dannelsen af det første sekundære Hadrom optræde enkelte Sclerenkymceller i Marven; dennes midterste og største Del omdannes omsider til et tæt Styrkevæv, hvis fortykkede og forvedede Celler have simple Porer, men i dens Periferi, altsaa lige indenfor Hadromcylinderen forbliver et Væv ufortykket, som partivis bestaar af stivelseførende Celler.

I det hele og store afviger *Tinosporas* snorformede Luftrødder altsaa ikke fra den normale Rodbygning, uden netop i dette ene, at en Endoderm ikke er udviklet; dens ledende Elementer af det sekundære Væv ere, som i Almindelighed hos Lianer og i Overensstemmelse med Stængelens, meget vide [1]).

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[1]) Stængelens og Bladenes Anatomi ere endnu uundersøgte for denne Arts Vedkommende, men den er ikke i væsentlige Punkter afvigende fra *Tinospora cordifolia* Miers. Vi have en ægte Lianstruktur for os, og jeg vil her nöjes med at henvise til Bemærkningerne om den nys nævnte Art hos Solereder [Syst. Anat. d. Dikotyl., 1899; pag. 45 ff.]. I Bladenes og Stængelens Epidermis er der meget smukt udviklede Kalciumoxalatkrystaller i hver eneste Overhudcelle; *Tinospora*-Stængelen er jo ejendommelig ved de tætstillede, langt fremragende Vorter, der i Spidsen bære Korkdannelser, ikke ulig en lille 4- eller 5-straalet Stjerne; Treub [Ann. du jardin bot. de Buitenzorg, vol. III, 1883, p. 81] opfatter Vorterne som Lenticeller: som saadanne kunne de efter min Mening ikke opfattes: de udvikles som emergensagtige Protuberanser paa de unge Skud, ere helt grönne og bære i Begyndelsen en lille Gruppe af Spalteaabninger paa deres Top; paa Stængelens øvrige Overflade findes ellers ingen Spalteaabninger. Aandehulerne ere meget smaa. Förend disse Vorter anlægges, bestaar Stængelbarken af temmelig smaa, isodiametriske, klorofylførende Celler, der yderst ude, under Epidermis, erstattes af et tydeligt Kollenkym, som kun afbrydes ved de allerede paa dette Stadium noget fremhvælvede Spalteaabningsgrupper. De inderste, grönne Barkceller begynde snart at strække sig ret betydelig i radial Retning samtidig med, at de deles ved hyppige, centripetalt opstaaende Tangentialvægge: Barken voxer paa en Maade sekundært ved Delinger i sine indre Partier. Denne Sekundærvæxt er dog særlig stærk under Spalteaabningerne, og paa denne Maade dannes de langt fremspringende Vorter. Naar senere hen den subepidermale Peridermdannelse begynder, kommer den derved dannede Kork ogsaa til at beklæde Vorternes stejle Sider. Paa dette Tidspunkt dannes der en særlig mægtig Korkmasse paa Vortens

3. Luftrødderne hos *Cissus sicyoides* L.

Fra de meget lange, grönne, hurtigvoxende Stængler af denne amerikanske Lian, hvis store Saft- (Vand-) Indhold i Vestindien har skaffet den Navnet „water-vis", hænge talrige, aldeles trinde, glatte, normalt ugrenede, snorlige Luftrødder lodret ned. De ere i yngre Tilstand meget tynde og røde: senere blive de grönne eller paa Grund af en tynd Korkhinde graa- eller brungrönne. De grene sig kun, naar de have naaet Jorden, i hvilken de da udvikle sig til almindelige, blege og haarede Jordrødder; dog skyde de ogsaa én eller flere Siderødder oppe i Luften, dersom de blive revne over, og disse Erstatningsgrene udspringe altid nær ved Brudfladen og voxe strax nedad, fortsættende Moderrodens Retning. De opnaa en Tykkelse som et tyndt Penneskaft.

Jeg har hyppigst fundet disse lange Luftrødder hexarke; de primære Karstraaler ere paa Siderne belagte med Sejbast, udviklet af Bindevævet; Leptomet bestaar af meget store Sirør med tydelige Siplader. I den inderste Del af den primære Bark findes ikke faa Krystalstjerner af oxalsurt Kalk; den mere perifere Del af Barken indeholder Klorofyl med Stivelse, langstrakte Parenkymceller med talløse, fine Oxalatnaale samt store Slimceller [Tab. XI, Fig. 2, *sl.*] med Rafider. Den oprindelige Overhud komprimeres meget snart, og første subepidermale Cellelag fortykkes, forvedes og sammenpresses ogsaa noget, idet Barkens derunder liggende Cellelag indleder en Korkdannelse. Disse i øvrigt temmelig talrige Korkcellelag komprimeres derpaa under Rodens tiltagende sekundære Tykkelsevæxt i den Grad, at man tror at sé et enkelt Cellelag med meget tykke, gullige, stærkt lagdelte Ydervægge. Barkens Krystalstjerner tage

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Spids, og der opstaar Revner i denne; lige under denne Lenticel udskilles der i nogle af Vortens indenfor Korkkambiet liggende, meget tykvæggede og forvedede Celler Kalciumoxalatkrystaller, der tilsammen danne en tæt, temmelig tyk, skiveformet Masse i Vortens Spids. At disse ejendommelige Protuberanser tjene til at give *Tinospora's* lange, tynde Stammer en for deres Liannatur gunstig, ujævn Overflade, er almindelig antaget og utvivlsomt rigtigt.

til i Antal, og der udvikles Sejbast i dens indre Partier lige ud for de „sekundære“ Marvstraaler; disse blive meget brede, og saavel i dem som i det indenfor det paa dette Tidspunkt stærkt sammenpressede, primære Leptom [Tab. XI, Fig. 2, *lp.*] udviklede, sekundære Hadrom udpræges flere Parenkymceller til Garvesyreholdere. I „Marven“ dannes overmaade megen Stivelse.

Nu ere disse i andre Maader saa normale Luftrødder ejendommelige derved, at Endodermen ikke altid er tydelig udpræget, ofte mangler den endog ganske. Lader den sig paavise, er den temmelig uregelmæssig; den Caspary'ske Plet er indskrænket til den inderste Del af Radialvæggene; men der gives mange Tilfælde, i hvilke denne Karakter ikke er at finde ikke engang i de yngre Dele af Roden, og hvor ikke engang Svovlsyrebehandling kan vise den[1]) [cfr. Tab. XI, Fig. 2 ved *e*, hvor den burde være at finde]. Disse *Cissus*-Luftrødder ere altsaa for saa vidt interessante, som de vise os en Overgangsform mellem den normale, endodermførende Rod og den absolut endodermløse, ligeledes lange og snorformede, som vi ovenfor paaviste hos *Tinospora*.

De Jordrødder, som udskyde fra de nedhængende Luftrødders nederste Ende, ere forsynede med normal, let paaviselig Endoderm med Caspary'ske Vægge.

II. Bladkirtlerne hos *Erythrochiton brasiliensis* Nees et Mart.

I 1898 offentliggjorde Haberlandt[2]) meget interessante Studier over Rutacernes Oliekirtler og paaviste, hvorledes disse ved intercellulære Epidermalspalter kunde udtömme deres Indhold. Haberlandt har fundet dette Forhold hos en Mængde Rutaceer, bl. a. ogsaa [hvilket jeg har kunnet verificere] hos *Pilocarpus*; han anser det

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[1]) Hos Luftroden af *Æschynanthus pulcher* Jacq. kan denne Karakter tabe sig med Alderen, men her kan vedkommende Cellelag igen göres tydeligt ved Snittenes Behandling med Svovlsyre [Cfr. Keller, loc. cit., pag. 14; hos *Cissus discolor* finder (p. 24) han en Endoderm].

[2]) Sitzungsberichte d. Wienerakad., Bd. CVII, Abth. I.

for ejendommeligt for Familien; Solereder[1]) har ikke kunnet tage Hensyn til Haberlandts Studier og nævner blot hans Arbejde. I November 1899 forelagde jeg mine Iagttagelser over den til samme Familie hørende *Erythrochiton brasiliensis's* Laminarkirtler, som i flere Henseender have Interesse, for det første fordi de konstatere, at der virkelig findes Oliekirtler i Bladpladen, hvorom Meningerne have været temmelig delte[2]), for det andet fordi der herigennem godtgöres, at ikke alle Rutacé-Kirtler forholde sig, som Haberlandt [der dog ikke har undersøgt denne Slægt] mener, og endelig, fordi der her er fundet et mærkeligt Afhængighedsforhold mellem Kirtler og Haar. *Erythrochiton* er en Slægtning af *Pilocarpus*; det har af den Grund ogsaa sin Interesse at se Afvigelsen fra denne. Mit Materiale er fra Universitetets botaniske Have.

De store, til Stilkene tilleddede Bladplader („*Folia unifoliolata*“ Autt.) ere mørkegrönne, blanke, læderagtige, men meget tynde. Tværsnittet viser under Oversidens udadtil meget tykvæggede Epidermis to Lag korte, ofte næsten kvadratiske Palissadeceller[3]), hvor under et meget lakunøst Luftvæv fylder Rummet mellem Karstrængene ned til Undersidens med talrige Spalteaabninger forsynede Overhud. Oliekirtlerne ere meget tydelige og meget talrige, men ganske vist ikke meget store; at man har kunnet være saa uenig om deres Existens, maa ligge deri, at man kun har undersøgt Herbariemateriale, i hvilket Vævet ofte er vanskeligt at bløde tilstrækkelig op. Paa vellykkede Tværsnit vil man finde, at der altid staar en ejendommelig, lav, stærkt kutikulariseret, død og tom Celle lige ovenover Midten af Oliekirtelen [Tab. XII Fig. 6 *h, k*]; den

[1]) Systematische Anatomie d. Dicotyledonen, 1899; pag. 201 f og 982.

[2]) Radlkofer har først paavist dem [Sitzungsber. d. Münchener Akad., 1886; p. 305].

[3]) Cellerne i Palissadevævet saa vel som i Luftvævet have temmelig store Klorofylkorn; i Spiritusmateriale udkrystalliserer der i mange meget smukke, rødgule Krystalblade eller flade, høvlspaanformet sammenrullede Plader eller korte Baand af Karotin; klarer man Snittene ved Celleindholdets Opløsning med Klornatron, bliver Karotinet meget tydelig tilbage.

ligner en resterende Basalcelle af et (affaldent) Haar, og gaar man tilbage til yngre Stadier i Bladets Udvikling, vil man ogsaa altid kunne finde dette [Tab. XII, Fig. 4 og 5, henholdsvis Længde- og Tværsnit af Bladpladen]. Hver Oliekirtel bærer sit Haar, og jeg har aldrig fundet noget Haar eller nogen Haarrest, uden at der jo var en Oliekirtel lige derunder.

Paa de ganske unge, endnu kun tommelange Blade, der udmærke sig ved som flere andre, tropiske Væxters at være røde, finde vi Kirtelorganets yngste Stadier [Tab. XII, Fig. 1, 2, 3; de skraverede Celler ere Oliekirtelmodercellerne; *h* er Haaret]; en Epidermicelle tangentialdeles samtidig med, at en derunder liggende, ung Mesofylcelle radialdeles. Disse Subepidermalceller samt den indre, afspaltede Epidermcelle blive tilsammen Modercellerne til Oliekirtlerne; jeg finder dennes videre Udvikling i Overensstemmelse med, hvad Sieck[1]) angiver for andre Arters Vedkommende, at være schizolysigen [Tab. XII, Fig. 4, *k*]; Hulheden anlægges temmelig hurtig og fyldes med Oliedraaber.

Den øverste (yderste) af de to ved Tangentialdelingen dannede Epidermceller hvælver sig frem og böjer sig lidt hen imod Bladets Spids, hvorpaa der opstaar en ny Tangentialvæg i Niveau med de øvrige Overhudscellers Ydervægge [Tab. XII, Fig. 1, *h*]; ved flere lignende Delinger voxer Haaret nu frem samtidig med, at den underneden liggende Kirtel udvikler sig. Det opnaar kun en ringe Længde, er noget kølleformet (i Længdesnit) samt tiltrykt til Bladpladen; i dets midterste Celler, som ere noget bredere, hvorved Haarets Kontur (set paa Fladesnit) bliver ægformet, optræde nu ogsaa nogle Længdevægge vinkelret paa Bladfladen [Tab. XII, Fig. 5 *a*]; dets Kutikula er stadig meget tynd, og det fungerer rimeligvis under Bladets Udvikling som et Sekretionsorgan, muligvis som Hydathode. Senere törrer det ind og falder omsider af, efterladende en Stilkcelle, som kutikulariseres stærkt [Tab. XII, Fig. 6, *h*]. Dets Plads paa Overhuden

[1]) Schizolysigene Sekretbehälter, Dissertation; Bern, 1895.

angives tydelig paa Fladesnit ved cirkelrunde, tykvæggede Celler, der blive stærkt gule med Klorzinkjod [Tab. XII. Fig. 9].

Det vil af denne Fremstilling skönnes, at der hos denne Rutacé ikke kan være Tale om de Haberlandt'ske Kirtelspalter.

III. Bladkirtlerne hos *Fagraea obovata* Bl.

I et Arbejde over nogle nye, extraflorale Nektarier, som et Studieophold paa Java havde givet mig i Hænde, publiceret i disse Meddelelser for Aaret 1897, pag. 356, har jeg bl. a. beskrevet de höjst mærkelige, sukkersecernerende Laminarglandler, som findes hos *Fagraea littoralis* Bl. Jeg paaviste heri, at det sekretproducerende, tyndvæggede, ikke klorofylførende Mesofyl [hvori en stor, med Epithel udfodret, uregelmæssig forløbende, spalteformet Hulhed findes, som gennem en rundagtig Aabning udmunder i Epidermis, af hvilken Hulhedens tyndvæggede Beklædning synes at være en Indfoldning] indeholdt Fedt eller fed Olie. Paa Grund af manglende Materiale havde jeg ikke kunnet efterspore Udviklingshistorien.

I vor botaniske Haves Væxthuse dyrkes for Tiden en anden Art: *Fagraea obovata.* Ogsaa hos denne forekommer der Laminarnektarier, som endnu ikke ere undersøgte[1]); men medens *F. littoralis* havde sine ligelig paa begge Bladsider, findes de hos *F. obov.* kun paa Bladoversiden. Det sekretproducerende Væv er her mindre mægtigt; det fylder ikke som hos *F. litt.* hele Rummet mellem begge Bladsiders Epidermis, men indtager kun en mindre Plads i de her rigtignok meget tykke Bladpladers Assimilationsvæv. I Nektarievævet, som her ligesom hos *F. litt.* er klorofylløst Mesofyl uden Cellemellemrum, findes mange, store, lidt grönlige Oliedraaber, der give tydelig Reaktion med Overosmiumsyre samt med Sudan III, hvorhos der i hver Celle ligesom hos den nævnte Art findes en Mængde, smaa Calciumoxalatkrystaller; lignende findes ogsaa, men i meget

[1]) Cfr. den udmærkede Afbildning hos Blume: Rumphia, Bd. II.

ringere Antal, i de andre, sædvanlige, bladgrøntholdige Mesofylceller, mellem hvilke der ogsaa hos denne Art findes de for de fleste *Fagraea*-Arter ejendommelige, tykvæggede Idioblaster. Under Oversidens Epidermis findes et temmelig storcellet, klart Hypoderm med smukke Oxalatkrystaller og porede Vægge; i hver Overhudscelle findes et meget lille, kugleformet, tæt Aggregat af spidse Krystalnaale; i Oversidens Epidermis findes ganske faa, meget spredte Spalteaabninger.

Selve Nektarspalten er [Tab. XII, Fig. 7 og 8] betydelig mindre end hos *F. litt.*, men ligesom hos denne beklædt med et tyndvægget Epithel uden Krystaller [*m* i de anf. Fig.; desuden i Fig. 3 b og 4, Tab. XI, hvoraf den første er fra et Fladesnit, den sidste fra et Tværsnit under Overhuden]. Paa mange af mine Præparater, især paa saadanne, der udgöres af ikke altfor tynde Snit, var det mig paafaldende, at der dels i Nektariemundingen, dels, men sjældnere, inde i Nektariehulheden fandtes løsnede, døde, halvt destruerede Celler; noget lignende havde jeg ikke fundet hos *F. litt.*; [cfr. Tab. XII, Fig. 7, i: Tab. XI, Fig. 4, r]. Da kun udvoxne Blade have staaet til min Raadighed, kunde Udviklingen ikke følges, men ved et Tilfælde er der netop samtidig fra anden Haand fremkommen ontogenetiske Studier over Bladkirtlerne hos andre *Fagraea*-Arter, der kunne forklare mine ovennævnte Fund. Zimmermann[1]) har fundet, at *Fagraea*-Nektarierne i visse Maader i det mindste hidtil ere ganske enestaaende Dannelser: de opstaa derved, at en Celle i Overhuden tidlig voxer stærkt ind efter i det unge Mesofyl, i hvilket det ligesom skyder en Bresche; derpaa gaar denne Initialcelle tilgrunde uden at efterlade sig andet Spor end den Aabning (Nektariehulen), den har frembragt imellem de subepidermale Celler; de, der begrænse Hulheden, konstituere

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[1]) Cfr. Annales du jard. bot. de Buitenzorg, 1902; Vol. XVIII, pag. 1. Forf. kender beklageligvis ikke mine i 1897 publicerede Studier over disse Organer; han siger udtrykkelig, at det sekretproducerende Væv indeholder et ejendommeligt Stof, der dog ikke kan være Fedt; dette maa jeg benægte. Jeg finder alle Reaktionerne for Fedt eller fede Olier at være tilstede; netop heri have Fagraea-Nektarierne en Ejendommelighed.

sig som Epithel, der i den Grad nöje slutter sig til Epidermis, at man efter de færdige Stadier at dömme skulde tro, at det var selve denne, der havde foldet sig ind i Bladet. Hos *F. obovata*, som Zimmermann ikke har undersøgt, bevares Initialcellen [*i* i Fig. 7, Tab. XII] nu netop meget længe om end i destrueret Skikkelse; det aftegnede Præparat var fra et over eet Aar gammelt Blad, men det kan dog bemærkes, at Initialcellen ingenlunde altid bevares. Hvorledes de øvrige, i Præparatet [Tab. XI, Fig. 4] afbildede Cellerester skulle forklares, er vanskeligere at angive; men de ere muligvis under Nektariets Udvikling løsnede fra Hulens Sider. I Fig. 3 a paa samme Tavle ses Mundingen af Nektariet med de nærmest omgivende Epidermceller paa Fladesnit; *i* er den endnu tilbageblevne Rest af Initialcellen, der her som en (løst siddende) Prop lukker Aabningen.

Ovenstaaende Undersøgelse forekommer mig at give et ret interessant Komplement til Zimmermanns ovennævnte, udviklingshistoriske Iagttagelser over en anden Art.

IV. Bladkirtlerne hos *Marcgravia umbellata* L.

Skönt extraflorale Nektarier hos Marcgraviaceer flere Gange have været Genstand for Undersøgelse og Omtale[1]), kan jeg dog dels ikke finde, at de, der forekomme paa Bladene af ovennævnte, ofte under Navn af *Marcgravia dubia*[2]) dyrkede Art, ere nærmere undersøgte, dels er det mig ubekendt, at Udviklingshistorien af disse Organer er nöjere studeret.

De vegetative Skud af den nævnte Art have toradede, kortstilkede, savtakkede, elliptiske Blade med hjærteformet Basis. De ligge som bekendt meget tæt tiltrykte til Underlaget[3]), skjulende Hæfte-

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[1]) Cfr. Juel: Anat. der Marcgraviaceen, [Bihang til K. Svenska Vet.-Akad. Handlinger, 1887; Vol. XII]. Solereder: Systemat. Anat. d. Dikot., 1899; pag. 152.

[2]) Cfr. Richter: Beiträge zur Kenntniss d. Marcgrav. u. Aroideen [Termezetrajzi Füsetek, Bd. XXII; 1899, pag. 58].

[3]) Sé ogsaa Goebel: Organographie d. Pflanzen, I, 1898, pag. 138.

rødderne. Paa Bladundersiden ser man ved Pladens Basis to secernerende Kirtler, en paa hver Side af Midtribben. De fungere kun i Bladets yngre Stadier; senere blive de brunlige, og deres Hulhed fyldes af et amorft Sekret, hvori ofte Smuds- og Støvpartikler eller Svampesporer og -mykelier ere tilstede i rigelig Mængde.

Nektariet har Form som en relativ vid, men kort, cylindrisk, vinkelret paa Bladfladen ind i Bladkødet gaaende Fordybning med hvælvet Bund. Den er beklædt med en af tyndvæggede, radialstrakte Celler dannet Epidermis, der i det mindste tilsyneladende er en Fortsættelse af Bladundersidens. Vævet, hvori dette Nektarium er indsænket, det sekretberedende Parenkym, er meget tyndvægget; Cellerne slutte til hinanden uden Mellemrum, ere forsynede med temmelig store, midtstillede Cellekærner, men have intet Klorofyl. Flere af dem ere noget större end de andre og indeholde som saa mange andre Celler i Mesofyllet Rafider, der som bekendt ere ejendommelige for Marcgraviaceerne. Hele det sekretberedende Væv afgrænses fra det det omgivende Luftvæv ved et noget uregelmæssigt Lag af forvedede, tykvæggede, grovt porede Celler.

Nogen Tid efter at Bladene ere anlagte, omtrent naar de ere c. 2 Mm. lange og endnu dannede af ganske ensartet, meristematisk Væv, hvori allerhöjst enkelte Steder Anlæggene til Ledningsstrængene udpræges, anlægges Nektarierne. Tager man Snitserier gennem *Marcgravia*-Skuddenes nøgne Endeknopper og klarer Snittene gennem de i Knoplejet sammenfoldede Bladpladers Basalpartier i Klornatron, finder man efter nogen Søgen unge og yngste Nektarieanlæg. Det sekretberedende Væv dannes først; det udpræges som et rundagtigt Vævkomplex af Bladets Grundvæv og giver sig ved opmærksom Betragtning tilkende ved Cellernes uordnede Arrangement i Modsætning til de øvrige omgivende Bladvævceller, der her som i andre, ganske unge Blade ere ordnede i temmelig regelmæssige Lag. Idet nu Bladet ved Strækning og tildels ogsaa ved Tangentialdelinger voxer i Tykkelse undtagen netop lige over Sekretvævets Midte, bliver der her dannet en brøndlignende Fordybning, Nektariegruben (Tab. IX. Fig. 5), som udklædes med den tynd-

væggede, spalteaabningsløse Overhud, Nektarie-Epithelet. Her er altsaa et virkeligt Epidermalepithel, ikke (som hos *Fagraea*) en Pseudoepiderm. Under Bladets videre Udvikling, som her ikke nærmere skal behandles, vedbliver Sekretvævet at holde sig tyndvægget og interstitiefrit, medens det det omgivende Mesofylvæv udvikler sig til Luftvæv, bliver klorofylholdigt samt uddanner de for Marcgraviaceerne saa ejendommelige, tykvæggede Ophiurceller; tilsidst udpræges de i Sekretvævets Periferi liggende Parenkymceller til det ovennævnte, begrænsende Styrkevæv.

Man vil af ovenstaaende sé, at disse Nektarier i færdig Tilstand ikke ganske stemme overens med de af Juel hos *M. polyantha* beskrevne.

København; botan. Laboratorium i April 1902.

Forklaring over Tavlerne.

Figurerne ere tegnede med Abbé's camera clara efter Zeiss's Mikroskop, Obj. DD. Ocul 2, og formindskede.

Tavle IX.

Fig. 1. *Tinospora crispa* Miers. Tværsnit af Luftrod gennem en Protohadromstraale, *k*, og den indre Bark; i Bindevævet ved Siderne af Karstraalen begyndende Kambiumdannelse.

Fig. 2. *Canarium commune*. Tværsnit af yngre Parti af en Luftrod. Pilen angiver Retningen ud mod Overfladen; *bg*: Balsamgang, *l*: ungt Leptom.

Fig. 3. Samme; ældre Parti af en Luftrod. Den sekundære Tykkelsevæxt er begyndt ved Anlæg af Kambiumbue i Bindevævet; første (yderste) Protohadromkar, *pk*, adskilles allerede ved tangentiale Kambiumdelinger fra Resten af Karstraalen. En Balsamgang, *bg*, i Leptomet ses nederst i Figuren.

Fig. 4. Samme; Tværsnit af Luftrod tæt ved Vækstspidsen; en Balsamgang er nylig anlagt (skizogent) [*bg*], ungt Leptom ses ved *l*; Pilen viser Retningen ud mod den ydre Bark.

Fig. 5. *Marcgravia umbellata*. Meget ungt Nektarium fra Bladpladens Basis. De radialdelte og -strakte Epidermceller have Cellekærnen i den inderste Del. [Obj. DD, Ocul. 4]. Tværsnit af det unge Blad.

Tavle X.

Alle Figurerne ere af *Tinospora crispa*; Fig. 4 skematisk.

Fig. 1. Tværsnit af Luftrodens Leptom og indre Bark. Pilen angiver Retningen mod Periferien.

Fig. 2 a. Tværsnit af Luftrodens Protohadrom og indre Bark. Man ser flere Slimceller, *sl*.

Fig. 2 b. Ydre Parti af samme. Ved *p* Kork; ved *sl* Slimcelle.

Fig. 3. Indre Bark, begyndende (sekundært) Kambium, *cb*, og ydre Protohadromkar af Luftrod i Tværsnit; [Partiet ved *m* i Fig. 4].

Fig. 4. Tværsnit af en i sekundær Vext indtraadt Luftrod. Karrene i det sekundære Hadrom meget store.

Tavle XI.

Fig. 1. *Tinospora crispa*. Længdesnit af en Luftrod gennem en Hadromstraale; Snittet har truffet Protohadromkarrene samt længere ude i Inderbarken en Slimcelle *sl*.

Fig. 2. *Cissus sicyoides.* Tværsnit af ung, snorformet Luftrod. Pilen angiver Retningen mod Periferien. En Endoderm er ikke udpræget; den burde søges ved *e*; *sl*: Slimcelle; *lp*: primært, komprimeret Leptom; *ls*: sekundært, fungerende Leptom; derindenfor Kambium.

Fig. 3 a. *Fagraea obovata;* Fladesnit af Løvbladets Overside, visende (i Midten) Nektariemundingen, *i*, endnu lukket af Initialcellen; i nogen Afstand derfra ses ejendommelig orienterede Epidermalvægge: i denne Kredszone sænker Overhudens Niveau sig ind imod Kirtelmundingen.

Fig. 3 b. Samme; Fladesnit som forrige, men lige under Epidermis. Nektariehulheden *sp* beklædt med det secernerede Epithel, *m* (Pseudoepiderm).

Fig. 4. Tværsnit af Bladpladen gennem udvoxet Nektarium; *m*: Pseudoepiderm; *r*: Initialcellerester.

Tavle XII.

Fig. 1. *Erythrochiton brasiliensis,* yngste Anlæg til Kirtelapparatet; Længdesnit af Løvbladets Plade. En Epidermcelle har tangentialdelt sig og hvælver sig frem til Kirtelhaaret, *h*; en Celle i første Subepidermallag, *k*, har radialdelt sig og bliver sammen med den inderste af de ovenover liggende Celler til Oliekirtelen. Dennes Celler ere her og i de følgende Figg. tonede.

Fig. 2. Samme; noget ældre Stadium. Haaret, *h*, peger tydelig hen imod Bladspidsen.

Fig. 3. Samme; lidt ældre; Haaret, *h*, böjes tæt ned til Bladpladen; *e*: Overhuden, *p*: Mesofyl.

Fig. 4. Samme; den schizo-lysigene Oliekirtel er nu dannet; Haaret, *h*, helt udviklet; *k*: Oliekirtel.

Fig. 5. Samme; 5 a og 5 b to Kirtelapparater paa omtrent samme Udviklingstrin (*a* fra Bladoversiden, *b* fra Undersiden); Tværsnit fra Bladpladen, visende Længdevæggene i Haarcellerne; *k*: Kirtelen. Bladet var lysegrönt.

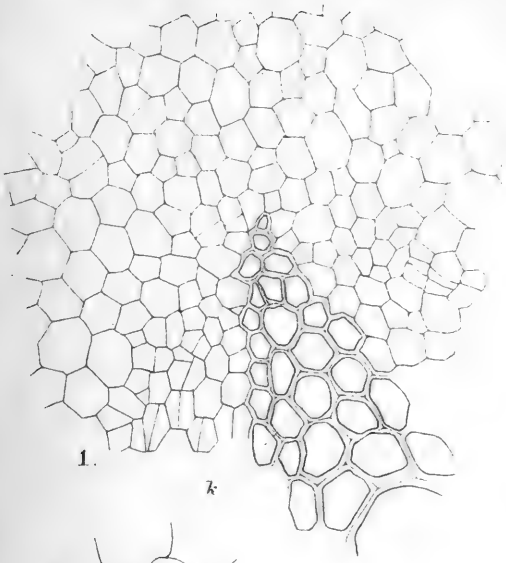
Fig. 6. Samme; Tværsnit af helt udvoxet, mørkegrönt Blad; Haaret nu affaldent, efterladende den kutikulariserede Stilkcelle, *h*, lige oven over Oliekirtelen; *e*: Overhud; *p*: Palissader.

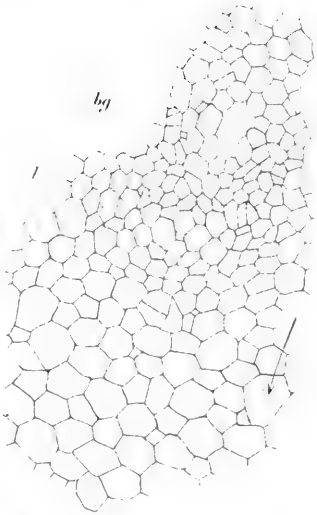
Fig. 7. *Fagraea obovata,* Længdesnit af Bladpladen gennem et udvoxet Nektarie. I dettes Munding ses endnu Resten, *i*, af den epidermale Initialcelle; *ep*: Overhud; *m*: secernerende Epithel.

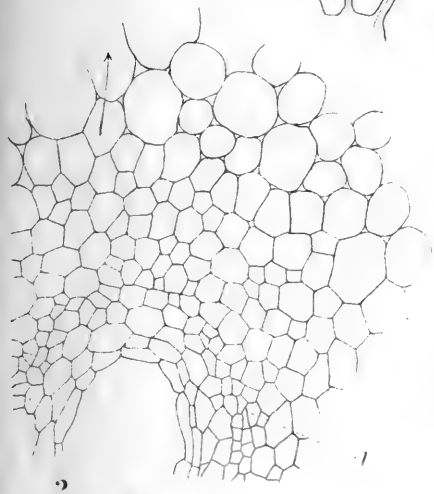
Fig. 8. Samme; Tværsnit af Bladpladen; Initialcellen forsvunden.

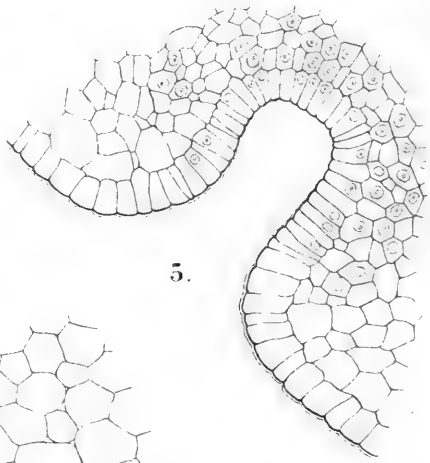
Fig. 9. *Erythrochiton brasiliensis:* Fladesnit af udvoxet Blads Overside; i Midten ses et affaldet Kirtelhaars tilbagesiddende, tykvæggede, kutikulariserede Basalcelle. I flere af Cellerne herudenom ses Epidermisvægge, som staa tangentialt til Basalcellen. [Smlgn. hermed Fig. 6, der kan betragtes som et Snit gennem Fig. 9].

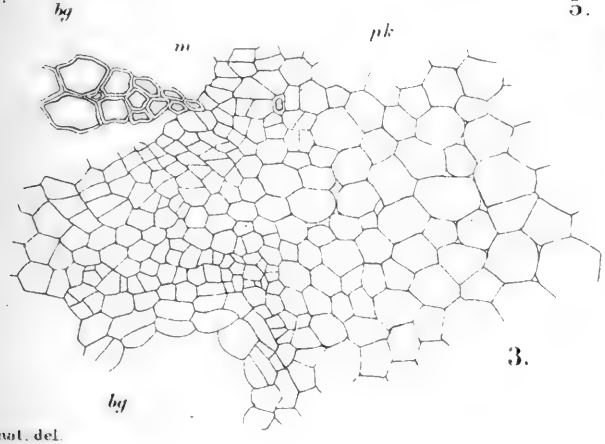
Kjøbenhavn. — Bianco Lunos Bogtrykkeri.











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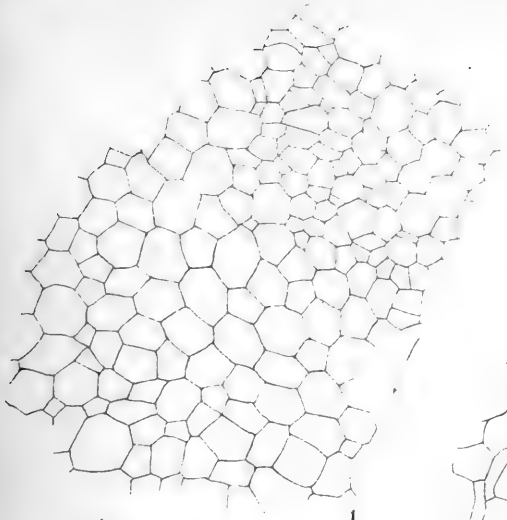

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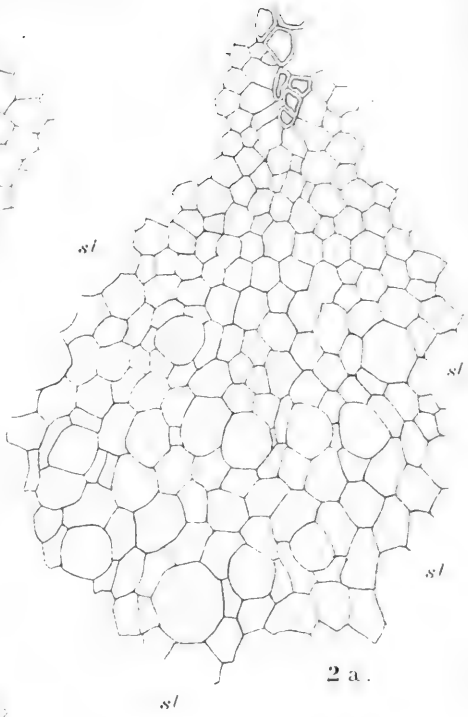

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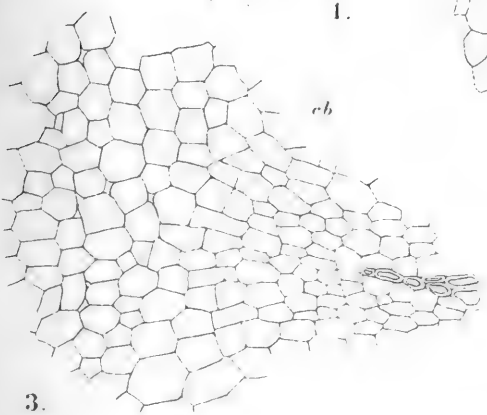

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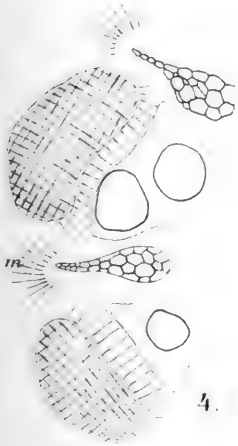

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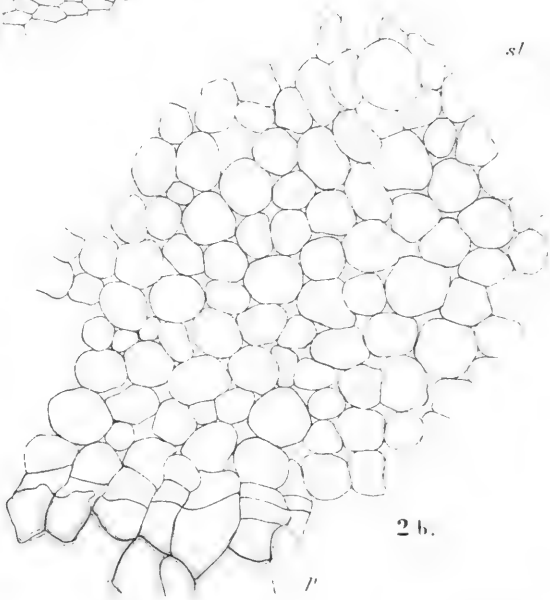

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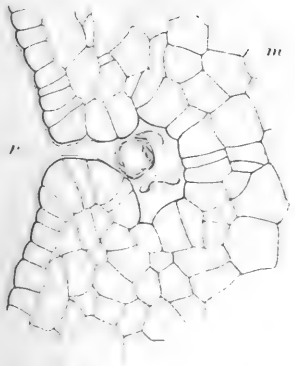

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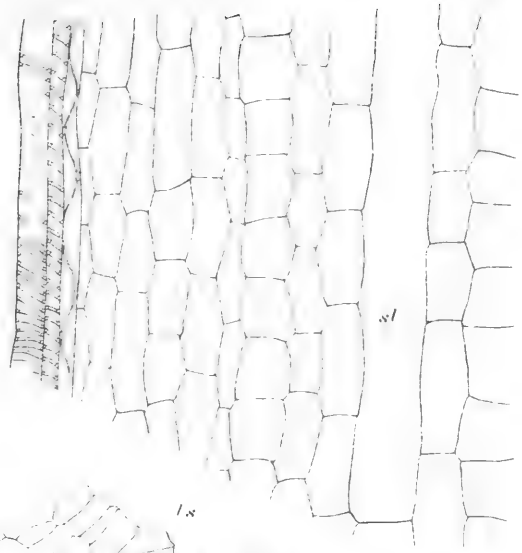

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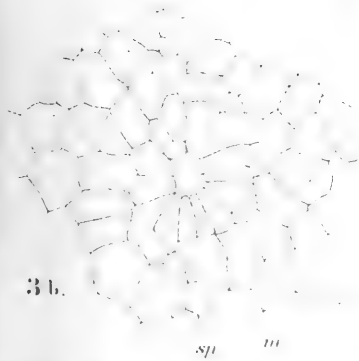

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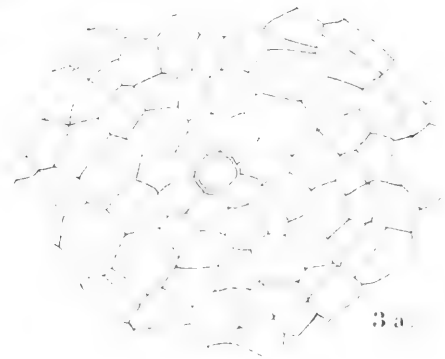

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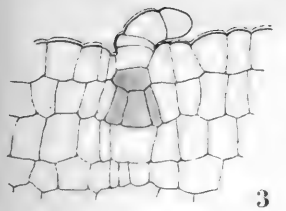

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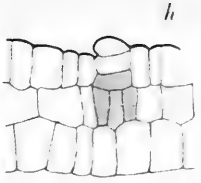

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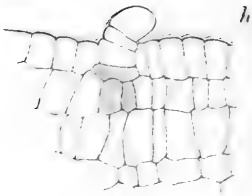

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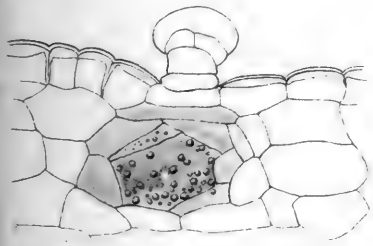

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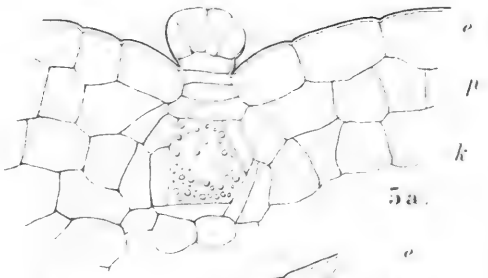

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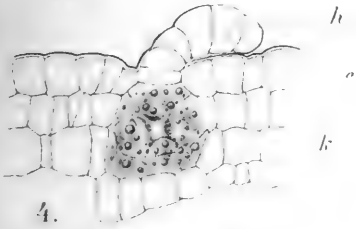

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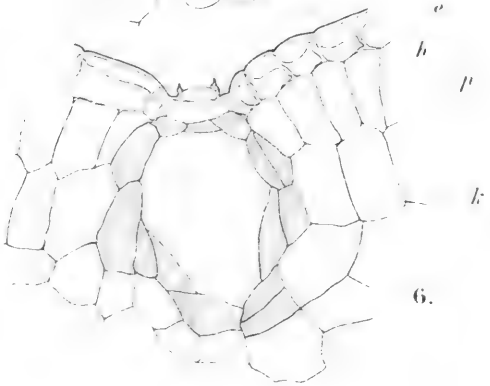

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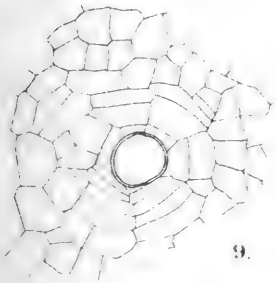

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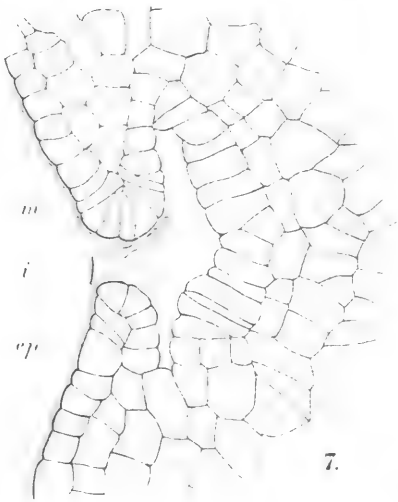

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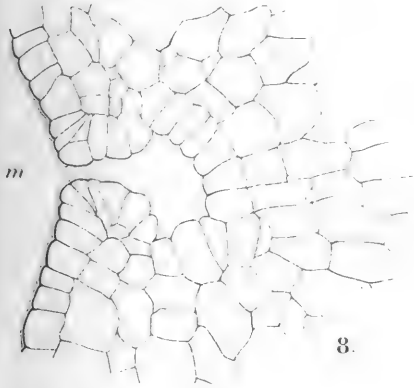

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Særtryk af Botanisk Tidsskrift. 25. Bind. 1. Hefte. · København 1902.

Arbejder fra den Botaniske Have i København. Nr. 11.

New Ferns from Brazil

by

Carl Christensen.

In working out a critical list of the ferns in the Botanical Museum at Copenhagen, I have found the following species or varieties to be undescribed or not hitherto recorded from Brazil; in a few species of Fée I have altered the name, when the name of Fée has been previously occupied in the genus. The specimens are gathered chiefly in South Brazil by the celebrated collector, Dr. Glaziou, and by Hj. Mosén of Stockholm, resident for many years at Caldas, state of Minas Geraes.

Elaphoglossum decoratum (Kze.) Moore. This beautiful species, previously only known from the West Indian islands, Guyana and Peru, has now been gathered in South Brazil by Glaziou n. 15712 and by Mosén n. 3727, San Paulo: Santos, $^{30}/_{3}$ 1875 (*Acrostichum Mosenii* Glaziou in sched.). It is also recorded from Ouro Preto: Serra das Camarinhas, leg. Schwacke (vide: Christ in Bull. l'herb. Boiss. II, **2**, 328 (1902)). All the specimens are sterile.

Polypodium Warmingii n. sp. (*Eupolypodium*). Caudex short, erect, crowned at the top with a tuft of light-brown, thin, linear-subulate, about 1 cm. long scales. Stems tufted, $^{1}/_{2}$—2 cm. long, rigid, clothed with long, soft, patent, reddish hairs; frond 1—5 cm. long, $^{3}/_{4}$—$1^{1}/_{2}$ cm. broad, oblong-lanceolate, gradually narrowed towards the base, pinnatifid into a narrow wing; segments oblong, obtuse, dilated and decurrent at the base, the lower ones reduced to mere auricles; larger segments crenate or incised $^{1}/_{3}$—$^{1}/_{2}$ of the way down to the midrib; texture very thick, coriaceous, midrib and veins quite hidden; veins free, 2—3 jugate, erecto-patent, once forked, not reaching the margin. Sori large, superficial and submarginal, one at each lobe. Frond with a few long, spreading, reddish

hairs, mostly confined to the margins, upper surface sparely, under one densely white-pruinose.

Glaziou 18687.

Near *P. albidulum* Bak. but differs by its pilose stem and frond, by the segments being again lobed, and by its more rigid texture.

Polypodium Blanchetii nom. nov. (*P. exiguum* Fée, crypt. vasc. Brés. **1**, 89, tab. 37, fig. 1, Christ, Bull. l'herb. Boiss. II, **2**, 369, non Griseb. Flor. br. W. Ind. 701).

Glaziou 10177, 15753.

Probably included under *P. trichomanoides* Sw. by Baker in „Flora brasiliensis", and, I think, only a dwarfed variety of this species.

Polypodium longepilosum nom. nov. (*P. villosum* Fée, Crypt. vasc. Brés. **2**, 54, tab. 97, fig. 1, non Karst. Flor. sel. Columbiæ tab. 144).

Frond clothed throughout with long, patent, reddish hairs; texture very thick, costa and veins invisible.

Glaziou 4411.

Polypodium Mosenii n. sp. (*Goniophlebium*).

Rhizome 1—$1^1/_2$ cm. thick, creeping, scaly; the scales are numerous, persistent, imbricated, adpressed, ovate, short acuminate, large (6 mm. long by 3 mm. broad), peltately fixed and dark red-brown or nearly black with transparent light-brown edges, very thick and rigid. Stems at distances of 4 cm., brownish or stramineous, glabrous, 3—4 dm. long. Frond $7^1/_2$—8 dm. long, lanceolate oblong, fully pinnate but with a pinnatifid apex. Rachis above sulcate, slightly hairy and clothed below with scattered dark-brown, ovate, long acuminated, ciliated, thin and reticulated scales with a cordate base. Largest pinnæ 2 dm. long by 2 cm. broad, the lower ones not deflexed or reduced; pinnæ numerous, 35—40 jugate, nearly opposite, in the lower half of the frond at distances of 2—3 cm., lanceolate, entire, often falcate, acute or acuminate, sessile; upper side of the base a little dilated and adnated to rachis, the lower one free, rounded; midrib stramineous; both surfaces naked except the lower third of the midrib below, which bears a few scales like those of the rachis but smaller; veins distinct, forming 4 or 5 rows of areoles between the midrib and edge, the free veinlets ending in a white calciferous dot on the upper surface, when not soriferous; sori round, superficial, in 2—3 rows on both sides of the midrib; texture herbaceous.

Vallée de Bomfim, Glaziou 4422, $^{25}/_3$ 1870 (*Goniophlebium dissimile L.*? Fée Crypt. vasc. Brés. **2**, 64). — Minas Geraes: Caldas, Mosén 2208, $^1/_{12}$ 1873, and a specimen distributed from Kew and marked: Pol. neriifolium Schkuhr, Amer. trop., also belongs here.

The species here described as new is allied to *P. loriceum* L. and also to *P. brasiliense* Poir. A *neriifolium* (Schkuhr) Baker. All the specimens belonging hereto are named *P. neriifolium* on the sheets, but they

are totally different from the species of Schkuhr by their frond having a pinnatifid apex and bearing scales on the rachis and midrib below, while *P. neriifolium* has a terminal pinna like the lateral ones and is entirely glabrous; from *P. loriceum*, a form of which (*Gon. pectinatum* J. Sm.) has a few similar scales on the rachis, our species differs by its distant pinnæ.

Polypodium lævigatum Cav. var. **crispatum** n. var.

Rhizome long trailing, clothed throughout with persistent, red-brown, crisped, long-acuminated, patent scales, like those of the following *P. Galatheæ*. Stem 4—8 cm. long, lamina not or slightly decurrent at the base; colour pale-green; only two rows of meshes by a frond of like breadth as ordinary *lævigatum*.

Minas Geraes: Caldas, l. Mosén 2220.

Polypodium Galatheæ nom. nov. (*Craspedaria crispata* Fée Crypt. vasc. Brés. **1**, 119, tab. 36, fig. 2, **2**, 66, non *P. crispatum* (J. Sm.) Hook. sp. fil. **5**, 1. — *P. lycopodioides* part. Bak. Flor. bras. **1**, part. 2, 533 — *P. vacciniifolium* Bak. Journ. Linn. Soc. **14**, 24).

Glaziou 2072, 4423, 5282, 5283, and gathered long ago by Didrichsen during the Danish Galathea Expedition 1845—1847 near Rio.

This species is intermediate between *P. vacciniifolium* Langsd. et Fisch. and *P. lycopodioides* L., next to the former; the fronds are very different, the sterile ones being from shortly ovate to lanceolate, the fertile ones narrow-linear; the essential character of this species yet shows the rhizome, which is thicker than in the two allied species and clothed throughout with persistent, crisped and patent scales.

Cyclodium rigidissimum n. sp. (or *Aspidium rigidissimum* n. sp.).

Rhizome not seen. Stems strong, erect, naked or with a few deciduous red-brown, linear-acuminate scales. Fronds pinnate, glabrous, dimorphous. Sterile frond ovate-oblong, 5 1/2 dm. long, 2—2 1/2 dm. wide at the middle; rachis above deeply and narrowly channelled; pinnæ 15—16 jugate with a terminal one, approximate, overlapping one another, horizontal, short-stalked, 3—4 cm. broad, ovate-oblong or elliptical, acute at the point, their base nearly equal-sided, cuneate-truncate or on the lower side a little more obliquely cuneate; margins irregularly undulate-crenate, thickened; venation as in *C. meniscioides* (Willd.) with 4 or 5 areoles on each side of the primary veins, but the veins very distinct, strong, raised on both sides; midrib sulcate, compressed; texture coriaceous, very rigid; colour brown. — Fertile frond oblong, 6 dm. long, 1 1/2 dm. broad; pinnæ in 15—16 pairs, rather distant, 8 cm. long by 1 cm. broad, linear, obtuse or rounded at the apex, truncate at the base; margins entire or subrepand, slightly recurved. Sori numerous, rather small, often confluent; indusium peltate, persistent; texture very rigid; upper surface of the pinnæ scalpturate by the raised veins.

Glaziou 12374.

Subspecies of *C. meniscioides* (Willd.) Pr.; it differs by its very rigid texture, the more numerous pinnæ, which are horizontal, approximate, and imbricated in the sterile frond, and by its very distinct and raised veins.

Asplenium serra Langsd. et Fisch. var. **geraense** n. var.

Rachis, like the stem, shining, black, throughout densely clothed with red-brown, deciduous tomentum, consisting of long, hairlike, thin scales with a somewhat broader base; pinnæ often lobed towards their base or with a distinct auricle on the upper side; under surface (and sometimes also the upper one) paleaceous along the veins; texture very rigid and leathery; whole plant smaller than the type.

Minas Geraes: 1) Lagoa Santa, Serra da piedade. Reinhardt, Warming. 2) Caldas. Mosén 2119, $^{30}/_{10}$ 1875.

The plant of Mosén is a curious, evidently abnormal form with the pinnæ auricled on both sides and sori extending into the auricles. Our variety somewhat resembles *A. caudatum* Forst., but the position of the sori is that of *A. serra*, and apparently it is a xerophilous form of this species.

— Max. Kuhn in his „Filices africanæ“ pag. 208 says: „*Asplenum Nigritianum* Hook. nullo modo ab *Aspleno pedicularifolio* St. Hil. (Voy. d. l. dist. d. Diam. I, 380) fide spec. orig. distingui potest, quod nomen ex prioriatis legibus anteponendum est“. — *A. nigritianum* Hook. is a well-marked species from the islands of west-tropical Africa, but by recent authors not recorded from Brazil, and the plant of Saint Hilaire is not noticed either by Baker in „Flora brasiliensis“ or by Fée in his „Crypt. vasc. du Brésil“. In our herbarium I find two specimens collected by Glaziou in the state of Minas Geraes, marked on the sheets *A. rhizophyllum* Kze. by Baker, but they are evidently extremely different from this species. The dried plants are black; rhizome woody, strong, oblique or erect; frond bipinnate, lower pinnæ reduced, ternate, the upper ones with several short-stalked rhomboidal or nearly fan-shaped, dentate pinnules; young rachises and stems clothed with dark-brown scales. The specimens exactly agree with the description and figure of Hooker (2 century tab. 44), and clearly they belong to the same species. Then the synonymy and distribution of the species are as follows:

Asplenium pedicularifolium St. Hilaire, Voy. d. l. dist. de Diam. **1**, 380, Kuhn Fil. afr. 208. — *A. nigritianum* Hook. 2 cent. tab. 44, spec. fil. **3**, 223; Hook. and Bak. Syn. Fil. 215, Kuhn Fil. afr. 108.

Minas Geraes: St. Hilaire, Glaziou 15740, 20156 (small). Prince's Island and St. Thomé in Guinea Bay.

Pteris quadriaurita Retz. var. **Christii** n. var. (*P. quadriaurita* f. *major* Christ, Annuaire Jard. bot. Genève 1899, 41).

Very large; pinnæ more than 2 dm. long by 5—6 cm. broad at the middle, the lower ones short-stalked, the upper sessile, adnated to the rachis with a decurrent wing; the first pairs of segments at the base of the pinnæ very reduced, auriform or like a broad wing to the costa of the pinna; terminal pinna narrowed suddenly at the base to a broad decurrent wing; sterile apex of the segments serrate; texture subcoriaceous, rigid; colour pale-green with a metallic, silvery lustre; veins raised as in *P. splendens* Klf.

Glaziou 12359.

Probably a distinct species, but the specimen being too incomplete I cannot form a concrete opinion upon that question.

Pteris Schwackeana Christ, Spec. pter. austr. Bras. 27. This species, lately described by Dr. Christ, I have found in the collection of Glaziou under n. 16641. The specimen agrees exactly with the description of Christ, only the pinnæ are nearly opposite and somewhat broader: $3^1/_2$ cm. A well-marked species allied to *P. splendens* Klf.

Lindsaya lancea (L.) Mett. var. **semilunata** n. var.

Unbranched, simple pinnate; pinnæ large, $4^1/_2$ cm. long, $1^1/_2$ cm. broad, the lateral ones with a curved falcate apex, the lower edge straight or slightly concave, the upper arched with the inner side straight and nearly parallel to the rachis, sometimes with a little auricle; the terminal pinna semilunar with a cuneate base, 3—4 cm. broad, upper edge somewhat concave and protruded at both sides into falcate curved horns. Texture papyraceous, plant entirely glabrous; sori in an unbroken row along the upper edge of the pinna.

Glaziou 12352, 12353.

This fern is of a peculiar habit, yet, I think, it is only a form of the very variable *L. lancea* (L.) Mett. (*L. trapeziformis* Dry.). It comes near the var. *falcata* (Willd.) Bak. in the size and shape of the lateral pinnæ, but the terminal pinna is very different. *L. Schomburgkiana* Kl., Kunze Farnkr. **2**, tab. 128, which I have not seen, differs by its more obtuse pinnæ and by its rachis being entirely hidden by the overlapping pinnæ.

$^6/_9$ 1902.

Bianco Lunos Bogtrykkeri.

(Særtryk af Vidensk. Meddel. fra den naturh. Foren. i Kbhvn. 1903.)

Arbejder fra den Botaniske Have i København. Nr. 12.

Lieutenant Olufsen's second Pamir Ekspedition.

Plants collected in Asia-Media and Persia.

By

Ove Paulsen.

Cruciferae

determ. **W. Lipsky,** St. Petersburg.

I. **Lepidium** L.

1. *L. Draba* L.

N. 48. Transcaspia, in the steppe by Bami near Askabad. April 24. 1898.

2. *L. latifolium* L.

N. 1032. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 4. 1898.
N. 1127. Pamir, on dry mountains ibid. Alt. 3800m. Aug. 18. 1898.
N. 1155. Pamir, by the lake Bulung Kul. Alt. 3800m. Aug. 23. 1898.
N. 1288. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 8. 1898.
N. 1342. Pamir, prov. Wakhan, by Sunk. Alt. 3000m. Sept. 10. 1898.
N. 1515. Pamir, prov. Garan, by Anderab. Alt. 2300m. Oct. 13. 1898.

3. *L. obtusum* Basin. (*foliis acutiusculis*).

N. 1769. Transcaspia, in cultivated land by Merw. June 3, 1899.

4. *L. persicum* Bois. (?)

N. 2000. Chiwa, on the mountain Sultan-Babá. July 24. 1899.

5. *L. ruderale* L.

N. 194. Transcaspia, by Tshardshui.

II. **Physolepidium** Schrenk.

6. *P. repens* Schrenk (*Lepidium repens* Bois.).

N. 128. Tashkent, in cultivated land by Tshinas. May 7. 1898.

III. **Dilophia** Thoms.

7. *D. salsa* Thoms. *D. kashgarica.*

N. 621. Pamir, on moist ground by „Kisil Kul". Alt. 4000m. June 29. 1898.

IV. **Didymophysa** Bois.

8. *D. Fedtschenkoana* Rgl. et Schm.

N. 1060. Pamir. On a mountain by the lake Jashil Kul. Alt. 4300m. Aug 7. 1898.

V. **Thlaspi** L.

9. *T. perfoliatum* L.

N. 1615. Ferghana, in cultivated land by Osh. April 10. 1899.

VI. **Taphrospermum** C. A. Meyer.

10. *T. altaicum* C. A. M.

N. 538. Alai mountains, by Olgin Lug. Alt. 2600m. June 24. 1898.

VII. **Sisymbrium** L.

11. *S. brassicaeforme* C. A. M.

N. 409. Alai mountains, by Sufi Kurgan. Alt. 2100m. June 6. 1898.
N. 822. Pamir, near the lake Jashil Kul. Alt. 3800m. July 18. 1898.

12. *S. heteromallum* C. A. M. f. *glabra.*

N. 1187. Pamir, by a spring near the lake Jashil Kul. Alt. 3800m. Aug 29. 1898.

13. *S. humile* C. A. M.

N. 755. Pamir, by Kara Su. Alt. 3800m. July 12. 1898.

14. *S. Korolkowi* Rgl. et Schm.

N. 632. Pamir, on dry plains by „Kisil Kul". Alt. 4000m. June 29. 1898.
N. 684. Pamir, on dry plains by Sary Mullah. Alt. 4100m. July 5. 1898.
N. 777. Pamir, Tshatir Tash. Alt. 4000m. July 14. 1898.

15. *S. Loeselii* L.

N. 288 a. Ferghana, in cultivated land by Margilan. May 27. 1898.
N. 322. Ferghana, in cultivated land by Osh. June 1. 1898.
N. 341. Ibid.
N. 1874. Pamir, prov. Goran, in cultivated land by Darmaraght (Misjus). Alt. 2300m. Oct. 10. 1898.

16. *S. mollissimum* C. A. M.

N. 598. Alai Steppe by Sary Tash. Alt. 3300m. June 27. 1898.

17. *S. pannonicum* Jacq.

Specimen minus fere ad *S. rigidulum* Dcne. vergens.

N. 54. Transcaspia, in the steppe by Bami near Askabad. April 24. 1898.

18. *S. pumilum* Steph.

Valde variat et synonyma permulta habet.

N. 20. Transcaspia, by Krasnowodsk. April 23. 1898.
N. 33. Transcaspia, in the steppe by Kailiu. April 23. 1898.
N. 71. Samarkand, in cultivated land. May 3. 1898.
N. 101. Ibid. May 6. 1898.

19. *S. Sophia* L.

N. 51. Transcaspia, in the steppe by Bami near Askabad. April 24. 1898.
N. 79. Samarkand, in cultivated land. May 3. 1898.
N. 1186. Pamir, by a spring near the lake Jashil Kul. Alt. 3800m. Aug. 29. 1898.

— — f. *nana*.

N. 968. Pamir, near the lake Jashil Kul. Alt. 3800m. July 28. 1898.
N. 1059. Ibid. Alt. 4000m. Aug. 6. 1898.
N. 1071. Ibid. Alt. 3800m. Aug. 8. 1898.

VIII. **Goldbachia** D. C.

20. *G. laevigata* D. C.

N. 1664. Chodshent, in the steppe by Dragomirowo. May 2. 1899.

— — *β. ascendens* Bois.

N. 100. Samarkand. May 6. 1898.
N. 203. Buchara, in cultivated land. May 15. 1898

IX. **Tauscheria** Fisch.

21. *T. lasiocarpa* Fisch.

N. 297. Ferghana, in cultivated land by Margilan. May 27. 1898.
N. 978. Pamir, near the lake Jashil Kul. Alt. 3800m. July 28. 1898.

X. **Isatis** L.

22. *I. Boisseriana* Rchb. *I. heterocarpa* Rgl. et Schm.

N. 96. Samarkand, in cultivated land. May 6. 1898.

XI. **Brassica** L.

23. *B. Napus* L.

N. 1285. Pamir, prov. Wakhan, in cultivated land by Langar Kisht. Alt. 3000m. Sept. 9. 1898.

24. *B. nigra* Koch.

N. 1947. Chiwa, in cultivated land. July 9. 1899.

XII. **Crambe** L.

25. *C. orientalis* L. (?)

N. 302. Ferghana, between Andidshan and Margilan. May 27. 1898.

26. *C. Sewerzowi* Rgl. et Schm.

N. 1628. Ferghana, on a mountain by Osh. April 10. 1899.

XIII. **Nasturtium** R. Br.

27. *N. palustre* D. C.

N. 330. Ferghana, by Osh. June 3. 1898.

XIV. **Capsella** D. C.

28. *C. draboides* Korsh.

N. 1157. Pamir, in a swamp by the lake Bulung Kul. Alt. 3800m. Aug. 24. 1898.

29. *C. bursa pastoris* L.

N. 74. Samarkand, in cultivated land. May 3. 1898.

N. 1282. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 8. 1898.

30. *C. procumbens* Fr.

N. 669. Pamir, ad Rabat I. Alt. 4300m. July 3. 1898.

N. 1001. Pamir, in a swamp by the lake Jashil Kul. Alt. 3800m. July 29. 1898.

N. 1201 a. Pamir, by the salt lake Tuz Kul. Alt. 3800m. Aug. 31. 1898.

XV. **Camelina** Crantz.

31. *C. silvestris* Wallr.

β. albiflora Bois.

N. 100 b. Samarkand. May 6. 1898.

XVI. **Neslia** Desv.

32. *N. paniculata* L.

N. 98. Samarkand, in cultivated land. May 6. 1898.

XVII. **Draba** L.

33. *D. incana* L.

N. 436. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 20. 1898.

34. *D. media* Litwinow.

N. 952. Alai steppe by Sary Tash. Alt. 3300m. June 27. 1898.
N. 1243. Pamir, in the Chargush-pass. Alt. 4300m. Sept. 3. 1898.

— — *β. leiocarpa.*

N. 442. Alai mountains, in the juniper forests by Olgin Lug. Alt 2600m. June 20. 1898.

35. *D. Tranzschelli* Litwinow.

A *D. turcestanica* Rgl. et Schm. non distinguitur.

N. 985. Pamir, on moist mountains. July 29. 1898.

XVIII. **Smelowskia** C. A. Meyer.

36. *S. annua* Rupr.

N. 1061. Pamir, in the mountains near the lake Jashil Kul. Alt. 4300m.

37. *S. calycina* C. A. M.

N. 561. Alai mountains, by Olgin Lug. Alt. 2800m. June 25. 1898.
N. 630. Pamir, on dry plains by „Kisil Kul". Alt. 4000m. June 29. 1898.
N. 782. Pamir, by Tshatir Tash, near the snow. Alt 4300m. July 15. 1898.
N. 1096. Pamir, on dry mountains near the lake Jashil Kul. Alt. 4100m. Aug. 11. 1898.
N. 1227. Pamir, in the Chargush-pass. Alt. 4300m. Sept. 3. 1898.

38. *S. sisymbrioides. Hutchinsia sisymbrioides* Rgl. et Schm.

N. 435. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 20. 1898.

XIX. **Erysimum** L.

39. *E. altaicum* C. A. M.

N. 604. Alai steppe by Sary Tash. Alt. 3300m. June 27. 1898.

40. *E. canescens* Rotb.

N. 364. Ferghana, Issik Bulak near Osh. June 16. 1898.

41. *E. pamiricum* Korsh.

Certe est *Braya.*

N. 633. Pamir, on dry plain by „Kisil Kul". Alt. 4000m. June 29. 1898.
N. 1159. Pamir, in a swamp by the lake Bulung Kul. Alt. 3800m. Aug. 24. 1898.
N. 1225. Pamir, in the Chargush-pass. Alt. 4300m. Sept. 2. 1898.

42. *E. sisymbrioides* C. A. M.

N. 793. Pamir, by Tshatir Tash. Alt. 4000m. July 15. 1898.
N. 1173. Pamir, by a stream near the lake Bulung Kul. Alt. 3800m. Aug. 25. 1898.

XX. **Alyssum** L.

43. *A. campestre* L.

N. 1649. Ferghana, on a mountain near Osh. April 18. 1898.

44. *A. desertorum* Stapf. *A. minimum* M.

N. 478. Alai mountains, by Olgin Lug. Alt. 2600m. June 21. 1898.
N. 594. Alai steppe by Sary Tash. Alt. 3300m. June 27. 1898.

45. *A. linifolium* Steph.

N. 34. Transcaspia, in the steppe by Kailiu. April 23. 1898.
N. 1622. Ferghana, on a mountain by Osh. April 10. 1899.

46. *A. marginatum* Steud.

N. 30. Transcaspia, in the steppe by Kailiu. April 23. 1898.

XXI. **Clypeola** L.

47. *C. Jonthlaspi* L.

N. 1649 a. Ferghana, on a mountain by Osh. April 18. 1899.

XXII. **Pseudobraya** Korshinsky.

48. *P. Kizil-arti* Korsh.

Certe est *Draba*. Non recte cl. beatus Korshinsky dein (in herb.) cum *Draba physocarpa* Komar. conjunxit.

N. 576. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 25. 1898.
N. 788. Pamir, by a river by Tshatir Tash. Alt. 4000m. July 15. 1898.
N. 1011. Pamir, on moist mountains near the lake Jashil Kul. Alt. 4000m. July 15. 1898.
N. 1247. Pamir, in the Chargush-pass near the snow. Alt. 4600m. Sept. 3. 1898.

XXIII. **Malcolmia** R. Br.

49. *M. africana* (L.) R. Br.

N. 14. Transcaspia, by Krasnowodsk. April 23. 1898.
N. 41. Transcaspia, in the steppe by Bami. April 24. 1898.
N. 145. Samarkand, in the steppe by Kunikud. May 10. 1898.
N. 1624. Ferghana, on a mountain by Osh. April 10. 1899.

— — *β. intermedia* Bois.

N. 70. Samarkand, in cultivated land. May 3. 1898.

50. *M. Bungei* Bois. *Fedtschenkoa turkestanica* Rgl. et Schm. (Lipski Acta H. Petrop. 18. 1900. P. 9.)

N. 108. Samarkand, in the steppe by Balan Hur. May 6. 1898.
N. 1669. Samarkand, in the steppe by Rostowsewo. May 6. 1899.

51. *M. Karelini* Lipsky.

Multa synonyma habet quorum proximum *Dontostemon brevipes* Bge.

N. 61 b. Buchara, in cultivated land by Jakatut. April 25. 1898.

XXIV. **Cryptospora** Kar. Kir.

52. *C. falcata* Kar. Kir.

N. 109. Samarkand, in the steppe by Balan Hur. May 6. 1898.
N. 367. Ferghana, Ag Jer near Osh. June 16. 1898.

XXV. **Euclidium** R. Br.

53. *E. syriacum* (L.) R. Br.

N. 40. Transcaspia, in the steppe by Bami. April 24. 1898.
N. 82. Samarkand, in cultivated land. May 3. 1898.

54. *E. tataricum* W.

N. 141. Tashkent, in cultivated land by Tshinas. May 10. 1898.

XXVI. **Leptaleum** D. C.

55. *L. filifolium* D. C.

N. 144. Samarkand, in the steppe by Kunikud. May 10. 1898.
N. 175. Samarkand, in the steppe by Balan Hur. May 12. 1898.

XXVII. **Chorispora** D. C.

56. *C. macropoda* Trautv.

N. 597. Alai steppe by Sary Tash. Alt. 3300m. June 27. 1898.
N. 634. Pamir, on dry plains by „Kisil Kul“. Alt. 4000m. June 29. 1898.
N. 781. Pamir, by Tshatir Tash, near the snow. Alt. 4300m. July 15. 1898.

XXVIII. **Christolea** Camb.

57. *C. crassifolia* Camb.

N. 1201 b. Pamir, by the salt lake Tuz Kul. Alt. 3800m. Aug. 31. 1898.

— — *a. typica* Korsh.

N. 685. Pamir, in a dry plain by Sary Mullah. Alt. 4100m. July 5. 1898.

— — *β. pamirica* Korsh.

N. 650. Pamir, on dry mountains by the lake Kara Kul. Alt. 4200m. July 1. 1898.

XXIX. **Parrya** R. Br.

58. *P. eriocalyx* Rgl. et Schm.

N. 628. Pamir, on dry plains by „Kisil Kul". Alt. 4000m. June 29. 1898.
N. 1226. Pamir, on the Chargush-pass. Alt. 4300m. Sept. 2. 1898.

59. *P. fruticulosa* Rgl. et Schm.

N. 564. Alai mountains, by Olgin Lug. Alt. 3000m. June 25. 1898.

— — *f. subintegrum* R. et S.

N. 524. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 24. 1898.

60. *P. nudicaulis* Kar. Kir.

β. turcestanica Korsh.

N. 1073. Pamir, near the lake Jashil Kul. Alt. 3800m. Aug. 8. 1898.

61. *P. pinnatifida* Kar. Kir.

N. 557. Alai mountains, by Olgin Lug. Alt. 3300m. June 25. 1898

Umbelliferae [1])

determ. **W. Lipsky**, St. Petersburg.

I. **Hydrocotyle** L.

1. *H. asiatica* L.

N. 2184. Persia, Prov. Gilan, in the forests by Imam Sadé Hashim. Sept. 16. 1899.

II. **Eryngium** L.

2. *E. coeruleum* M. Bieb.

N. 2182. Persia, Prov. Gilan, by Imam Sadé Hashim. Sept. 16, 1899.

III. **Echinophora** L.

3. *E. Sibthorpiana* Guss.

N. 2200. Persia, Prov. Gilan, by Batshinar. Sept. 18. 1899.

IV. **Caucalis** L.

4. *C. leptophylla* L.

N. 245. Samarkand, in the steppe by Ujimawut. May 22. 1898.

V. **Turgenia** Hoffm.

5. *T. latifolia* Hoffm.

N. 281. Ferghana, in cultivated land by Margilan. May 27. 1898.
N. 373. Ferghana, by Gultshá. June 17. 1898.

VI. **Hymenolaena** D. C.

6. *H. Lindleyana* Klotzsch. *Renarda siliifolia* Rgl.

β. Bucharica Lipsky Acta H. Petrop. 18. 1900. P. 71.

N. 1234. Pamir, on moist mountains in the Chargush-pass. Alt. 4600m. Sept. 3. 1898.

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[1]) Of several *Umbelliferae* I have collected only the fruits, and most of them have germed in the botanical garden at Copenhagen, but they have not all flowered. O. P.

7. *H. Darwasica* Lipsky l. c. p. 72.

N. 1076. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 8. 1898.

VII. **Trachydium** Lindl.

8. *T. sp.*

N. 1074. Pamir, by the lake Jashil Kul. Alt. 4000m. Aug. 8. 1898.

VIII. **Cachrys** L.

9. *C. didyma* Rgl.

N. 1663. Chodshent, in the steppe by Dragomirowo. Maj 5. 1899.

IX. **Aphanopleura** Bois.

10. *A. capillifolia* Lipsky.

N. 143. Tashkent, in the steppe by Tshisak. May 10. 1898.
N. 250. Samarkand, in the steppe by Jangi Kurgan. May 23. 1998.
N. 260. Samarkand, in the steppe by Kerki. May 23. 1898.

X. **Carum** L.

11. *C. confusum* O. Fedtschenko. *C. chaerophylloides* Rgl. et Schm. in Acta H. Petrop. V. 587, nomen bis repetitum, confer p. 585).

N. 150. Tashkent, in the steppe by Kunikud, near Tshisak.

12. *C. atropurpureum* Kar. Kir.

β. alpestre Herd. (= *γ. kokanicum* Rgl.).

N. 434. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 20. 1898.

13. *C. Carvi* L.

N. 1185. Pamir, by a hot spring near the lake Jashil Kul. Alt. 3800m. Aug. 29. 1898.

XI. **Selinum** L.

14. *S. papyraceum* C. B. Clarke.

N. 1164. Pamir, by a river near the lake Bulung Kul. Alt. 3800m. Aug. 25. 1898.

XII. **Ligusticum** L.

15. *L. alpinum* (Ledb.) Benth. et Hook. *Pachypleurum alpinum* Ledb., *Neogaya* . . .

N. 971. Pamir, in mountains near the lake Jashil Kul. Alt. 3800m. July 28. 1898.
N. 1184. Ibid., by a hot spring. Aug. 29. 1898.

XIII. **Archangelica** Hoffm.

16. *A. Songarica* (Rgl.) Lipsky. *Angelica Songarica* Rgl.

N. 1272. Pamir, Djangarlik by the river Pamir daria between Betula. Alt. 3800. Sept. 6. 1898.

XIV. **Ferula** L.

17. *F. Assa foetida* L.

N. 124. Samarkand, in the steppe by Chawast. May 7. 1898.

?N. 160. Samarkand, in the steppe by Ujimawut near Tshisak. May 10. 1898.

N. 272 a. Samarkand, in the steppe by Chawast. May 25. 1898.

18. *F. Jaeschkeana* Vatke.

N. 515. Alai mountains, by Olgin Lug. Alt. 2600m. June 22. 1898.

XV. **Peucedanum** L.

19. *P. tenuisectum* Rgl. et Schm.

N. 272. Samarkand, in the steppe by Chawast. May 23. 1898.

XVI. **Heracleum** L.

20. *H. Olgae* Rgl. et Schm.

β. virens m.

quam in typo glabrius, virescens.

N. 982. Pamir, on dry mountains near the lake Jashil Kul. Alt. 3800m.

XVII. **Zozimia** Hoffm.

21. *Zozimia Pamirica* n. sp.

Brevissime velutino-pubescens dumosa, caulibus numerosis rigidis, parte inferiori petiolis vetustis obsitis, fere a medio dichotome ramosis. Foliis omnibus basalibus, caulinis paucis ad dichotomias diminutis, supremis ad vaginas reductis, foliis basalibus longe petiolatis, petiolis rigidis, ambitu linearibus pinnatisectis, jugis 2—3 remotis, segmentis suborbiculatis in lacinias lineares flabellatas partitis. Umbellis 2—4 radiatis, involucro et involucello 3—4-phyllo, phyllis ovato-lanceolatis margine albo-scariosis, petalis sulphureis glabris radiantibus, fructu (juniore) elliptico-ovato, breviter pubescente.

Caulibus ad 20 cm. altis, foliis radicalibus 7—8 cm. longis, radiis (absque fructu) 2—3 cm. longis, fructu (immaturo) 5 mm. longo.

Caulibus humilibus dumosis dichotomis et toto habitu valde affinis est *Z. dichotomae* Boiss., sed optime differt segmentorum laciniis non brevissimis, sed linearibus; praeterea pubescentia brevi, petalis glabris radiantibus et caet. Foliorum segmenta (saltem in sicco) complicata. Fructus junioris margo nondum inflatus, potius *Heraclei*, sed vittae totam valleculam implentes.

N. 1254. Pamir, in the Chargush-pass. Alt. 4300m. Sept. 4. 1898.

22. *Z. tragioides* Boiss.

N. 1002. Pamir, on dry mountains near the lake Jashil Kul. Alt. 3800m. Aug. 1. 1898.

XVIII. **Daucus** L.

23. *D. Carota* L.

N. 2043. Chiwa, by Kunja Urgentsh, not cultivated. July 7. 1899.

Valerianaceæ

determ. **W. Lipsky,** St. Petersburg.

I. **Valeriana** L.

1. *V. caespitosa* Rupr. *V. longiflora* Rgl. et Schm.

N. 530. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2700m. June 24. 1898.

2. *V. sisymbrifolia* Vahl.

N. 1651. Ferghana, on a mountain near Osh. April 18. 1899.

II. **Valerianella** Moench.

3. *V. turkestanica* Rgl. et Schm.

N. 173. Samarkand, in the steppe by Balan Hur. May 12. 1898.

4. *V. plagiostephana* F. et M.

N. 497. Alai mountains, by Olgin Lug. Alt. 2600m. June 22. 1898.

Compositae.

Determ. **O. Hoffmann,** Berlin.

I. **Callistephus** Cass.

1. *C. chinensis* (L.) Cass.

N. 1431. Pamir, Prov. Wakhan (Ishkashim), cultivated in gardens by Namatgut. Alt. 2700m. Sept. 27. 1898.

II. **Aster** L.

2. *A. altaicus* W. *Callimeris* Nees.

N. 333. Ferghana, by Osh. June 8. 1898.

3. *A. alpinus* L.

Eine durch die stark verdickte Blütenstiele auffällige Form.

N. 567. Alai mountains, in the Juniper forests by Olgin Lug. June 25. 1898. Alt. 3000m.

4. *A. flaccidus* Bunge.

Von *A. alpinus* durch die Hülle verschieden; in der Hülle stimmt die Pflanze mit *A. flaccidus* überein, von welche ich so grosse Exemplare nicht gesehen habe (Blätter und Köpfchen)[1]. Doch möchte ich die Pflanze für eine grosse Form von *A. flaccidus* halten.

N. 1240. Pamir, on moist slopes in the Chargush-pass. Alt. 4300m. Sept. 9. 1898.

N. 457. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 21. 1898.

III. **Psychrogeton** Bois.

5. *P. turkestanicus* (Rgl. et Schm.) Hoffm. *Diplopappus turkestanicus* Rgl. et Schm. *Aster turkestanicus* Franchet.

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[1]) The plant is 25 cm. high, the inferior leaves with petiole 7—8 cm. long, the flower-heads 1½ cm. in diameter. O. P.

Nach Paulsens Mitteilung sind die Blüten, auch die Randblüten gelb. Regel schreibt „flores marginales ligulis in statu sicco flavis v. rarius caerulescentibus; flores disci .... flavi."

Auch die Berliner Exemplare zeigen dies, doch würde ich statt *caerulescentibus* vielmehr *purpurascentibus* sagen. Beide Färbungen kommen an demselben Individuum vor, doch bemerke ich, dass wenn die Strahlblüten purpurn sind, auch die Scheibenblüten, die verhältnissmässig wenig zahlreich sind, dieselbe Färbung zeigen. Auch unter diesen Exemplaren findet sich einmal (bei einem Stengel von No. 565) die purpurne Färbung. Jedenfalls sind also die Köpfchen homochrom. Aus diesem Grunde und wegen der mehrreihigen ♀ Blüten wäre die Planze nicht zu *Aster* zu stellen. Ich glaube jetzt, dass Boissier recht hatte, als er auf diese Charaktere hin die Gattung *Psychrogeton* (Fl. or. III. 156) aufstellte, und meine, dass *Diplopappus turkestanicus* Regel zu dieser Gattung zu stellen, also *Psychrogeton turkestanicus* zu nennen ist. Zu dem Gattungscharakter wäre hinzuzufügen, dass die ♀ u. ☿ Bl. gleichfarbig und zwar meist gelb, seltener beide purpurn sind. (Ich vermute, dass die jungen Blüten gelb sind und beim Abblühen purpurn werden). Die Unterschiede zwischen seiner Art und *Psychrogeton cabulicus* Bois. giebt Regel selbst an. Es kommt jedoch noch hinzu, was Regel übersehen zu haben scheint, dass die Scheibenblüten steril sind; sie haben bei den reifen Köpfchen ziemlich lange aber fadenförmig dünne Ovarien und einen narbenlosen Griffel.

N. 565. Alai mountains, by Olgin Lug. Alt. 3000m. June 25. 1898.
N. 595. Alai steppe. Alt. 3300m. June 27. 1898.
N. 680. Pamir, on dry plains by Sary Mullah. Alt. 4100m. July 5. 1898.
N. 1010. Pamir, in the mountains by the lake Jashil Kul. Alt. 4000m. Aug. 1. 1898.

IV. **Erigeron** L.

6. *E. acer* L.
var. *droebachensis* Mik. *E. elongatus* Ldb.

N. 1004. Pamir, near the lake Jashil Kul. Alt. 3800m. Aug. 1. 1898.

7. *E. uniflorus* L.

N. 1216. Pamir, by a stream in the Chargush-pass. Alt. 4200m. Sept. 3. 1898.

8. *E. canadensis* L.

N. 1462. Pamir, prov. Garan, in cultivated land by Anderab. Alt. 2600m. Oct. 5. 1898.

N. 2151. Persia, prov. Gilan, by Resht. Sept. 13. 1899.

V. **Pluchea** Cass.

9. *P. caspia* (Less.). *Karelinia caspia* Less.

N. 1789. Buchara, on moister spots in the sandy desert by Chodsha Dawlet. June 10. 1899.

VI. **Leontopodium** R. Br.

10. *L. alpinum* Cass.

N. 528. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 24. 1898.

— — var. *subalpinum* Ldb.

N. 483. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2600m. June 21. 1898.

11. *L. sibiricum* Cass. ♂.

N. 1089. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. Aug. 11. 1898.

VII. **Anaphalis** D. C.

12. *A. virgata* Thoms.

N. 1514. Pamir, prov. Garan, by Anderab. Alt. 2400m. Oct. 13. 1902.

VIII. **Inula** L.

13. *I. caspica* Blum. (?)

N. 2025. Chiwa, betwenn Chodsheli and Kunja Urgentsh. July 27. 1899.

14. *I. Schugnanica* C. Winkl. ? *I. ammophila* Bunge, D. C., Prodr. V, 470.

Nach Exemplaren des Berliner Herbars (Mongolei, Gobi, coll. Potanin 1886. — Mongolei, coll. Erzewalski 1871. — Östl. Mongolei, coll. David 2716, vom Jahre 1866; die beiden ersten aus dem Petersburger Herbar und dort bestimmt, die letzte aus dem Pariser Herbar und dort bestimmt) ist die vorliegende Pflanze *Inula ammophila* Bunge. Ein Originalexemplar von *I. Schugnanica* C. Winkl. in Act. Hort.

Petrop. XI (1890) 276 stimmt ebenso wie die Beschreibung mit dem vorliegenden sowie mit den obigen Exemplaren von *I. ammophila* überein. Winkler giebt als Unterschied an, dass seine Art kahle, drüsige, nicht seidig behaarte Früchte hat. Im D. C. Prodr., wo *I. ammophila* veröffentlicht ist, steht über die Früchte nichts (abgesehen von Sectionscharakter, wo sie *villosa* genannt werden).

Die vorliegende Pflanze ist also jedenfalls *I. Schugnanica* C. Winkl., doch kann ich nicht mit Sicherheit darüber entscheiden, ob diese Art mit *I. ammophila* identisch ist.

IX. **Pulicaria** Gärtn.

15. *P. dysenterica* (L.) Gärtn.

N. 2167. Persia, prov. Gilan, in the forests by Resht. Sept. 14. 1899.

16. *P. gnaphalodes* (Vent.) Bois.

N. 2211. Persia, on dry mountains near Teheran. Sept. 28. 1899.

X. **Xanthium** L.

17. *X. strumarium* L.

N. 1944. Chiwa, in cultivated land. July 9. 1899.

XI. **Bidens** L.

18. *B. tripartitus* L.

N. 2141. Persia, prov. Gilan, Piribasar near Enseli. Sept. 12. 1899.

XII. **Tagetes** L.

19. *T. erectus* L.

N. 1424. Pamir, prov. Wakhan (Ishkashim), cultivated in gardens by Namatgut. Alt. 2700m. Sept. 26. 1898.

N. 1430. Ibid.

XIII. **Achillea** L.

20. *A. micrantha* M. B.

N. 132. Tashkent. May 8. 1898.

N. 243. Samarkand, in cultivated land by Ujimawut. May 22. 1898.

XIV. **Matricaria** L.

21. *M. lamellata* Bunge.

?N. 23. Transcaspia, by Krasnowodsk. April 23. 1898.

?N. 53. Transcaspia, in the steppe by Bami. April 24. 1898.

N. 181. Samarkand, by Kuju Masar. May 13. 1898.

XV. **Chrysanthemum** L.

22. *C. coronarium* L.

N. 1429. Pamir, prov. Wakhan (Ishkashim), cultivated in gardens by Namatgut. Alt. 2700m. Sept. 27. 1898.

23. *C. Richteria* Bnth. et Hook f. Fl. Brit. Ind. III. 315.

N. 820. Pamir, in the mountains near the lake Jashil Kul. Alt. 3800m. July 18. 1898.

N. 1033. Pamir, on moist slopes near the lake Jashil Kul. Alt. 4000m. Aug. 1. 1998.

N. 1094. Pamir, in the mountains near the lake Jashil Kul. Alt. 4100m. Aug. 11. 1898.

24. *C. (Tanacetum) tibeticum* Hook f. et Thoms.

N. 658. Pamir, near the river Mus-Kol. Alt. 4100m. July 2. 1898.

N. 756. Pamir, near the river Kara-Sù. Alt. 3800m. July 12. 1898.

N. 1224. Pamir, in the Chargush-pass. Alt. 4200m. Sept. 2. 1898.

25. *C. (Tanacetum) umbelliferum* Bois. Diagn ser. 2. 3. p. 30. *T. trichophyllum* Rgl. et Schm. 1877.

In der Beschreibung von *T. trichophyllum* wird der Stengel *solidus*, in der von *umbelliferum fistulosus* genannt; ich fand ihn jedoch bei den Originalexemplaren von *T. trichophyllum* fistulos; ich glaube darum die Arten vereinigen zu müssen, da weiter keine Unterschiede vorliegen.

N. 240. Samarkand, in cultivated land. May 21. 1898.

26. *C. (Tanacetum) pamiricum* O. Hoffm. n. sp. Fructiculus humilis inde a basi ramosissimus, ramulis foliosis villosulis, floriferis in pedunculum monocephalum abeuntibus; foliis petiolatis pinnatipartitis, segmentis usque ad 9, integerrimis vel iterum 2—3-fidis, omnibus subcarnosis lineari-oblongis obtusis et brevissime mucronatis, glandulis sessilibus pilisque brevibus obsitis; pedunculis tenuibus, foliis 1-paucis reductis bracteatis; capitulis late campanulatis parvulis homogamis multifloris; involucri imbricati squamis villosulis, ab exterioribus ovatis ad interiores oblongas sensim elongatis, medio viridibus, margine hyalina atrobrunnea cinctis; receptaculo paulo convexo; floribus vix exsertis, omnibus ☿, circiter 40—50; corolla cylindrica, glandulis sessilibus obsita, limbo breviter

5-dentato, ovario glandulis sessilibus dense obsito, ceterum glabro, paleis 5 ovatis coronato.

Fruticulus radice ultra 1 cm. crassa, pulvinar formans circiter 9 cm. altum, 15—20 cm. in diametrum patens. Folia ca. 15 mm. longa, segmentis 3 mm. longis, fere 1 mm. latis. Capitula 8 mm. alta et lata.

N. 843. Pamir, on dry plains near the lake Jashil Kul. Alt. 3800m. July 19. 1898.

XVI. **Artemisia** L.

27. *A. scoparia* W. K.

N. 1348. Pamir, prov. Wakhan, in the bed of the river Pandsh by Langarkisht. Alt. 3000m. Sept. 10. 1898.

28. *A. pamirica* C. Winkl. (ex descr.).

N. 1036. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 4. 1898.
N. 1204. Pamir, by the lake Tuz Kul. Alt. 3800m. Aug. 31. 1898.

29. *A. herba alba* Asso.

N. 2217. Persia, in dry mountains near Téheran. Sept. 28. 1899.

— — var. *laxiflora* Bois.

N. 1177 A?. Pamir, near the lake Bulung. Alt. 3800m. Aug. 27. 1898. (in Pamir very frequent).
N. 1879. Chiwa, in the desert by Kara Aigir by the river Amu Darià. June 26. 1899.
N. 2004. Chiwa, on the mountain Sultan Babà. July 24. 1899.

— — var. *densiflora* Bois.

N. 1539. Pamir, prov. Shugnan, in the mountains by Chorock. Alt. 2300m. Nov. 9. 1898.

30. *A. fragrans* W.

var.? *dissitiflora* O. Hoffm. n. var.

Ich glaube kaum, dass diese Planze sich als Art wird von *A. fragrans* W. trennen lassen. Sie ist allerdings eine durch den sehr schmalen und lockeren Blütenstand recht auffällige Form dieser Art. Ebenso schmale, aber zugleich gedrängtere Blütenstände zeigt die Form *A. spicigera* C. Koch. Die Abart wäre kurz zu charakterisieren:

Var. ramis floriferis virgatis simplicibus, in inflorescentiam laxam angustam excurrentibus; ramulis lateralibus inflorescentiae perbrevibus mono-oligocephalis.

N. 1351. Pamir, prov. Wakhan, by Sunk. Alt. 3000m. Sept. 10. 1898.

31. *A. compacta* Fisch. (?)

N. 1177 B. Pamir, near the lake Bulung Kul. Alt. 3800m. Oct. 27. 1898.

32. *A. maritima* L.

var. *Larcheana* (Wieb.) Ldb. (?).

N. 1656. Ferghana, in cultivated land near Osh. April 18. 1899.

33. *A. annua* L.

N. 2150. Persia, prov. Gilan, by Resht. Sept. 13. 1899.

34. *A. Falconeri* Clarke.

N. 1257. Pamir, by Kisil Krashim by the river Pamir Daria. Alt. 3200m. Sept. 5. 1892.

35. *A. vulgaris* L.

N. 1370. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 13. 1898.

36. *A. Tournefortiana* Rchb.

N. 1332. Pamir, prov. Wakhan, in the bed of the river Pandsh by Langarkisht. Alt. 3000m. Sept. 9. 1898.

N. 1358. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 13. 1898.

N. 1392. Pamir, prov. Wakhan, by Torguz. Alt. 2900m. Sept. 19. 1898. 1898.

37. *A. sacrorum* Ldb.

N. 722. Pamir, by Shatshan. Alt. 3800m. July 11. 1898.

N. 1267. Pamir, by Djangarlik by the river Pamir daria. Alt. 3100m. Sept. 6. 1898.

N. 1331. Pamir, prov. Wakhan, in the bed of the river Pandsh by Langarkisht. Alt. 3000m. Sept. 9. 1898.

N. 1505. Pamir, prov. Garan, by Darmaraght. Alt. 2400m. Oct. 10. 1898.

38. *A. macrocephala* Jacquem. *A. Griffithiana* Bois.

N. 384. Ferghana, in the bed of the river Kursháb by Gultsha. Alt. 1600m. June 17. 1898.

N. 1017. Pamir, on moist slopes near the lake Jashil Kul. Alt. 4000m. Aug. 1. 1898.

N. 1149. Pamir, by the lake Bulung Kul. Alt. 3800m.

39. *A. minor* Jacquem.

N. 993. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. July 29. 1898.

N. 1107. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. Aug. 13. 1898.

N. 1221. Pamir, in swamps in the Chargush-pass. Alt. 4200m. Sept. 3. 1898.

XVII. **Senecio** L.

40. *S. coronopifolius* Desf.

var. *parvulus* Ldb. (sub. *S. subdentato*).

N. 733 A. Pamir, on dry plains by Shatshan. Alt. 3800m. July 11. 1898.

— — var. *sphacelatus* O. Hoffm. n. var.

Calyculi et involucri squamis apice sphacelatis. Cetera omnino *var. subdentati* (Ldb.) Bois.

N. 1200. Pamir, by the lake Tuz-Kul. Alt. 3800m. Aug. 31. 1898.
N. 1207. Ibid, on saline ground. Sept. 1. 1898.

41. *S. Jacobaea* L.

N. 389. Ferghana, in the bed of the river Kurshab by Gultsha. Alt. 1600m. June 17. 1898.

42. *Senecio (§ Crociserides) Paulsenii* O. Hoffm. n. sp.; herbacea perennis fere undique glaberrima, e caudice procumbente caules emittens complures simplices erectos striatos, 25 cm. altos, 1-oligocephalos, basi foliorum delapsorum petiolis persistentibus basi vaginantibus pallidis dense vestitis; foliis basalibus longe petiolatis, lamina elliptica in petiolum subaequilongum plerumque longe attenuata, obtusa, margine grosse et irregulariter sinuato-dentata vel basin versus sinuato-lobata vel hinc inde pinnatipartita; foliis caulinis paucis, basi attenuata sessilibus, cito in bracteas oblongas et denique lineares transeuntibus; capitulis pedunculatis magnis ample radiatis multifloris; involucro late campanulato basi minute puberulo calyculato; calyculi squamis linearibus herbaceis, apice breviter caudato-acuminatis membranaceis; involucri phyllis 20 et ultra, lineari-oblongis viridibus, apice purpurascentibus et minute villosulis; corollis citrinis; corollarum radii tubo involucrum aequante, ligula longiore oblonga; corollis disci involucrum paulo excedentibus, angustis; styli ramis truncatis; ovario glabro; pappo niveo involucrum aequante.

Folia incluso petiolo usque ad 13 cm. longa et 3 cm. lata. Pedunculi 3—6 cm. longi, apice incrassati. Calyculi squamae 7 mm. longae, 1 mm. latae. Involucrum 15 mm. altum, 15—20 mm. latum.

Ligulae 2 cm. longae, 6 mm. latae; corollarum ☿ tubus 8 mm., limbus 4 mm. longus. Ovarium 4 mm., pappus 1 cm. longus.

N. 996. Pamir, on dry slopes near the lake Jashil Kul. Alt. 3900m. July 29. 1898.

43. *S. pedunculatus* Edg.

Wir besitzen in Berlin dieselbe Pflanze aus Turkestan, von C. Winkler als *S. coronopifolius* bestimmt. Die Richtigkeit dieser Bestimmung ist mir sehr zweifelhaft, denn *S. coronopifolius* hat grössere Randblüten.

Dagegen stimmt die Planze gut mit zuverlässigen Exemplaren von *S. pedunculatus* Edg. überein. Die Worte „achenes glabrous or nearly so" in Hook. f. Fl. Brit. Ind. III. 342 treffen auch auf unsere Exemplare nicht zu. Die Früchte sind bei diesen ebenso behaart wie bei Paulsens Exemplaren, das Laub ebenso variabel.

N. 1330. Pamir, prov. Wakhan, in the bed of the river Pandsh by Langar Kisht. Alt. 3000m. Sept. 9. 1898.

N. 1367. Pamir, prov. Wakhan, by Langarkisht. Alt. 3000m. Sept. 13. 1898.

44. *S. vernalis* W. K.

N. 22. Transcaspia, by Krasnowodsk. April 23. 1898.

XVIII. **Ligularia** Cass.

45. *L. altaica* D. C.

N. 573. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2800m. June 25. 1898.

N. 751. Pamir, near the river Kara-Su. Alt. 3000m. July 12. 1898.

46. *L. robusta* D. C. *Cineraria robusta* Ldb. fl. alt. IV p. 106. Stimmt recht gut mit dem Berliner Exemplar vom Altai, nur hat dies (in Übereinstimmung mit Decandolles Beschreibung) weniger Köpfchen.

N. 555. Alai mountains, in the Juniper forests by Olgin Lug. Alt. 2800m. June 25. 1998.

XIX. **Calendula** L.

47. *C. officinalis* L.

N. 1434. Pamir, prov. Wakhan (Ishkashim), cultivated in gardens by Namatgut. Alt. 2700m. Sept. 27. 1898.

XX. **Echinops** L.

48. *E. xanthacanthus* Rgl. et Schm.? ex descr.

Bis auf die Worte: „caulis .... initio lana alba detergibili setulisque brevibus sparsis glanduliferis vestitus“, ... und „folia .... supra setulis brevissimis glanduliferis sub lente ± dense adspersa“ passt die Beschreibung durchaus. Wenigstens wage ich nicht, auf diese Abweichungen hin die Pflanze als eine besondere, neue Art zu erklären.

N. 1277. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 8. 1898.

XXI. **Thevenotia** D. C.

49. *T. persica* D. C.

N. 2208. Persia, on dry ground between Kaswin and Teheran. Sept. 21. 1899.

N. 2223. Persia, in dry mountains near Teheran. Sept. 28. 1899.

XXII. **Arctium** L.

50. *A. Lappa* L. *Lappa maior* Grtn.

N. 1512 A. Pamir, prov. Shugnan, by Choroch. Alt. 2400m. Oct. 11. 1898. (The seeds; the plant is determined from specimens growing in the botanical garden at Copenhagen).

XXIII. **Cousinia** Cass.

51. *C. annua* C. Winkl. (ex descr. sed sine ullo dubio).

N. 1854. By the river Amu Daria between Tshardshui and Chiwa, in sandy desert by Tashachér. June 22. 1899.

52. *C. decurrens* Rgl.

N. 274. Samarkand, in the steppe by Chawast. May 23. 1898.

53. *C. dichotoma* Bunge.

N. 1881. Chiwa, in sandy desert by Kara Aigir by the river Amu Daria. June 26. 1899.

54. *C. microcarpa* Bois.

N. 369. Ferghana, Ag Jer near Osh. June 16. 1898.

55. *C. Nemesskyana* C. Winkl.

N. 1262. Pamir, on dry slopes by Djangarlik by the river Pamir daria. Alt. 3100m. Sept. 6. 1898.

56. *C. rava* C. Winkl.

N. 817. Pamir, in the mountains near the lake Jashil Kul. Alt. 3900m. July 18. 1898.

N. 887. Pamir, near the lake Jashil Kul. Alt. 3800. July 23. 1898.

57. *C. triflora* Schrenk (determ. W. Lipsky).

N. 304. Ferghana, on dry plains between Andidshan and Margilan. May 27. 1898.

XXIV. **Saussurea** D. C.

58. *S. crassifolia* D. C.

N. 1130. Pamir, in saline swamps by the lake Jashil Kul. Alt. 3800m. Aug. 19. 1898.

XXV. **Jurinea** Cass.

59. *Jurinea (§ Aegopordon) Paulsenii* O. Hoffm. n. sp.

Herbacea perennis undique fere glaberrima, e caudice repente ramoso, foliorum delapsorum reliquiis vaginiformibus anguste lanceolatis parallelinerviis hyalinis densissime obtecto caules floriferos emittens adscendentes flexuosos parce ramosos foliatos oligocephalos; foliis coriaceis, infimis e portione vaginante parce lanosa in laminam ellipticam acutam irregulariter undulato-dentatam transeuntibus, dentibus corneis rectis vel arcuatis; caulinis superioribus sessilibus ellipticis vel oblongis, in parte inferiori argute dentatis, in parte superiori integris; foliis supremis minoribus oblongis linearibusque integerrimis; capitulis (in exemplaribus visis semper ternis) ad apices ramulorum solitariis pedicellatis magnis multifloris; involucri late campanulati squamis imbricatis pluriseriatis ab exterioribus ovatis ad intimas lineari-oblongas sensim elongatis, viridibus, exterioribus sub apice trilineatis et mucrone subpungente auctis, margine pube minuta villosula decidua vestitis, intimis in parte superiori violaceis acutissimis inermibus; receptaculo plano, setis ovario brevioribus vel summum aequilongis onusto; corollis (e sicco) lilacinis; ovario glaberrimo laevi; pappi setis pluriseriatis breviter barbellatis stramineis, exterioribus brevioribus.

Caulis 15 cm. altus. Folia usque ad 8 cm. longa et 2 cm. lata. Capitula 3 cm. alta et lata.

N. 726. Pamir, in the mountains by Shatshan. Alt. 3800m. July 11. 1898.

N. 1023. Pamir, on dry plains near the lake Jashil Kul. Alt. 3800m. Aug. 3. 1898.

XXVI. **Cirsium** Scop.

60. *C. arvense* (L.) Scop.

N. 1148. Pamir, on moist ground by the lake Bulung Kul. Alt. 3800m. Aug. 23. 1898.

N. 1378. Pamir, prov. Wakhan, in cultivated land by Sergin. Alt. 2900m. Sept. 16. 1898.

N. 1912. Chiwa, in cultivated land by Petro-Alexandrowsk. June 29. 1899.

XXVII. **Russowia** C. Winkl.

61. *R. crupinoides* C. Winkl.

var. *latifolia* C. Winkl.

Winklers Angabe, dass der Blütenboden nackt ist, ist nach den Originalexemplaren unrichtig. Die Pflanze besitz ein receptaculum setis paucis subcomplanatis onustum.

Plagiobasis Sogdiana Bunge, die ich leider nicht gesehen habe, fällt nach der Beschreibung mit *Russowia* zusammen. Ich möchte jedoch den Namen *Russowia* voranstellen, da *Plagiobasis* Schrenk (*Pl. centauroides* Schr.), die ich gesehen habe, nach meiner Ansicht eine *Centaurea* ist.

Russowia würde *Serratula* nahe stehen und sich von dieser durch wenigblütige Köpfchen, stumpfe Hüllblätter und zottige Früchte unterscheiden.

N. 238. Samarkand, in cultivated land. May 21. 1898.

XXVIII. **Centaurea** L.

62. *C. iberica* Trev.

N. 2140. Persia, prov. Gilan, by Piribasar near Enseli. Sept. 12. 1899.

— —?

Da noch keine gut entwickelten Früchte vorhanden sind und die Farbe der Blüten nicht sicher zu beurteilen ist, schwanke ich zwischen *C. iberica* Trev. und *C. pallescens* Del. Einen Pappus habe ich beobachtet, *C. Calcitrapa* kann es also nicht sein. Da die Antheren rosafarben sind, was ich bei der gelbblütigen *C. pallescens* nicht gesehen habe, so möchte ich annehmen, dass auch die Blumenkronen rosa waren, die Pflanze also *C. iberica* Trev.[1]) ist.

N. 1704. Buchara, in cultivated land by Chok-i-Mullamir. May 25. 1899.

[1]) I cann add that the corolla were white. I think this plant is a white-flowering *C. iberica* Trev. O. P.

63. *C. repens* L. *Acroptilon repens* et *A. Picris* D. C.

N. 1289. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 8. 1898.

N. 1709. Buchara, in cultivated land by Chok-i-Mullamir. May 25. 1899.

64. *C. depressa* M. B.

N. 211. Buchara, in cultivated land. May 15. 1898.

XXIX. **Carthamus** L.

65. *C. tinctorius* L.

N. 1500. Pamir, prov. Garan, in cultivated land by Darmaraght. Alt. 2400m Oct. 10. 1898.

XXX. **Koelpinia** Pall.

66. *K. linearis* Pall.

Blüten länger als die Hülle kommen auch bei *K. linearis* vor. *K. macrantha* ist wohl auch nur eine Abart von *K. linearis*. Die Bezeichung „rami ramosissimi" trifft bei unseren Originalexemplaren durchaus nicht zu.

N. 52. Transcaspia, in the steppe by Bami. April 24. 1898.

— — forma *latifolia* (C. Winkl.). *K. latifolia* C. Winkl., in der That nur Form von *K. linearis* Pall., die ebenfalls bei ganz schmalen Blättern oft drei Nerven zeigt. Auch in der Frucht finde ich keinen auffälligen Unterschied.

N. 151. Samarkand, in the steppe by Kunikud. May 10. 1898.

N. 255. Samarkand, by Jangi Kurgan. May 22. 1898.

N. 337. Ferghana, by Osh. June 9. 1898.

XXXI. **Tragopogon** L.

67. *T. parvifolium* L.

N. 1246. Pamir, on dry slopes in the Chargush-pass. Alt. 4300m. Sept. 3. 1898.

XXXII. **Scorzonera** L.

68. *S. pusilla* Pall.

N. 856. Pamir, on dry plains near the lake Jashil Kul. Alt. 3800m. July 21. 1898.

69. *S. mollis* M. B.

forma foliis dense tomentosis.

N. 855. Pamir, on dry plains near the lake Jashil Kul. Alt. 3800m. July 21. 1898.

XXXIII. **Taraxacum** Hall.

70. *T. officinale* Wigg.

genuinum.

N. 1614. Ferghana, in gardens by Osh. April 4. 1899.

— — forma.

N. 486. Alai mountains, on the Olgin Lug-steppe. Alt. 2600m. June 21. 1898.

— — var. *laevigatum* (W.) Bisch.

N. 116. Samarkand, in the steppe by Chawast. May 7. 1898.

N. 1960. Chiwa, in cultivated land. July 11. 1899.

— — var. *lividum* (W. K.) Koch. *T. palustre* D. C.

N. 744. Pamir, on moist ground by the river Kara-sù. Alt. 3700m. July 12. 1898.

N. 1150 A. Pamir, on moist ground by the lake Bulung Kul. Alt. 3800m. Aug. 22. 1898.

? N. 590. On the Alai steppe. Alt. 3300m. June 27. 1898.

— — var. *Steveni* (D. C.) Bois.

N. 1150 B. Pamir, on moist ground by the lake Bulung Kul. Alt. 3800m. Aug. 22. 1898.

(Seeds only, from which plants are grown up in the botanical garden at Copenhagen).

71. *T. bicolor* D. C. *T. leucanthus* Ldb.

N. 695. Pamir, in swamps by the river Murghab. Alt. 3800m. July 8. 1898.

N. 1215. Pamir, in swamps in the Chargush-pass. Alt. 4200m. Sept. 3. 1898.

? N. 2019. Chiwa, on dry plains by Chodsheli. July 26. 1899.

? N. 2086. By the river Amu Daria between Tshardshui and Chiwa, by Kisil Yi. Aug. 12. 1899.

XXXIV. **Launaea** Cass.

72. *L. nudicaulis* (L.) Hook. f.

N. 1815. Transcaspia, on a island in the river Amu Daria by Tshardshui. Juny 18. 1899.

XXXV. **Mulgedium** Cass.

73. *M. tataricum* (L.) D. C.

N. 1124. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 18. 1898.

N. 1393. Pamir, prov. Wakhan, in the mountains by Torguz. Alt. 2900m. Sept. 19. 1898.

N. 1822. By the river Amu Daria between Tshardshui and Chiwa, by Shatman Togai. June 19. 1899.

N. 1930. Chiwa, in cultivated land. July 7. 1899.
N. 1958. Ibid. July 7. 1899.

— — forma.

N. 1767. Transcaspia, by Merw. June 3. 1899.

XXXVI. **Sonchus** L.

74. *S. oleraceus* L.

N. 1399. Pamir, prov. Wakhan, in the mountains by Torguz. Alt. 2900m. Sept. 19. 1898.

XXXVII. **Lactuca** L.

75. *L. orientalis* Bois.

N. 1263. Pamir, by Djangarlik by the river Pamir Daria. Alt. 3100m. Sept. 6. 1898.
N. 1522. Pamir, prov. Garan, on dry slopes by Kuh-i-lal. Alt. 2600m. Oct. 14. 1898.
N. 2213. Persia, in dry mountains by Teheran. Sept. 28. 1899.

76. *L. Scariola* L.

N. 2038. Chiwa, by Kunja Urgentsh. July 30. 1899.

XXXVIII. **Crepis** L.

77. *C. corniculata* Rgl. et Schm. (ex descr.).

N. 1326. Pamir, prov. Wakhan, in the bed of the river Pandsh. Alt. 3000m. Sept. 9. 1898.

78. *C. flexuosa* (Ldb.) Bnth. et Hook. fil.

Die Synonymie ist etwas verworren. Mir scheint *Cr. glauca* Bnth. et Hook. f. mit *Cr. flexuosa* Bnth. et Hok. (*Youngia fl.* Ldb.) identisch zu sein.

N. 694a. Pamir, on dry plains by the river Murghab. Alt. 3800m. July 7. 1898.
N. 727. Pamir, on dry slopes by Shatshan. Alt. 3800. July 11. 1898.
Nr. 747. Pamir, in a dry river-bed by Kara-Sü. Alt. 3700m. July 12. 1898.

79. *C. multicaulis* Ldb. *C. Stoliczkai* Clarke.

N. 439. Alai mountains, in the juniper-forests by Olgin Lug. Alt. 2600m. June 20. 1898.
N. 574. Alai mountains, by Olgin Lug. Alt. 2800m. June 6. 1898.

80. *C. tenuifolia* W.

Nach unseren Exemplaren vermag ich *C. baicalensis* Ldb. hiervon nicht zu unterscheiden. Nach D. C., der diese Art zu *Barkhausia* zieht, müszte sie geschnäbelte Früchte haben, was unsere Exemplare nicht zeigen. Bei der vorliegenden Pflanze sind die Früchte leider noch nicht entwickelt.

Nr. 476. Pamir, in a dry river-bed by Kara-Su. Alt. 3700m. July 12. 1898.

19—3—1903.

Gramineae.

Determ. **E. Hackel,** St. Pölten.

I. **Andropogon** L.

1. *A. Ischaemum* L.

N. 1380. Pamir, prov. Wakhan, by Sergin. Alt. 2900m. Sept. 16. 1898.
N. 1338. Pamir, prov. Wakhan, on dry slopes by Langarkisht. Alt. 3000m. Sept. 9. 1898.

2. *A. Sorghum* Brot.

var. *technicus* Koern.

Cfr. Hack. Monogr. Androp. 508.

N. 2095. Chiwa, cultivated by Hanka, called „supsé". Aug. 15. 1899.

3. *A. halepensis* Sibth.

N. 2195. Persia, prov. Gilan, by Imam Sadé Hashim. Sept. 16. 1899.

II. **Saccharum** L.

4. *S. spontaneum* L.

N. 1828. By the river Amu Daria between Tshardshui and Chiwa, frequent. June 19. 1899.

III. **Erianthus** Mich.

5. *E. Ravennæ* L.

var. *purpurascens* Hack. Monogr.

N. 1827. By the river Amu Daria between Tshardshui and Chiwa, frequent. June 19. 1899.

IV. **Panicum** L.

6. *P. miliaceum* L.

N. 1294. Pamir, prov. Wakhan, cultivated by Langar Kisht. Alt. 3000m. Sept. 8. 1898.
N. 1468. Pamir, prov. Garan, cultivated by Darmaraght. Alt. 2300m. Oct. 6. 1898.
N. 2114. Chiwa, cultivated by Petro-Alexandrowsk. Aug. 27. 1899.

7. *P. Crus Galli* L.

var. *muticum* Hack.

N. 1760. Transcaspia, in cultivated land by Merw. June 3. 1899.
N. 1925. Chiwa, in cultivated land. July 7. 1899.

var. *brevisetum* Doel.

N. 2087. Chiwa, by Kisil Yi, in mud by the river Amu Daria. Aug. 12. 1899.

var. *hispidulum* (Retz. a. A.).

N. 2098. Chiwa, in rice-fields by Chasar-asp. Aug. 18. 1899.

V. **Setaria** Beauv.

8. *S. viridis* Beauv.

N. 301. Ferghana, in cultivated land by Margilan. May 27. 1878.
N. 1284. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 8. 1898.

9. *S. glauca* Beauv.

N. 1941. Chiwa, in cultivated land. July 9. 1899.

VI. **Oryza** L.

10. *O. sativa* L.

N. 2097. Chiwa, cultivated by Chasar-asp. Aug. 18. 1899.

VII. **Alopecurus** L.

11. *A. pratensis* L.

N. 518. Alai mountains, Olgin Lug. Alt. 2800m. June 24. 1898.

12. *A. ventricosus* Pers. *A. ruthenicus* Weinm. *A. nigricans* Horn.

N. 1070. Pamir, by the lake Jashil Kul. Ast. 3800m. Aug. 8. 1898.

13. *A. mucronatus* Hack. n. sp.

Rhizoma repens, stoloniferum. Culmus humilis (ad 14 cm. altus), erectus, teres, glaberrimus. Folia ad basin culmi aggregata, illam vaginis laminisque emortuis dense cingentia, glaberrima, glauco-viridia: vaginae laxae, summa valde inflata, ligula rotundata v. truncata, erosula, circ. 2 mm. longa, laminae lineares, acutae, planae vel siccando saepius complicatae, 6—10 cm. longae, explicatae circ. 4 mm. latae, summa culmi vix 3 cm. longae, rigidulae. Panicula spiciformis ovato-oblonga, 1,6—2 cm. longa, 1 cm. lata,

densissima, violascens. Spiculae ovali-oblongae 4 mm. longae amoene variegatae, parte inferiore albescente, superiore rubro-violacea nervis obscure viridibus. Glumae steriles omnino liberae vel ima basi tantum subconnatae a latere visae lanceolatae, apice in mucronem brevissimum (0,5 mm. longum) sed distinctum subito acuminatae, apicibus porrectis (neque conniventibus neque divergentibus), carina longe ciliatae (ciliis circ. dimidiam glumam aequantibus), nervis lateralibus parce villosulae, interstitiis glabris. Gluma fertilis quam steriles paullo brevior, ovalis, oblique truncata, emarginata, glabra, in $^1/_3$ inferiore aristam e glumis parum exsertam circ. 4 mm. longam emittens. Palea 0. Antherae flavae, 2,5 mm. longae.

Habitu *A. alpini* Sm., qui vero differt glumis sterilibus obtusiusculis minime mucronatis undique villosis; characteribus glumarum propius accedit ad *A. ventricosum* Pers. (*A. nigricantem* Horn.) qui differt culmo elato, panicula longiore, glumis sterilibus acutis, apice divergentibus sed non mucronatis.

N. 772. Pamir, Tshatir Tash, on moist ground. Alt. 4000m. July 14. 1898.

N. 1162. Pamir, in swamps by the lake Bulung Kul. Alt. 3800m. Aug. 24. 1898.

VIII. **Phleum** L.

14. *Pasperum.* Vill.

N. 131. Tashkent. May 8. 1898.

IX. **Stipa** L.

15. *S. barbata* Desf.

var. *platyphylla* Hack. n. var.

Differt a typo foliis planis 3 mm. latis (neque convoluto-setaceis), spiculis majoribus, gluma fertili 14 mm. longa ad apicem usque seriatim pubescente, arista ultra 20 cm. longa (in typo gl. fert. 11 mm. haud usque ad apicem pubescens, arista circ. 15—16 cm. longa).

N. 407. Alai mountains, by Sufi Kurgan. Alt. 2400m. June 18. 1898.

16. *S. splendens* Trin.

N. 1394. Pamir, prov. Wakhan, by Torguz. Alt. 2900m. Sept. 19. 1898.

N. 1437. Pamir, prov. Wakhan, by Namatgut. Alt. 2700m. Sept. 27. 1898.

17. *S. orientalis* Trin.

N. 672. Pamir, on dry plains by Sary Mullah. Alt. 4100m. July 5. 1898.
N. 1020. Pamir, on dry slopes by the lake Jashil Kul, frequent. Alt. 3800m. Aug. 1. 1898.

var. *trichoglossa* Hack. n. var.

Differt a typo praesertim ligula brevi dense breviterque ciliata (in typo glabra).

N. 404. Alai mountains, by Sufi Kurgan. Alt. 2400m. June 18. 1898.
N. 683. Pamir, on dry plains by Sary Mullah. Alt. 4100m. July 5. 1898.

X. **Aristida** L.

18. *A. plumosa* L.

N. 2198. Persia, prov Gilan, in the mountains by Batshinar. Sept. 18. 1899.

19. *A. pungens* Desf.

N. 1791. Buchara, in sandy desert by Chodsha Dawlet. June 10. 1899.

20. *A. pennata* Trin.

N. 235. Buchara, in sandy desert by Chodsha Dawlet. May 17. 1898.
N. 1746. Transcaspia, in sandy desert by Barachané. June 2. 1899.

XI. **Oryzopsis** Michaux.

21. *O. holciformis* Hack.

β. songorica Hack. *Urachne songorica* Trin.

N. 408. Alai mountains, by Sufi Kurgan. Alt. 2100m. June 18. 1898.

22. *Oryzopsis purpurascens* Hack. n. sp.

Perennis, caespitosa. Culmi circ. 3 dm. alti, erecti, teretes, simplices, glaberrimi, superne breviter nudi. Vaginae superiores arctae, innovationum dilatatae, internodiis multo breviores, scaberulae. Ligula exserta (circ. 4 mm. longa), obtusa. Laminae lineares, siccando convolutae, acutae, 5—10 cm. longae, explicatae 2 mm. latae, glaucescentes, subtus scaberulae, supra puberulae, margine scabrae. Panicula pro magnitudine plantae spectabilis (18—26 cm. longa), ovato-oblonga, laxissima, patens, subinterrupta, rariflora, ramis plerumque binis (5—8 cm. longis) scaberulis maxima parte nudis, apice spiculas 1—2 (rarissime plures) longiuscule pedicellatas (pedicello subterminali spiculam aequante) gerentibus. Spiculae late lanceolatae, 8 mm. longae, basi virides, superne amoene purpureae; glumae steriles subae-

quales, elliptico-lanceolatae, breviter subulato-acuminatae, concavae, inferne 7-nerves, glaberrimae. Gluma fertilis sterilibus duplo brevior, oblonga, obtusiuscula, castanea, tota appresse pubescens, aristam caducam ipsam subaequantem e glumis vix v. haud exsertam emittens.

Affinis *O. caerulescenti* Hack., quae differt paniculae ramis ramulosis multispiculatis, gluma fertili glabra, sterilibus inconspicue nervosis. *O. sphacelata* Hack. (*Piptatherum sphacelatum* Bois. et Buhse) differt (sec. descript.) culmo superne longe nudo, panicula breviter pyramidata, spiculis lineari-oblongis, glumis sterilibus viridibus apice nigro-sphacelatis, arista exserta.

N. 994. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. July 27. 1898.

23. *O. molinioides* Hack. *Piptatherum molinioides* Bois., Diagn. I, 8. 1846. *Piptath. laterale* Munro (1886). *Milium laterale* Rgl. (1881). *Oryzopsis lateralis* Stapf in Hook fl. Br. Ind. 7, 234.

N. 842. Pamir, on dry plains by the lake Jashil Kul, frequent. Alt. 3800m. July 21. 1898.

XII. **Polypogon** Desf.

24. *P. monspeliensis* Desf.

N. 196. Transcaspia, by Tshardshui. May 13. 1898.
N. 1803. Buchara. June 14. 1899.

— — forma minor, habitu *P. maritima* similis, sed characteribus omnino *P. monspeliensis*.

N. 1329. Pamir, prov. Wakhan, in thickets by the river Pandsh. Alt. 3000m. Sept. 9. 1898.

XIII. **Agrostis** L.

25. *A. alba* L.

N. 1183. Pamir, in the mountains by the lake Jashil Kul. Alt. 3800m. Aug. 29. 1898.
N. 1390. Pamir, prov. Wakhan, by Torguz. Alt. 2900m. Sept. 19. 1898.
N. 1402. Ibid.

26. *A. Paulsenii* Hack. n. sp.

Perennis, caespitosa, innovationibus extravaginalibus paucis, stolonibus nullis. Culmi erecti, ad 60 cm. alti, teretes, glaberrimi,

simplices, apice longe nudi, graciles, 3-nodes, nodo summo in $^1/_3$ inferiore sito. Vaginae laxiusculae, internodiis multo breviores, glaberrimae. Ligula ovata, obtusa, 3—4 mm. longa. Laminae lineares, acutissimae, planae, flaccidulae, virides, glabrae, subtus laeves, supra nervis scaberulae, margine scabrae. Panicula oblonga, patula, laxiuscula (ad 18 cm. longa 4 cm. lata), rhachi glaberrima, ramis 3—5nis subcapillaribus scabris a $^1/_4$ inferiore vel (breviores) jam a basi divisis et spiculiferis, longioribus bis terve divisis, spiculis secus ramos subaequaliter dispositis, pedicellis spiculis aequilongis v. (in subterminalibus) iis duplo brevioribus clavatis fultis.

Spiculae, dum clausae sunt, lanceolatae, 2 mm. longae, pallide virides: glumae steriles aequales, lanceolatae, acutae, 1-nerves, carina aculeolato-scabrae; gluma fertilis sterilibus paullo brevior, ovalis, truncata, apice obsolete denticulata, 4-nervis, dorso inferne scaberula, callo nudo, in medio dorso aristam exserens rectam gracilem circ. 3 mm. longam e glumis breviter exsertam. Palea gluma sua duplo brevior, ovalis, rotundato-truncata, obsolete binervis, antherae 3, oblongae, 0,8 mm. longae, albidae. Ovarium lineari-oblongum; caryopsis (immatura) lineari-oblonga, ventre macula hilari lineari fere $^5/_6$ caryopseos aequante notata.

Ex affinitate *A. albae* L., quae differt rhizomate stolonifero, gluma fertili plerumque mutica, 3-nervi, palea quam gluma $^1/_4$ brevior, antheris fere duplo majoribus (1,5 mm. longis), caryopsi elliptica.

N. 1226. Pamir, by a spring by Djangarlik near the river Pamir Daria. Alt. 3800m. Sept. 6. 1898.

XIV. **Apera** Adans.

27. *A. interrupta* Beauv.

N. 153 a. Transcaspia, by Kunikud. May 10. 1898.

XV. **Calamagrostis** Roth.

28. *C. pseudophragmites* Baumg.

N. 1035. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 4. 1898.

N. 1335 a. Pamir, prov. Wakhan, in thickets by the river Pandsh, by Langarkisht. Alt. 3000m. Sept. 9. 1898.

N. 1336. Ibid.

N. 1369. Ibid. Sept. 9. 1898.

N. 1829. By the river Amu Daria between Tshardshui and Chiwa, frequent. June 19. 1899.
N. 1875. Ibid, by Ishak rabat. June 25. 1899.
N. 2020. Chiwa, by Chodsheli. July 26. 1899.

— — forma macra, angustifolia.

N. 1420. Pamir, prov. Wakhan, in sand by Sermut. Alt. 2900m. Sept. 24. 1898.

29. *C. Epigejos* Roth.

N. 1335 b. Pamir, prov. Wakhan, in thickets by the river Pandsh, by Langarkisht. Alt. 3000m. Sept. 9. 1898.

30. *C. stricta* Beauv. *C. neglecta* Beauv. *Arundo stricta* Timm.

N. 1128. Pamir, in saline swamps by the lake Bulung Kul. Alt. 3800m. Aug. 19. 1898.

31. *C. emodensis* Gris.

var. *breviseta* Hack. n. var.

Differt a typo arista gluma sua breviori haud exserta, panicula angusta.

N. 1403. Pamir, prov. Wakhan, in thickets by Sermut. Alt. 2900m. Sept. 21. 1898.

32. *C. anthoxanthoides* Rgl.

N. 625. Pamir, on moist ground by „Kisil Kul". Alt. 4000m. June 29. 1898.
N. 1248. Pamir, in the Chargush-pass, near the snow. Alt. 4300m. Sept. 3. 1898.

33. *C. compacta* Hack. n. nom. *Deyeuxia compacta* Munro in Hook fl. Brit. Ind. Eadem videtur esse *C. tianschanicum* Rupr. in Mém. Ac. Petrop. XIV.

N. 773. Pamir, Tshatir Tash, on saline spots. Alt. 4000m. July 14. 1898.
N. 1160. Pamir, in swamps by the lake Bulung Kul. Alt. 3800m. Aug. 24. 1898.
N. 1210. Pamir, by the salt-lake Tuz Kul. Alt. 3800m. Sept. 1. 1898.

— — var.

differt a typo gluma fertili breviori, collo longius piloso.

N. 738. Pamir, Jaman Tal near the river Murghab. Alt. 3800m. July 12. 1898.
N. 741. Ibid.

XVI. **Trisetum** Pers.

34. *T. Gaudinianum* Bois.

Spec. a planta typica non diversum nisi pilis in basi floris superioris brevioribus.

N. 1530 C. Transcaspia, by Kunikud. May 10. 1898.

35. *T. subspicatum* Beauv.

N. 1222. Pamir, in the Chargush-pass. Alt. 4200m. Sept. 3. 1898.

— — var. *glabrescens* Hack. n. var.

Differt a typo foliis, culmo, paniculae ramulis glabris, panicula angusta, elongata, spiculis virescentibus leviter variegatis. An re idem ac *Tr. subspicatum* var. *pallida* Gris. Gram. Hochas. 78, „glabrior, panicula contracta, pallide virens?"

XVII. **Avena** L.

36. *A. fatua* L.

N. 1580. Pamir, prov. Shugnan, in cultivated land by Chorock. Found in hay. Alt. 2200m. Febr. 6. 1899.

37. *A. desertorum* Less.

N. 534. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2800m. June 24. 1898.

N. 584. On the Alai steppe. Alt. 3300m. June 27. 1898.

XVIII. **Cynodon** Pers.

38. *C. Dactylon* Pers.

N. 1732. Buchara, in cultivated land. May 29. 1899.

XIX. **Phragmites** Trin.

39. *P. communis* Trin.

N. 874. Pamir, in swamps by the river Alitshur. Alt. 3800m. July 22. 1898.

N. 1356. Pamir, prov. Wakhan, by Sunk. Alt. 3000m. Sept. 10. 1898.

N. 1381. Pamir, prov. Wakhan, by Sergin. Alt. 2900m. Sept. 16. 1898.

N. 1436. Pamir, prov. Wakhan, by Namatgut. Alt. 2700m. Sept. 27. 1898.

N. 2106. Chiwa, by Chasar-asp. Aug. 20. 1899.

N. 2115. Transcaspia, by Farab. Sept. 3 1899.

N. 2116. Ibid.

N. 2118. Ibid.

— — var. ***pumila*** (Willk.). *Phragmites pumila* Willk.

N. 1383. Pamir, prov. Wakhan, in sand by Sergin. Alt. 2900m. Sept. 16. 1898.

N. 1421. Pamir, prov. Wakhan, in sand by Sermut. Alt. 2900m. Sept. 24. 1898.

N. 1975. Chiwa, in sandy desert. July 14. 1898.

XX. **Eragrostis** Host.

40. *E. minor* Host.

N. 1343. Pamir, prov. Wakhan, on saline spots by Sunk. Alt. 3000m Sept. 10. 1898.

XXI. **Koeleria** Pers.

41. *K. phleoides* Pers.

N. 251. Transcaspia, by Jangi Kurgan. May 22. 1898.

42. *K. cristata* Pers.

γ. glabra Rgl.

N. 532. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2800m. June 24. 1898.

XXII. **Aeluropus** Trin.

43. *Ae. repens* Parl.

forma foliis minus dense aggregatis majoribus.

N. 1790. Buchara, in sandy desert by Chodsha Dawlet. June 10. 1899.

44. *Ae. littoralis* Parl.

N. 260. Buchara, in cultivated land. May 15. 1898.

N. 1691. Buchara, in saline desert. May 5. 1899.

N. 1811. By the river Amu Daria between Tshardshui and Chiwa, by Shatman Togai. June 18. 1899.

N. 1865. Ibid, by Kis-Kalá. June 23. 1899.

N. 2049. Chiwa, by Kunja Urgentsh. June 31. 1899.

XXIII. **Sclerochloa** Beauv.

45. *S. dura* Beauv.

N. 1685. Buchara, in saline desert. May 20. 1899.

XXIV. **Schismus** Beauv.

46. *S. calycinus* (L.) Duv. Jouve. *S. fasciculatus* Beauv. *f. marginatus* Beauv. *S. minutus* Rgl. et Schm.

N. 186. Transcaspia, by Kujumasar. May 13. 1898.

XXV. **Poa** L.

47. *P. attenuata* Trin.

Ich habe hier (in dieser Collection) das als *Poa attenuata* Trin. bezeichnet, was Hooker in Fl. of Brit. Ind., ferner v. Grisebach in Gramin. Hochas. und Regel in Descr. pl. nov. dafür gehalten haben. Ob diess wirklich genau die Trinius'sche Art darstellt, ist nicht ganz sicher.

N. 784. Pamir, in mountains by Tshatir Tash. Alt. 4100m. July 15. 1898.
N. 1055. Pamir, in mountains near the lake Jashil Kul. Alt. 3900m. Aug. 6. 1898.
N. 1016. Ibid. Alt. 3800m. Aug. 1. 1898.
N. 1072. Ibid. Aug. 8. 1898.

— — *f. pygmaea.*

N. 773. Pamir, Tshatir Tash, on moist ground. Alt. 4000m. July 14. 1898.

— — *α. typica* Rgl.

N. 679. Pamir, on dry plains by Sary Mullah. Alt. 4000m. July 5. 1898.
N. 511. Alai mountains by Olgin Lug. Alt. 2700m. June 22. 1898.

— — ad *γ. versicolor* Rgl. vergens.

N. 995. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. July 29. 1898.

— — *γ. versicolor* Rgl.

N. 1249. Pamir, in the Chargush-pass near the snow. Alt. 4300m. Sept. 3. 1898.
N. 1218. Pamir, ibid in swamps. Alt. 4200m. Sept. 3. 1898.
N. 1098. Pamir, on dry slopes by the lake Jashil Kul. Alt. 4100m. Aug. 11. 1898.
N. 1178. Pamir, on moist slopes by the lake Bulung Kul. Alt. 4000m. Aug. 27. 1898.
N. 1110. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. Aug. 13. 1898.

Die *Poa attenuata* der Himalaya-Flora (inclus. Pamir) ist eine sehr variable Pflanze, nicht bloss inbezug auf Höhe des Halmes und Färbung der Ährchen, sondern es variirt auch die Behaarung der Deckspelse (gluma florifera); bei dem N. 1110 sind auch die Interstitien der Nerven schwach behaart, beim Typus kahl.

48. *P. attica* Bois. et Heldr. *P. silvicola* Guss.

N. 312. Ferghana, in cultivated land by Andidshan. May 28. 1898.
N. 1730. Buchara, in cultivated land. May 29. 1899.

49. *P. trivialis* L.

N. 75. Samarkand. May 3. 1898.

50. *P. bulbosa* L.

var. *vivipara.*

N. 38. Transcaspia, in the steppe by Bami frequent. April 24. 1898.
N. 77. Samarkand. May 3. 1898.
N. 152. Samarkand, in the steppe by Kunikud. May 10. 1898.

51. *P. compressa* L.

N. 739. Pamir. Jaman Tal near the river Murghab. Alt. 3800m. July 12. 1898 (spec. nimis incompl.).

β. teretiuscula Rgl. Descr. pl. nov. VIII, 75.

N. 976. Pamir, on moist ground near the lake Jashil Kul. Alt. 3800m. July 28. 1898.

52. *P. pratensis* L.

N. 444. Alai mountains, in the Juniper forest by Olgin Lug. Alt. 2700m. June 20. 1898.
N. 961. Pamir, in swamps by the lake Jashil Kul. Alt. 3800m. July 26. 1898.

— — „var. *alpigena* Blytt“ [1]) ex Hook Fl. Brit. Ind. VII, 370. Vielleicht nicht mit der norwegischen Pflanze identisch. Ich habe kein Blütt'sches Exemplar gesehen. Sicher mit Hookers Pflanze übereinstimmend.

N. 707. Pamir, in swamps by the river Murghab. Alt. 3800m. July 8. 1898.

— — var. *anceps* Gaud.

N. 291. Ferghana, in cultivated land by Margilan. May 27. 1898.

var. *angustifolia* (L.).

N. 381. Ferghana, by Gultsha. June 17. 1898.

— — var. *subcoerulea* Sm. *P. pratensis v. humilis* (Ehrh.).

N. 804. Pamir, by the river Alitshur by Bosala. Alt. 3900m. July 16. 1898.

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[1]) I dont think this is the true *v. alpigena* Blytt, who has a contracted panicle and plicate leaves (Blytt Norges Flora, p. 130, Fries Herb. Normale, Fasc. 9, N. 93). O. P.

53. *P. tibetica* Munro, Hook. Fl. Brit. Ind. VII, 339.

Differt a typo spiculis variegatis nec pallidis.

N. 708. Pamir, by the river Murghab. Alt. 3800m. July 8. 1898.

54. *P. persica* Trin.

var. *songorica* Hook. Fl. Brit. Ind. VII. 337. *P. songorica* (Schrenk).

N. 509. Alai mountains, by Olgin Lug. Alt. 2700m. June 22. 1898.
N. 1171. Pamir, by a river near the lake Bulung Kul. Alt. 3800m. Aug. 25. 1898.

— — var. *alpina* Bois. Fl. or. V. 610.

N. 1245. Pamir, in the Chargush-pass. Alt. 4300m. Sept. 3. 1898.

XXVI. **Colpodium** Trin.

55. *C. altaicum* Trin.

N. 625. Pamir, by „Kisil Kul". Alt. 4000m. June 29. 1898.

56. *C. sp.*

Videtur species nova ex affinitate *C. Thomsoni* (Hook f.) Hack. quae differt praecipue palea carinis villosa.

Das Material ist zu spärlich und schlecht um eine Diagnose zu machen.

N. 707. Pamir, in swamps by the river Murghab. Alt. 3800. July 8. 1898.

XXVII. **Atropis** Rupr.

57. *A. tenuiflora* Griseb.

N. 1158. Pamir, in swamps by the lake Bulung Kul. Alt. 3800m. Aug. 24. 1898.

58. *A. convoluta* Griseb.

N. 767. Pamir, by the river Kara-Su. Alt. 3800m. July 12. 1898.
N. 875. Pamir, by the river Alitshur. Alt. 3800m. July 22. 1898.
N. 1209. Pamir, in saline swamps by the lake Tuz Kul. Alt. 3800m. Sept. 1. 1898.

— — forma humilior, ceterum typica.

N. 1228. Pamir, on dry spots in the Chargush-pass. Alt. 4200m. Sept. 3. 1898.

— — var. *subscariosa* Hack. n. var.

Differt a typo glumis fertilibus haud firmis sed submembranaceis v. subscariosis, ita ut nervi multo magis promineant quam in

convoluta typica; ceterum glumae fertiles acutiusculae, quae in illa obtusae.

N. 1132. Pamir, in saline swamps by the lake Bulung Kul. Alt. 3800m. Aug. 19. 1898.

N. 1208. Pamir, in saline swamps by the lake Tuz Kul. Alt. 3800m. Sept. 1. 1898.

59. *A. distans* Griseb.

N. 292. Ferghana, in cultivated land by Margilan. May 27. 1898.

XXVIII. **Sclerochloa** Link.

60. *S. dura* Beauv.

N. 78. Samarkand. May 3. 1898.

XXIX. **Festuca** L.

61. *F. ovina* L.

var. *valesiaca* Koch. *F. valesiaca* Schleicher.

N. 475. Alai mountains, by Olgin Lug. Alt. 2700m. June 21. 1898.

N. 531. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2800m. June 24. 1898.

N. 601. On the Alai steppe by Sarytash. Alt. 3300m. June 27. 1898.

N. 1015. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. Aug. 1. 1898.

N. 1069. Ibid. Aug. 8. 1898.

— — var. *sulcata* Hack. Monogr. Fest.

N. 355. Ferghana, by Issik Bulak by the river Langar. June 16. 1898.

62. *F. rubra* L.

var. *planifolia* Trautv.

subvar. γ. *villosa* Hack. Monogr. 141.

N. 825. Pamir, by a river near the lake Jashil Kul. Alt. 3800m. July 18. 1898.

63. *F. ciliata* Danth. *Vulpia ciliata* Link.

N. 153 b. Transcaspia, in the steppe by Kunikud. May 10. 1898.

64. *F. sibirica* Hack. in Bois. Fl. Or. V. 626.

N. 533. Alai mountains, in the juniper forests by Olgin Lug. Alt. 2800m. June 24. 1898.

XXX. **Nardurus** Rchb.

65. *N. tenuiflorus* Rchb. *Festuca maritima* L. *F. tenuiflora* Schr.

N. 159. Transcaspia, in the steppe by Ujimawut. May 11. 1898.

XXXI. **Bromus** L.

66. *B. (Sect. Festucaria) Paulsenii* Hack. n. sp.

Perennis, caespitosus. Culmi erecti, circ. 4 dm. alti, robusti, binodes, cano-puberuli, superne longiuscule denudati. Folia undique pube molli densa interdum sericea vestita, inde incana. Vaginae arctae, internodiis breviores, emortuae integrae vel laceratae sed non fibrosae. Ligula brevis (1,5 mm.), rotundata, erosula. Laminae late lineares, acutae, planae, ad 15 cm. longae et 5 mm. latae, erectae, rigidulae, nervis parum prominulis. Panicula ovata, patens, erecta, simplex, 10—12 cm. longa, rhachi ramisque minute puberulis, his binis v. (superioribus) solitariis, omnibus unispiculatis quam spicula paullo ad duplo longioribus. Spiculae lanceolatae, saepius 7-florae ad 24 mm. longae, ex atroviolaceo et viridi variegatae. Glumae steriles lanceolatae, acutiusculae, fertilibus contiguis paullo v. $^1/_4$ breviores, inferior 1—3-nervis, superior 3—5-nervis, glabrae. Glumae fertiles late lanceolatae, acutiusculae, apice et lateribus anguste scariosae, integrae, aristam exserentes quam ipsa gluma 2—3plo breviorem, 7-nerves, glabrae, scabrae v. minute hirtulae. Palea gluma sua paullo brevior, carinis minute ciliolata. Antherae 4 mm. longae.

Affinis *B. tomentello* Bois. qui differt vaginis emortuis, reticulatim fibrosis, paniculae ramis spiculae aequilongis vel ea brevioribus, glumis fertilibus acute bidentatis; *B. tomentosus* Trin. differt rhizomate stolonifero, panicula angusta, contracta, ramis strictis spicula brevioribus, glumis fertilibus infra apicem bidentatum aristatis. A *B. erecto* Huds. nostra species differt praesertim indumento foliorum, laminis latis fere sublanceolato-linearibus haud ciliatis, glumis fertilibus apice integris.

N. 1108. Pamir, on the mountains near the lake Jashil Kul. Alt. 3900^m. Aug. 13. 1898.

67. *B. erectus* Huds.

forma.

N. 1241. Pamir, in the Chargush-pass. Alt. 4300^m. Sept. 3. 1898.

68. *B. tectorum* L.

N. 11. Transcaspia, by Krasnowodsk. April 23. 1898.
N. 92. Samarkand. May 3. 1898.
N. 508. Alai mountains, by Olgin Lug. Alt. 2700m. June 22. 1898.
N. 1291. Pamir, prov. Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 9. 1898.

— — var. ***anisanthus*** Hack. in Denkschr. Akad. Wien 50. (1885). *Anisantha pontica* C. Koch.

N. 387. Ferghana, by Gultsha. June 17. 1898.
N. 200. Transcaspia, in sandy desert by Jakatut. May 14. 1898.

69. *B. crinitus* Bois.

N. 510. Alai mountains, by Olgin Lug. Alt. 2700m. June 22. 1898.
N. 790. Pamir, by a river near Tshatir Tash. Alt. 4000m. July 15. 1898.
N. 823. Pamir, near the lake Jashil Kul. Alt. 3800m. July 18. 1898.
N. 882. Pamir, on dry slopes near the lake Jashil Kul. Alt. 3800m. July 23. 1898.
N. 980. Pamir, on moist ground near the lake Jashil Kul. Alt. 3800m. July 28. 1898.
N. 1172. Pamir, by a river near the lake Bulung Kul. Alt. 3800m. Aug. 25. 1898.
N. 1188. Pamir, on moist ground near the lake Jashil Kul. Alt. 3800m. Aug. 29. 1898.

70. *B. mollis* L.

N. 323. Ferghana, in cultivated land by Osh. June 1. 1898.

— — var. ***leiostachys*** M. K.

N. 83. Samarkand. May 3. 1898.

71. *B. Danthoniae* Trin. *B. macrostachyus* Dsf. v. *triaristatus* Hack.

N. 248. Transcaspia, in the steppe by Ujimawut. May 22. 1898.
N. 1686. Buchara, in saline desert. May 20. 1899.

— — forma spiculis pubescentibus.

N. 27. Samarkand, in the steppe by Chawast. May 23. 1898.

72. *B. oxyodon* Schrenk.

N. 247. Transcaspia, in the steppe by Ujimawut. May 22. 1898.

73. *B. japonicus* Thunb. *B. patulus* M. et K.

N. 379. Ferghana, by Gultsha. May 17. 1898.
N. 1731. Buchara, in cultivated land. May 29. 1899.

— — var. *umbrosa* Hack. n. var.

Differt a typo panicula laxissima, pauciflora, spiculis 4—5 floribus, glumis fertilibus angustioribus (obovato-oblongis) ad latera rotundatis nec angulosis. Habitu accedit *B. arvensi* L. a quo valde distinctus est antheris minutis (vix 1 mm. longis).

N. 1368. Pamir, prov. Wakhan, by Langarkisht. Alt. 3000m. Sept. 13. 1898.

XXXII. **Boissiera** Hochst.

74. *B. bromoides* Hochst.

N. 298. Ferghana, in cultivated land by Margilan. May 27. 1898.
N. 884. Pamir, on dry slopes near the lake Jashil Kul. Alt. 3800m. July 23. 1898.

XXXIII. **Lolium** L.

75. *L. temulentum* L.

N. 207. Buchara, in cultivated land. May 15. 1898.

XXXIV. **Agropyrum** Gärtn.

76. *A. squarrosum* Lk.

N. 62. Transcaspia, by Jakatut. April 25. 1898.
N. 185. Transcaspia, by Kuju-masar. May 13. 1898.

77. *A. cristatum* Roem. et Sch. *Triticum cristatum* Schreb.

N. 406. Alai mountains, by Sufi Kurgan. Alt. 2400m. June 18. 1898.

78. *A. longearistatum* Bois.

N. 886. Pamir, on moist slopes near the lake Jashil Kul. Alt. 3900m. July 23. 1898.
N. 1022. Pamir, on dry slopes near the lake JashilKul. Alt. 3800m. Aug. 3. 1898.
N. 1056. Pamir, near the lake Jashil Kul. Alt. 3900m. Aug. 6. 1898.

XXXV. **Secale** L.

79. *S. cereale* L.

N. 1675. Buchara, evil weed in wheat-fields. May 13. 1899.
N. 1733. Buchara, in cultivated land. May 29. 1899.

XXXVI. **Triticum** L.

80. *T. sativum* Lam.

N. 212. Buchara, cultivated. May 15. 1898.

N. 1674. Buchara, cultivated. May 13. 1899.
N. 1677. Buchara, cultivated. May 14. 1899.

81. *T. durum* Desf.

N. 1297. Pamir, prov. Wakhan, cultivated by Langarkisht. Alt. 3000m. Sept. 8. 1898.

82. *T. Aegilops* Beauv.; Roem. et Sch. Syst. — *Aegilops squarrosa* L.

N. 263. Buchara, by Kerki. May 23. 1898.

83. *T. triaristatum* Gr. Godr.

var. *intermedium* Hack. *Aegilops intermedia* Steud.

N. 377. Ferghana, by Gultsha. June 17. 1898.

XXXVII. **Hordeum** L.

84. *H. crinitum* Desf. *Elymus crinitus* Schreb.

N. 158. Transcaspia, in the steppe by Ujimawut. May 11 1898.
N. 242. Ibid. May 22. 1898.
N. 378. Ferghana, by Gultsha. June 17. 1898.

85. *H. secalinum* Schreb.

N. 256. Transcaspia, by Jangi Kurgan. May 22. 1898.
N. 873. Pamir, in swamps by the river Alitshur. July 22. 1898.
N. 1129. Pamir, in saline swamps by the lake Bulung Kul. Alt. 3800m. Aug. 19. 1898.
N. 1397. Pamir, prov. Wakhan, by Torguz. Alt. 2900m. Sept. 19. 1898.

— — var. *brevisubulatum* Trin. *H. violaceum* Bois.

N. 692. Pamir, on dry plains by Sary Mullah. Alt. 4100m. July 5. 1898.
N. 706. Pamir, in swamps by the river Murghab. Alt. 3800m. July 8. 1898.
N. 1030. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 4. 1898.

86. *H. vulgare* L.

N. 64. Buchara, cultivated. April 26. 1898.
N. 1676. Buchara, cultivated. May 14. 1899.

87. *H. hexàstichum* L.

N. 1785. Transcaspia, cultivated by Merw. June 6. 1899.

88. *H. coeleste* L. (determ. O. P.).

Cultivated in Wakhan. Sept. 1898.

89. *H. murinum* L.

N. 10. Transcaspia, by Krasnowodsk. April 23. 1898.

90. *H. bulbosum* L.

N. 319. Ferghana, near Osh. May 30. 1898.

XXXVIII. **Elymus** L.

91. *E. giganteus* Vahl.

β. sabulosus M. *E. sabulosus* M. Bieb.

Specimen inter *giganteum* typicum et *sabulosum* fere medium.

N. 234. Buchara, in sandy desert by Chodsha Dawlet. Maj 17. 1898.

92. *E. dasystachyus* Trin.

N. 764. Pamir, near the river Kara Su. Alt. 3900m. July 12. 1898.

N. 799. Pamir, Tshatir Tash. Alt. 4000m. July 15. 1898.

N. 876. Pamir, in swamps by the river Alitshur. Alt. 3800m. July 22. 1898.

N. 1202. Pamir, on saline ground near the lake Tuz Kul. Alt. 3800m. Aug. 31. 1898.

N. 1334. Pamir, prov. Wakhan, in thickets by the river Pandsh by Langarkisht. Alt. 3000m. Sept. 9. 1898.

— — var. *aristatus* Rgl.

N. 1175. Pamir, on dry plains near the lake Bulung Kul. Alt. 3800m. Aug. 27. 1898.

93. *E. lanatus* Korshinski, Mém. Ac. St. Pétersb. sér. 8. vol. 4. 1896. p. 102.

var. *canus* Hack. n. var.

differt glumis fertilibus cano-villosis.

N. 974. Pamir, on dry slopes near the lake Jashil Kul. Alt. 3900m. July 28. 1898.

N. 1100. Ibid. Alt. 4100m. Aug. 11. 1898.

94. *E. sibiricus* L.

N. 740. Pamir, Jaman Tal near the river Murghab. Alt. 3800m. July 12. 1898.

N. 1012. Pamir, on moist mountains near the lake Jashil Kul. Alt. 3800m. Aug 1. 1898.

N. 1398. Pamir, prov. Wakhan, by Torguz. Alt. 2900m. Sept. 19. 1898.

95. *E. aralensis* Rgl.

N. 2009. Chiwa, in thickets by Kiptjak. July 24. 1899.

Potamogetonaceæ.

Determ. **J. Baagøe,** Næstved, Denmark.

I. Potamogeton.

1. *P. nodosus* Poir. *P. fluitans* Roth.

Roth's name is from 1788 and elder than Poiret's name, which is from 1816; I have used the latter [1]), because some botanists consider the steril hybrid *P. lucens* × *natans* as Roth's plant, others the fructiferous and again others (Ascherson und Graebner Syn. Mitteleur. Flora 1897) refer both the hybrid and the fructiferous „*P. fluitans*" to the same species. This is not at all correct, these two forms diverge in several respects. Original fructiferous specimens of Roth's *P. fluitans* I have seen in the herbarium of St. Petersburg, but Roth has in his describing the plant in Tent. Fl. Germ. I. (1788) 72 „.... foliis inferioribus longissimis" and in Tent. Fl. Germ. II (1789) 202 „..... folia inferiora pedalia et longiora" no doubt had the hybrid before him (the above mentioned character is particulary characteristic for the hybrid, while the fructiferous plant has short submerged leaves); perhaps Roth has emitted both plants under the same name, and until it can be fixed, which plant shall bear Roth's name, or whether this is to be retained after all, I will use the name given by the author, who is next after him, viz. *P. nodosus* Poir. (*P. occidentalis* Sieb., *P. canariensis* Link, *P. americanus* Cham. and more are of later date).

N. 1951. Chiwa, in a pond. July 11. 1899.
N. 1980. Chiwa, in a pond by Chasawat. July 15. 1899.

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[1]) Proposed by Mr. O. Hagström (Lyswik, Sweden).

2. *P. perfoliatus* L.

N. 1115. Pamir, in the lake Jashil Kul; depth 1—2m. Alt. 3800m. Aug. 25. 1898.

N. 1444. Pamir, prov. Wakhan (Ishkashim), in a pond by Rang. Alt. 2700m.

N. 2077. Transcaspia, in a fountain by Artshman. Sept. 6. 1899.

— — var. *Muelleri* A. Bennett Journ. of Botany XV (1887) p. 177.

This variety is characterized by the short, somewhat acute, reflexed leaves. Mr. Bennett has been so kind to send me the original specimens from Australia, and they agree perfectly with this plant.

N. 1452. Pamir, prov. Wakhan (Ishkashim), in running water by Nut. Alt. 2700m. Oct. 3. 1898.

— — var. *rotundifolia* M. K.

N. 1770. Transcaspia, in running water by Merw. June 3. 1899.

N. 1936. Chiwa, in a channel. July 9. 1899.

3. *P. lucens* L.

forma.

The superior leaves have longer stalks than usually is the case, and they are not so membranaceous as the lower ones, but as this plant in all other characters agrees with *P. lucens*, I will not refer it to the nearly related form *P. Zizii* M. K., which is perhaps a hybrid.

N. 2076. Chiwa, in a pond, former an arm of the river Amu Daria, by Giaur Kalá near the mountain Sultan Babá. Aug. 11. 1899.

4. *P. gramineus* L.

N. 616. Pamir, in a pond by Bordo-bá, by the Alai steppe. Alt. 3500m. June 28. 1898.

5. *P. crispus* L.

N. 127. Tashkent, in running water by Tshinas. May 7. 1898.

N. 1138. Pamir, in the lake Jashil Kul, depth 1—2m. Alt. 3800m. Aug. 15. 1898.

N. 1143. Pamir, in the lake Bulung Kul, depth 2m. Alt. 3800m. Aug. 21. 1898.

— — var. *angustifolius* Fieb.

This form with long and narrow leaves is in Asia-Media and India more frequent than the typical form.

N. 1678. Buchara, in the pond „Hafs-i-Pasha-Chodsha". May 16. 1899.

6. *P. Friesii* Rupr.? *P. mucronatus* Schrad.

Mr. Hagström means this is an intermediate form between *P. Friesii* and *P. rutilus* Wolfg.

N. 1117. Pamir, in the lake Jashil Kul, depth 1—2m. Alt. 3800m. Aug. 15. 1898.

7. *P. pectinatus* L.

N. 2130. In the Caspian See by Krasnowodsk, depth 1m. Sept. 7. 1899.

8. *P. amblyophyllus* C. A. Meyer (Beitr. z. Pflanzenk. des russ. Reiches. St. Petersburg 1849. 6. lief. p. 10). This species belongs to the group *Coleogeton* and under this nearest to the *filiformis*-group. Meyer says „proxime ad *P. pectinatum* accedit"; several botanists take it for a form of *P. filiformis*, but the fruit is different, and by the broad leaves, whose point is at least as broad as the middle of the leaves, and by the short rigid ligulae this species is sufficiently distingued from *P. filiformis*. — The plant agrees perfectly with the original (fructiferous) specimens from the museum of Helsingfors. — The localities indicated by Meyer (Kasbek Kaukasus and Jahagan Altai) might make it probable, that *P. amblyophyllus* were to be found in the Pamir.

N. 711. Pamir, in swamps by the river Murghab,. in stagnant water. Alt. 3800m. July 8. 1898.

N. 712. Ibid, in running water.

N. 1456. Pamir, prov. Wakhan (Ishkashim), in running water by Nut. Alt. 2700m. Oct. 3. 1898.

9. *P. filiformis* Pers.

N. 639. Pamir, in a pond by the lake Kara Kul. Alt. 4000m. July 1. 1898.

N. 879. Pamir, in swamps by the river Alitshur. Alt. 3800m. July 22. 1898.

N. 1102. Pamir, in the lake Jashil Kul, depth 0,5m. Alt. 3800m. Aug. 13. 1898.

N. 1445, 1446. Pamir, prov. Wakhan (Ishkashim), in a pond by Rang. Alt. 2000m. Oct. 1. 1898.

N. 1590. Pamir, in a spring by Tshatir Tash. Alt. 4000m. March 14. 1899.

10. *P. pamiricus* n. sp.

Caulis strictus teres, in latere folio verso planiusculus, simplex vel subsimplex, 1 m. longus vel longior; internodia luteo-viridia, inferiora brevia (2 cm.), superiora longiora (8—12 cm.). Inferiora pars caulis vaginis aphyllis interdum dissolutis instructa; folia rigida, angustissime linearia, obtusa, 3—5 nervia, inferiora superioribus 12—20 cm. longis 1—3 mm. latis breviora. Nervus medius (in siccis) latere inferiore elevatissimus. Axilli non ramiferi[1]). Vaginæ magnæ, 2—3 cm. longae, 4—7 mm. latae, rigidæ, virides, multinerviae, subinflatae, earum margines versus basin membranaceæ. Ligulæ subpersistentes obtusæ, superiores saltem vaginis fere dimidia parte breviores. Pedunculus spiciferus 3—4 cm. longus rigido-erectus, crassitudine æqualis, foliis multo brevior, ex axillis superioribus nascens, realiter terminalis sed ad latus inflexus ita ut lateralis videtur.

Spicae pauciflores intervallis brevibus inter glomerulos. Fructus immaturus parvus, obliquo-ovatus, stylo brevi, stigma obliquo-discoidea. Rhizomam non vidi.

N. 644. Pamir, in a pond by the lake Kara Kul. Alt. 4000m. July 1. 1898.

Potamogeton pamiricus belongs to the group *Coleogeton* Rchb., and this group being divided in two well separated undergroups, viz. *pectinatus-* and *filiformis* group, it belongs to the latter; of hitherto described *Potamogeton*-species the following belong to the same group: *P. filiformis* Pers., *P. juncifolius* Kern., *P. vaginatus* Turcz., *P. amblyophyllus* C. A. Meyer, *P. strictus* Phil.

[1]) Only at the lowest axil of the two apparently opposite leaves at the base of the peduncle grows a shoot, which apparently is a continuation of the stem, so that the peduncle is apparently lateral.

and *P. aulacophyllus* Kr. Sch. Of these species *P. pamiricus* comes nearest to *P. juncifolius* (cfr. Verh. d. k. k. zool.-bot. Gesellsch. in Wien, B. XLV, 1895), but differs from it by the broader sheaths (by which it comes near to *P. vaginatus*), and much larger ligules, unbranched stems, apparently lateral peduncles and by the whole stouter structure.

P. pamiricus has only been found once before in Kuenluen at the source of the river Hoangho 1894 by W. J. Raborowsky (St. Petersburg herbarium for Central-Asia, N. 411). — The two localities are not far from each other, and under the same northern latitude (35°). — It seems to be endemic for Central-Asia.

11. *P. sp.*, ad forma *P. filiformis.*

N. 1143. Pamir, in the lake Bulung Kul, depth 1—2m. Alt. 3800m. Aug. 21. 1898.

II. **Zannichellia** Micheli (det. O. Hagström).

12. *Z. pedicellata* Fr.

N. 217. Buchara, in ponds. May 15. 1898.
N. 225. Buchara, in running water. May 16. 1898.
N. 1116. Pamir, in the lake Jashil Kul, depth 1—2m. Alt. 3800m. Aug. 15. 1898.
N. 1962. Chiwa, in a stream. July 2. 1898.

— — forma *gracilis.*

N. 224 a. Buchara, in a saline pond. May 16. 1898.

III. **Ruppia** L. (det. O. Hagström).

13. *R. rostellata* Koch.

N. 224 b. Buchara, in a saline pond. May 16. 1898.

14. *R. maritima* L.

N. 1982. Chiwa, in a saline pond by Ak-Darbent. July 15. 1899.

IV. **Najas** L.

15. *N. marina* L.

N. 2131. In the Caspian See by Krasnowodsk. Sept. 7. 1899.

7—4—1903.

Chenopodiaceæ.

Determ. **Ove Paulsen,** Copenhagen.

With plate II and III.

I. **Chenopodium** L.

1. *Ch. glaucum* L.; Ldb. fl. ros. III, p. 700; Bunge reliquiae Lehmannianæ, Mém. savants étrangers VII, 1852, p. 448; Bunge Enum. Salsolac. centrasiat. Acta H. Petrop. X 1879, p. 404; Bois. fl. or. IV, p. 903; Hooker fl. brit. Ind. V, p. 4. Olga Fedtschenko, Botan. Issledowanija, in: Iswestija Imp. Obschtschestwa liubitelei estestwosnanija, antropologiji i etnografiiji T. CIII. Moskva 1902, p. 128.

N. 195. Transcaspia, by Tshardshui. May 13. 1898.
N. 1802. Buchara, in cultivated land. June 14. 1899.
N. 1345. Pamir, in the bed of the river Pandsh, by Langarkisht. Alt. 3000m. Sept. 10. 1898.
Area: Europe, Sibiria, Asia-Media.

2. *Ch. Vulvaria* L.; Ldb. fl. ros. III, p. 695; Bunge Enum. p. 404; Bois fl. or. IV, p. 901; Buhse Aufzähl. Transkauk. Pers. Pflanzen, Moskau 1860, p. 186; O. Fedtschenko l. c. p. 128.

N. 328. Ferghana, Osh. June 3. 1898.
N. 686. Pamir, on dry plains by Sary Mullah. Alt. 4100m. July 5. 1898. (a form with small leaves and the younger stems often red-tinged).
Area: Europe, northern Africa, western- and middle Asia.

3. *Ch. murale* L.; Ldb. fl. ros. III, p. 702; Bunge rel. Lehm. p. 447; Bunge Enum. p. 405; Buhse l. c. p. 187; Bois. fl. or. IV, p. 902; Aitchison fl. of Kuram Valley, Journ. Lin. Soc. XVIII, p. 902; Hooker fl. brit. Ind. V, p. 4.

N. 338. Ferghana, by Osh. June 9. 1898. Called „Shorá".
Area: Europe, Africa, Sibiria, Asia-Media, India, America.

4. *Ch. album* L.; Ldb. fl. ros. III, p. 697; Bunge Rel. Lehm. p. 447; Buhse l. c. p. 186; Hooker fl. brit. Ind. V, p. 3; Aitchison fl. Kuram Valley p. 89; O. Fedtschenko l. c. p. 128.

Of this species I have collected the following forms:

— — v. *integrifolium* Fenzl in Ldb. fl. ros. III. p. 697.

N. 417. Alai mountains, by Sufi Kurgan. Alt. 2100m (a small erect form with ovoid or deltoid-ovoid leaves).

N. 1281. Pamir, Wakhan, in cultivated land by Langarkisht. Alt. 300m. Sept. 8. 1898 (a great form).

— — v. *pseudopulifolium* Scholz in Oesterr. bot. Zeitschr. 1900, p. 97.

N. 1735. Buchara, in cultivated land. May 29. 1899.

Area: Old and new world.

5. *Ch. ficifolium* Sm.; Ldb. fl. ros. III, p. 696; Bois. fl. or. IV, p. 901.

N. 1801. Buchara. June 14. 1899.

Area: Europe, Sibiria, Asia-Media.

6. *Ch. rubrum* L.; *Blitum rubrum* Bunge Rel. Lehm. p. 448; Bois. fl. or. IV, p. 905; *Blitum polymorphum* C. A. M., Fl. alt. I, p. 13; Ldb. fl. ros. III, p. 709; Bunge Enum. p. 406; O. Fedtschenko l. c. p. 128.

N. 1536. Pamir, Shugnan, in the mountains by Chorock. Alt. 2100m. Oct. 29. 1898. — I have collected only the fruits, who sowed in the botanical garden at Copenhagen gave specimens of *Ch. rubrum*.

Area: Europe, Sibiria, Asia-Media.

7. *Ch. Botrys* L., Ldb. fl. ros. III, p. 704; Bunge Rel. Lehm. p. 448; Bunge Enum. p. 405; Bunge in Rgl. et Herd. Pl. Semen., Bull. soc. nat. Moscou 1868, p. 400; Buhse l. c. p. 187; Bois. fl. or. IV, p. 903; Hook fl. brit. Ind. V, p. 4; Aitchison Kuram Valley, p. 99; Aitchison Botany, o. t. Afghan delimitation Commission, Transact. Lin. Soc. 1888, p. 100; O. Fedtschenko l. c. p. 128.

N. 383. Ferghana, in the bed of the river Kurshab by Gultsha. Alt. 1600m. June 17. 1898.

N. 1280. Pamir, Wakhan, in cultivated land by Langarkisht. Alt. 3000m. Sept. 8. 1898. (A very stout form with broad leaves).

N. 1346. Pamir, Wakhan, in the bed of the river Pandsh. Alt. 3000m. Sept. 10. 1898.

Area: Southern Europe, Northern Africa, Persia, Asia-Media, Northern America.

II. **Monolepis** Schrad.

8. *Monolepis Litwinowii* n. sp.

Planta perennis pusilla, altitudine 2—4 cm., albo-farinosa, collo foliorum reliquiis obtecto. Caulis in parte inferiore ramos

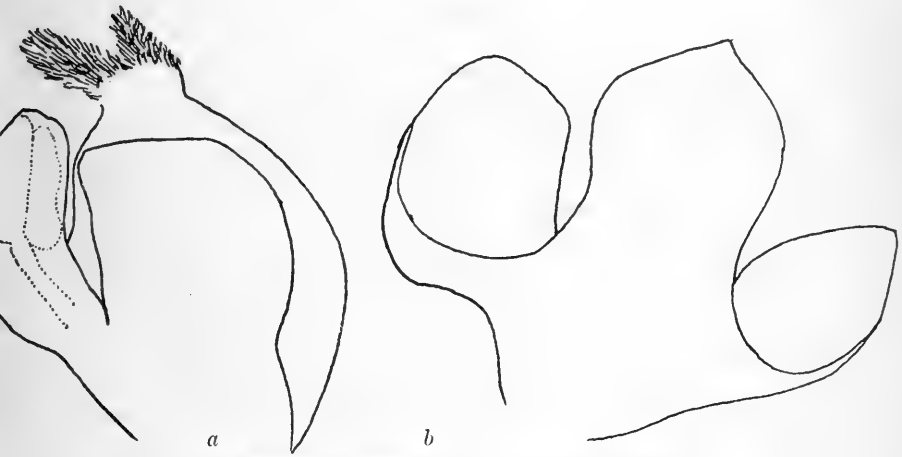


Fig. 1. *Monolepis Litwinowii* n. sp. (Very magnified).
a. flower in side view, b. sepal seen from behind.

eo æquilongos vel longiores edens; internodia longa. Folia radicalia longestipitata (stipes 2—3 cm., folium 1,5—2 cm.), hastato-triangularia, irregulariter dentata, dentibus brevibus acutis vel aculeo brevissimo rubro munitis. Folia floralia hastata, quo altius sedentia, eo brevius stipitata, in summo caule fere sedentia, hastato-linearia. Florum glomeruli 10—15 flori, sepalum unum trifidum (Fig. 1, b) lacinia media acuta lateralibus muticis longiore. Stamen unum, ante anthesem sepali lacinia media obtectum (Fig. 1, a). Ovarium ovatum ovulo unico verticali, stigmatibus duobus penicilliformibus. Semen castaneum. Embryo curvatum, non orbiculatum: radice cotyledones non tangente.

Differs from the other species of *Monolepis* by the trifid sepals. I have given this species the name of Mr. D. Litwinow, of the imperial academy of St. Petersburg, a notable investigator of the Chenopodiaceæ.

N. 667. Pamir, on dry ground near the river Muskol. Alt. 4300m. July 2. 1898.

III. **Spinacia** L.

9. *Spinacia tetrandra* Stev.; Ldb. fl. ros. III, p. 412; Bunge Enum. p. 407; Bois. fl. or. IV, p. 906; O. Fedtschenko l. c. p. 128.

N. 44. Transcaspia, in the steppe by Bami. April 24. 1898. (♂)
N. 123. Samarkand, in the steppe by Chawast. May 7. 1898. (♀)
N. 254. Dshisak, in the steppe by Jangi Kurgan. May 22. 1898. (♀)
Area: Caucasus, Armenia, Persia, Afghanistan, Asia-Media.

IV. **Atriplex** L.

10. *A. crassifolium* C. A. M., Ldb. fl. ros. III, p. 721; Bunge reliq. Lehm. p. 450; Bunge Enum. p. 410; Bois. fl. or. IV, p. 908; Hooker fl. brit. Ind. V, p. 6.

N. 1033, 1034. Pamir, by the lake Jashil Kul. Alt. 3800m. Aug. 4. 1898.
N. 1111. Pamir, on moist ground by the lake Jashil Kul. Alt. 3800m. Aug. 15. 1898.
N. 1152. Pamir, on the shore of the lake Bulung Kul. Alt. 3800m. Aug. 8. 1898.
Area: Sibiria, Asia-Media.

11. *A. dimorphostegium* Kar. Kir.; Ldb. fl. ros. III, p. 730; Bunge Enum. p. 412; Buhse l. c. p. 187; Bois. fl. or. IV, p. 909; Aitchison Afghan. Delim. p. 101; O. Kuntze Pl. orientali-rossicae, Act. H. Petrop. X, p. 231; O. Fedtschenko l. c. p. 129.

N. 1701. Buchara, on sandy soil. May 23. 1899.
Area: Northern Africa, western, middle and central Asia.

12. *A. laciniatum* L.; Ldb. fl. ros. III, p. 718; Westerlund Sveriges Atriplices, Lund 1861, p. 35; Bunge in Rgl. et Herd. l. c. p. 401; Bunge Rel. Lehm. p. 450; Bunge Enum. p. 408; Buhse l. c. p. 187; Duthie in Alcock: Report nat. hist. Results o. t. Pamir boundary commission Calcutta 1898. No. 76; O. Fedtschenko l. c.

p. 129. — *A. laciniata* L. v. *genuina* Trautvetter Enumerat. pl. Songoricarum a Schrenk coll., Bull. soc. nat. Moscou 1867, 2, p. 52. *A. Tataricum* L.; Bois. fl. or. IV; p. 910. O. Kuntze. l. c. p. 131.

I think, *A. laciniatum* L. and *A. Tataricum* L. are synonyms and are distinguished from *A. rosea* L. by long leaves and spicate inflorescences and from *A. crassifolium* by the narrow, long-stalked, laciniate leaves.

N. 2026. Chiwa, in dry places near Kunja Urgentsh.
N. 2037. Chiwa, in a grove near Kunja Urgentsh.
Area: Europe, northern Africa, Sibiria, western, middle and central Asia.

13. *A. roseum* L.; Ldb. fl. ros. III, p. 717; Westerlund l. c. p. 31; Bunge rel. Lehm. p. 450; Bunge Enum. p. 408; Bois. fl. or. IV, p. 911; Hook. fl. brit. Ind. V, p. 7; Aitchison Afghan Delim. p. 101. *A. laciniata* L. v. *rosea* Trautvetter Enum. pl. Songor. p. 53.

N. 766. Pamir, near Kara Su. Alt. 3800m. July 7. 1898.
N. 1144. Pamir, near the lake Bulung Kul, on clay. Alt. 3800m. Aug. 21. 1898.
N. 1212. Pamir, on saline ground by the lake Tuz Kul. Alt. 3800m. Sept. 1. 1898 (very small specimens).
N. 1231. Pamir, in the Chargush-pass, on the shore of a little lake. Alt. 4200m. Sept. 2. 1898.
Area: Europe, Sibiria, middle- and central Asia.

14. *A. turcomannicum* F. et M.; Bois. fl. or. IV, p. 911; Bunge Enum. p. 409; *Obione turcomannica* Bunge reliq. Lehm. p. 451; Buhse l. c. p. 187.

N. 2201. Persia, Prov. Gilan, in the mountains by Batshinar.
Area: Turkestan, western Asia.

15. *A. flabellum* Bunge, Bois fl. or. IV, p. 912; Bunge Enum. p. 411; Aitchison Afghan Delim. p. 101; O. Fedtschenko l. c. p. 129.

N. 313. Ferghana, by Andidshan. Called „Shorá".
Area: Asia-Media.

V. **Eurotia** Adans.

16. *E. ceratoides* (L.) C. A. M. in Ldb. fl. alt. IV, p. 239; Ldb. fl. ros. III, p. 738; Bunge reliq. Lehm. p. 451; Bunge Enum.

p. 413; Bunge in Rgl. et Herd. l. c. p. 401; Buhse l. c. p. 187; Trautvetter Enum. pl. songor. p. 56; Bois. fl. or. IV, p. 917; Hooker fl. brit. Ind. V, p. 8; Duthie l. c. N. 77; Aitchison Afghan Delim. p. 106; Hemsley fl. of Tibet or High-Asia, Journ. Lin. Society XXXV. 1902, p. 195.

N. 694. Pamir, on dry plains by Sarymullah. Alt. 4100m. June 5. 1898.

N. 718. Pamir, on dry plains by the river Murghab. Alt. 3800m. June 9. 1898.

N. 1067. Pamir, on dry slopes near the lake Jashil Kul. Alt. 3800m. Aug. 8. 1898.

These specimens from dry localitys very often have the stem strongly fasciated and are not more than 20 cm. high.

N. 1300. Pamir, Wakhan, by Langarkisht. Alt. 3800m. Sept. 8. 1898. (a flexuose shrub, 1m high, winding in a rose-shrub).

N. 1419. Pamir, Wakhan, by Sermut. Alt. 2800m. Sept. 24. 1898. (in flying sand, partly cowered).

Area: Southern Europe and Sibiria, Mongolia, Asia Media, Himalaya.

VI. **Ceratocarpus** L.

17. *C. arenarius* L.; Ldb. fl. ros. III, p. 739; Bunge reliq. Lehm. p. 452; Bunge Enum. p. 413; Bunge in Rgl. et Herd. l. c. p. 401; Buhse l. c. p. 188; Trautv. Enum. pl. songor. p. 56; Bois. fl. or. IV, p. 918; Aitchison Afghan Delim. p. 101; O. Fedtschenko l. c. p. 129.

N. 249. Samarkand, in the steppe by Ujimawut. May 22. 1898 (a small form with broader leaves than usually is the case, and with long recurved spines upon the perigone).

N. 1702. Near Buchara. May 23. 1899.

N. 2064. Chiwa, in the desert near Kunja Urgentsh. Aug. 4. 1899 (big globose specimens).

Area: Greek peninsula, Russia, Sibiria, middle- and central Asia.

VII. **Bassia** All.

18. *B. hyssopifolia* (Pall.) Volkens, Engler u. Prantl Nat. Pflanzenfam. III. 1 a, p. 70. — *Suaeda hyssopifolia* Pallas Ill. pl. imperfecte cognit. t. 36. *Echinopsilon hyssopifolius* Moq. Tand.; Ldb. fl. ros. III, p. 751; Bunge reliq. Lehm. p. 455. Traut-

vetter Enum. pl. songor. p. 58. — *Kochia hyssopifolia* Roth; Bunge Enum. p. 418; Bois. fl. or. IV, p. 926; O. Fedtschenko l. c. p. 130.

N. 1350. Pamir, Wakhan, on rocks by Sunk. Alt. 3000m. Sept. 10. 1898.
N. 1395. Pamir, Wakhan, in a ravine by Torguz. Alt. 2800m. Sept. 19. 1898.
Area: Southern Europe and Russia, middle and central Asia.

19. *B. sedoides* (Pall.) Volkens l. c. *Suæda sedifolia* Pall. Ill. pl. imp. cogn. t. 32-34; *Echinopsilon sedoides* Moq. Tand.; Ldb. fl. ros. III, p. 756; Bunge reliq. Lehm. p. 455; Trautv. Enum. pl. songor. p. 59; Litwinow Herb. Fl. Ros. No. 434. *Kochia sedoides* Bois. fl. or. IV, p. 926; Bunge Enum. p. 419.

N. 154. Samarkand, in the steppe by Kunikud. May 10. 1898.
Area: South-eastern Europe, Sibiria, middle- and central Asia.

VIII. **Kochia** Roth.

20. *K. prostrata* (L.) Schrad. N. Journ. 1809, p. 85; Ldb. fl. ros. III, p. 747; Bunge reliq. Lehm. p. 454; Bunge Enum. p. 416; Buhse l. c. p. 188; Trautv. Enum. pl. songor. p. 58; Bois. fl. or. IV, p. 923; Hooker fl. brit. Ind. V, p. 10; O. Kuntze. l. c. p. 131; O. Fedtschenko l. c. p. 130.

N. 885. Pamir, in a ravine near the lake Jashil Kul. Alt. 3800m. Aug. 23. 1898 (a form with white, rather broad (1½ cm.) leaves, very like a specimen from Tibet (Hb. Hook. fil et Thomson)).
Area: Middle and Southern Europe, Northern Africa, Russia, Sibiria, middle- and central Asia.

21. *K. stellaris* Moq. Tand. Chenop. Monogr. Enum. 1840, p. 93. *K. odontoptera* Schrenk, Bull. Ac. Pétersb. I. 1843; Ldb. fl. ros. III, p. 749; Bunge Reliq. Lehm. p. 455; Bunge Enum. p. 417; Bois. fl. or. IV, p. 924; Hooker fl. brit. Ind. V, p. 11; O. Fedtschenko l. c. p. 130.

N. 733. Pamir, on dry slopes by Shatshan. Alt. 3800m. July 11. 1898.
N. 1141. Pamir, near the lake Bulung Kul. Alt. 3800m. Aug. 8. 1898.
N. 1353. Pamir, Wakhan, on dry slopes by Sunk. Alt. 3000m. Sept. 10. 1898.
Area: Middle- and central Asia.

IX. **Agriophyllum** M. Bieb.

22. *A. minus* Fisch. et Mey., Bull. Soc. Nat. Moscou 1839; Ldb. fl. ros. III, p. 755; Bunge reliq. Lehm. p. 457; Bunge Enum. p. 419; Bois. fl. or. IV, p. 928.

N. 1840. Buchara, in the desert by Ustyk. June 19. 1899.
N. 1970. Chiwa, in the desert. June 11. 1899.
Area: Asia Media.

23. *A. latifolium* Fisch. et Mey., Ldb. fl. ros. III, p. 757; Bunge reliq. Lehm. p. 456; Bunge Enum. p. 420; Bois fl. or. IV, p. 929.

N. 1839. Buchara, in the desert by Ustyk. June 19. 1899.
Area: Asia Media, Belutshistan.

X. **Anthochlamys** Fenzl.

24. *A. polygaloides* (F. et M.) Moq. Chenop. monogr. Enum. p. 102; Ldb. fl. ros. III, p. 765; Bois. fl. or. IV, p. 931; Jaub. et Spach Ill. pl. orient. t. 299; *Corispermum polygaloides* Fisch. et Meyer.

N. 2219. Persia, in the mountains near Teheran. Sept. 28. 1899.
Area: Caucasus, Persia.

XI. **Halopeplis** Bunge.

25. *H. pygmaea* (Pall.) Bunge, Ung. Sternberg Syst. Salic., Dorpat 1866, p. 105; Bunge Enum. p. 423; Bois. fl. or. IV, p. 934; *H. songarica* C. A. M., Ldb. fl. ros. III, p. 771; Bunge reliq. Lehm. p. 460.

N. 1687. Buchara, in saline desert. May 5. 1899.
Area: Southern Russia, middle- and central Asia.

XII. **Halostachys** C. A. Meyer.

26. *H. caspica* (Pall.) C. A. M.; Ung. Sternb. l. c. p. 77; Bunge reliq. Lehm. p. 460; Bunge Enum. p. 423; Bunge in Rgl. et Herd. l. c. p. 402; Bois. fl. or. IV, p. 935; Aitchison Afghan Delim. p. 102; *Salicornia caspica* Pall. It. I Anh. p. 28, t. D; *Halocnemum caspicum* Fzl. in Ldb. fl. ros. III, p. 772.

N. 1689, 1690. Buchara, in saline desert. May 20. 1899.
N. 1845, 1852. By the river Amu Daria between Tshardshui and Chiwa. June 21. 1899.

N. 1900. Ibid., in sandy desert by Sudyk. June 28. 1899.
N. 2048. Chiwa, in the desert by Kunja Urgentsh. July 31. 1899.
Area: Southern Russia, middle- and central Asia.

XIII. **Halocnemum** M. Bieb.

27. *H. strobilaceum* (Pall.) M. Bieb. fl. taurico-caucas. III, p. 3; Ldb. fl. ros. III, p. 773; Trautv. Enum. pl. songor. p. 61; Bunge Reliq. Lehm. p. 460; Bunge Enum. p. 423; Bunge in Rgl. et Herd. l. c. p. 402; Buhse l. c. p. 188; Bois. fl. or. IV, p. 936; O. Kuntze. l. c. p. 31; *Salicornia strobilacea* Pall. Iter, I Anh. p. 29, t. E.

N. 216. Near Buchara, in saline desert. May 15. 1898.
N. 1899. By the river Amu Daria between Tshardshui and Chiwa, in sandy desert by Sudyk. June 28. 1899.
Area: Southern Europe, Northern Africa, middle- and central Asia.

XIV. **Salicornia** L.

28. *S. herbacea* L.; Ldb. fl. ros. III, p. 767; Trautv. Enum. pl. songor. p. 60; Bunge reliq. Lehm. p. 282; Bunge Enum. p. 421; Bois. fl. or. IV, p. 933.

N. 228. Near Buchara, in saline desert. May 16. 1898 (seedlings).
N. 1983. Chiwa, by the salt-lake Jugur Kul near Ak-darbant. June 15. 1899.
Area: Europe, Northern Africa, middle- and Central-Asia, Northern-America.

XV. **Suæda** Forsk.

29. *S. linifolia* Pall., Ill. pl. imp. cogn. t. 40. *Schanginia linifolia* C. A. M., Ldb. fl. alt. I, p. 325; Ldb. fl. ros. III, p. 775; Bunge reliq. Lehm. p. 460; Bunge Enum. p. 423; Bunge in Rgl. et Herd. l. c. p. 402; Bois. fl. or. IV, p. 944; O. Fedtschenko l. c. p. 130.

N. 2040. Chiwa, in a grove by Kunja Urgentsh. July 30. 1899.
Area: Southern Russia, Southern Sibiria, Asia-Media.

30. *S. dendroides* (C. A. M.) Moq. Tand. Chenop. monogr. Enum. p. 126; Ldb. fl. ros. III, p. 778; Bunge Enum. p. 426; Bois. fl. or. IV, p. 938; O. Fedtschenko l. c. p. 130; *Schoberia dendroides* C. A. M., Ind. cauc. p. 159.

N. 1914. Chiwa, in sandy desert by Petro-Alexandrowsk. July 1. 1899.
Area: Asia-Media, Armenia.

31. *S. altissima* (L.) Pall. Ill. pl. imp. cogn. t. 42; Ldb. fl. ros. III, p. 781; Bunge reliq. Lehm. p. 462; Trautv. Enum. pl. songor. p. 61; Bunge Enum. p. 427; Bunge in Rgl. et Herd. l. c. p. 402; Buhse l. c. p. 188; Bois fl. or. IV, p. 940; O. Kuntze l. c. p. 232; O. Fedtschenko l. c. p. 130.

N. 2045. Chiwa, in cultivated land by Kunja Urgentsh. July 30. 1899.
Area: Southern Europe, Southern Sibiria, Asia-Media.

32. *S. Olufsenii* n. sp.

Planta annua glabra collo pluricauli. Caulis non vel inferne nec superne ramosus, 5—22 cm. longus ramis paucis longis flexuosis vel recurvatis teretibus roseis non striatis. Folia semiteretia curta (caulis inferiore parte 7 mm. longa 3 mm. lata), basi rotundato-attenuata, inferiora apice obtusa acumine minuta munita, superiora acuta. Florum glomeruli in omnibus axillis, manifeste petiolares 6—12 flori, pedunculo ab ima basi bifido. Flores omnes hermaphroditi, dimorphi aliis majoribus aliis minoribus, sepalis cucullatis sæpe imparibus fructus non totum tegentibus. Antheræ subglobosæ, stigmata 2 filiformia brevia. Ovula semper horizontalia, semina impresso-punctata. — Tab. nostr. II. (magnit. $\frac{1}{1}$).

This species is allied to *S. (Belowia) paradoxa* Bunge, (of which I have seen the original specimen), but the ramification is very different, *S. paradoxa* bearing the branches on the superior part of the stem. Also the leaves and the inflorescense differs from that of *S. paradoxa*, which is a big and erect plant, while *S. Olufsenii* is little and prostrate. I have named this species after Lieutenant O. Olufsen, the head of the expedition.

N. 1230. Pamir, in the Chargush-pass, on the saline shore of a little lake. Alt. 4200^{m}. Sept. 2. 1898.

33. *S. Lipskii* Litwinow, Schedae ad Herb. fl. rossicæ, Trudi Botanit. Museji, Wyp. 1. 1901. N. 736; ? *S. maritima* v. *abunda* Lipski Sapiski Kiewskago Obsch. jestestwopit. 11. 2. 1890 p. 17.

N. 1734. Buchara, in cultivated land. May 29. 1899, in flower.
N. 1805. Ibidem. June 14. 1899, in flower.
Area: Transcaspia, Buchara.

34. *S. setigera* Moq., Ann. sciences nat. sér. 1, 23 p. 309; Ldb. fl. ros. III, p. 783; Bunge Enum. p. 428; Trautv. Enum. pl. Songor. p. 62; Bois. fl. or. IV, p. 942.

N. 1126. Pamir, near the lake Jashil Kul. Alt. 3800m. Aug. 18. 1898.
N. 1151. Pamir, on the saline shore of the lake Bulung Kul. Alt. 3800m. Aug. 18. 1898.
N. 1211. Pamir, on the saline shore of the lake Tuz Kul. Alt. 3800m. Sept. 1. 1898.
N. 1681. Buchara, in saline desert. May 20. 1899.

Nr. 1151, 1211 are very small forms, like the *S. Kareliniana* Fenzl, which in my opinion is only a form of *S. setigera* Moq., as exponed by Bunge (Enum). Litwinow (Schedae ad Herb. fl. rossicæ N. 636) distinguish *S. Kareliniana* from *S. setigera.*

Area: Southern Europe, southern Sibiria, Asia-Media.

35. *S. microsperma* (C. A. M.) Fenzl, Ldb. fl. ros. III, p. 785; Trautv. Enum. pl. Songor. p. 62; Bunge Enum. p. 428; Bois. fl. or. IV, p. 943; Hooker fl. brit. India V, p. 15; *Schoberia microsperma* C. A. M. in Eichwaldt Pl. casp. cauc. p. 14. t. 13. (1831).

N. 2032. Chiwa, on dry plains between Chodsheli and Kunja Urgentsh July 27. 1898.
Area: Middle- and central Asia.

36. ? *S. pterantha* (Kar. Kir.) Ldb. fl. ros. III, p. 791; Bunge Enum. p. 430; *Schoberia pterantha* Kar. et Kir. Enum. alt., Bull. soc. nat. Moscou 1841 p. 734; *Calvelia pterantha* Moq. D. C. Prod. XIII, 2, p. 167; *Suaeda transoxana* Bunge Reliq. Lehm. p. 467; Bois fl. or. IV, p. 943.

Sepals strongly carinate-cucullate, but not alate, the flower seen from above stellate, sepals not oblique as indicated by Kar. et Kir. — Stem and leaves with papulose hairs.

N. 1699. Buchara, on a sandy uncultivated land called „Reksár". May 23. 1899.
Area: Asia-Media.

37. *S. arcuata* Bunge Reliq. Lehm. p. 461; Bunge Enum. p. 430; Bois. fl. or. IV, p. 943; Litwinow Herb. fl. ros. N. 686.

N. 1373. Pamir, prov. Wakhan, by Sunk on slight saline ground. Alt. 3000m. Sept. 13. 1898 (small specimens, 10cm high).
Area: Asia-Media.

XVI. **Arthrophytum** Schrenk.

38. *A. subulifolium* Schrenk; Ldb. fl. ros. III, p. 821; Trautv. Enum. pl. songor. p. 69; Bois. fl. or. IV, p. 948; *Haloxylon subulifolium* Bunge Enum. p. 438; *Anabasis affinis* Bunge Reliq. Lehm. p. 480.

N. 1834. Buchara, in sandy desert near Ustyk. June 19. 1899.
Area: Middle- and central Asia.

XVII. **Horaninowia** Fisch. et Mey.

39. *H. ulicina* F. et M.; Ldb. fl. ros. III, p. 794; Bunge Enum. p. 430; Bois. fl. or. IV, p. 947; O. Kuntze l. c. p. 231; Lipski l. c. p. 18; O. Fedtschenko l. c. p. 131.

N. 1791. In sandy desert near Chiwa. July 13. 1899.
Area: South-western Sibiria, Asia-Media.

var. *longifolia* n. var.

Folia 2 cm. vel ultra longa, planta tota scabridissima, prostrato-erecta.

N. 1749. Transcaspia, in sandy desert by Karaul Kuju. June 2. 1899.

I have not seen this plant in the herbarium of the imperial botanical garden at St. Petersburg. In habitus it does not resemble *H. ulicina*, but I cannot see any principal criterion, by which it could be distingued from this species.

XVIII. **Seidlitzia** Bunge.

40. *S. florida* (M. Bieb.) Bunge, Bois. fl. or. IV, p. 950.

N. 2199. Persia, prov. Gilan, on the mountains by Batshinar. Sept. 18. 1899.
Area: Persia, Armenia.

XIX. **Salsola** L.

41. *S. Kali* L.; Ldb. fl. ros. III, p. 797; Trautv. Enum. pl. songor. p. 65; Bunge Reliq. Lehm. p. 472; Bunge Enum. p. 431; Bunge in Rgl. et Herd. l. c. p. 402; Buhse l. c. p. 189 (v. *angustifolia*); Bois. fl. or. IV, p. 954; Aitchison Afghan Delim. p. 103; Hooker

fl. brit. Ind. V, p. 17; Lipski l. c. p. 17; O. Fedtschenko l. c. p. 131; Hemsley fl. of Tibet p. 196.

N. 1328. Pamir, prov. Wakhan, in the bed of the river Pandsh. Alt. 3000m. Sept. 9. 1898.

N. 1385. Pamir, prov. Wakhan, in flying-sand by Sergín. Alt. 2800m. Sept. 16. 1898.

N. 1901. Buchara, in sandy desert by Chodsha Dawlet. June 10. 1899.

— — var. *Tragus* (M. Bieb.) Bois fl. or. IV, p. 954.

N. 2059. Chiwa, in the desert near Kunja Urgentsh. Aug. 8. 1899.

Area: Europe, Asia, Africa, America.

42. *S. collina* Pall. Ill. pl. imp. cogn. t. 26; Ldb. fl. ros. III, p. 800; Bunge Reliq. Lehm. p 474; Bunge Enum. p. 431; Hooker fl. brit. Ind. V, p. 17; O. Fedtschenko l. c. p. 131; Hemsley fl. of Tibet p. 196.

N. 1382. Pamir, prov. Wakhan, in dry mountains by Sergin. Alt. 2800m. Sept. 16. 1898. (Red coloured specimens).

N. 1426. Pamir, prov. Wakhan, in stony fields by Namatgut. Alt. 2700m. Sept. 27. 1898. (Green specimens).

Area: Southern Russia, Sibiria, middle- and central Asia.

43. *S. sogdiana* Bunge Reliq. Lehm.; Bunge Enum. p. 433; Bois. fl. or. IV, p. 953; Lipski l. c. p. 17. — Tab. nostr. III. (magnit. $\frac{1}{1}$).

The inferior leaves of my specimens are 5—10 cm. long, Bunge indicates $1^1/_2$ inch (c. 4 cm.), but I have seen specimens collected by Bunge in Persia, whose leaves, althought broken far below, are 2 inches long. The diameter of the fruit with wings is 10—12 mm. Bornmüllers No. 4203 (Iter persico-turcicum 1882—93) is not this plant (a Suæda?).

N. 1892. Chiwa, in the desert by Kara Aigir by the river Amu Daria, between Ishak rabat and Chiwa. June 26. 1899.

Area: Asia-Media, Persia.

44. *S. aperta* n. sp.

Annua glauca glabra, caulis a basi ramosus albo-nitidus, folia sparsa inferiora plana crassa oblongo-linearia 3 cm. longa v. longiora (fracta!), superiora florifera oblongo-ovata triangularia, bracteæ his conformiae breviores, folia omnia semiamplexicaulia apice longe spinosa, superiora longius quam inferiora. Flores solitarii in fere

omnibus axillis. Antheræ exappendiculatæ. Calyces inferiores non vel angustissime alati, superiores alati, in his perigonii fructiferi foliorum 3 (vel 4) alata, 2 (1) non vel minime alata, omnia apice reflexa semen horizontale non tegentia. Alæ diametrum 5—7 mm. Stigmata 2 filiformia. — Tab. nostr. III. (magnit. $\frac{1}{1}$).

This species is nearly allied to *S. sogdiana* Bunge, which is a very strict plant, while *S. aperta* is less ose more diffuse. The latter has shorter leaves but longer spines upon the leaves (by *S. sogdiana* „breviter cuspidata sed vix pungentia"), and the sepals form no cover over the fruit, which lies as in the bottom of a bowl (aperta). By *S. sogdiana* the superior parts of the sepals form „discum convexum induratum". This is te be seen upon the foregoing species, but not at all upon this. — To this species belongs No. 349 of Mr. Litwinows Plants from Turcomannia, collected by him by Repetek 24. V. 1898 (with the Name *S. sogdiana* Bge.).

N. 1868. Buchara, in sandy desert by Kis-Kalá by the river Amu Daria between Ishak rabat and Tshardshui. June 23. 1999.

45. *S. crassa* M. Bieb.; Ldb. fl. ros. III, p. 804; Trautv. Enum. pl. songor. p. 66; Bunge Reliq. Lehm. p. 472; Bunge Enum. p. 433; Bois. fl. or. IV, p. 956; Lipski l. c. p. 18.

N. 2021. Chiwa, between Tamarix-shrubs near Chodsheli. July 26. 1899.
Area: Southern Russia, Southern Sibiria, middle- and central Asia.

46. *S. sclerantha* C. A. M. in Eichw. Pl. casp. cauc. p. 25, T. 27; Ldb. fl. ros. III, p. 807; Trautv. Enum. pl. songor. p. 68; Bunge reliq. Lehm. p. 471; Bunge Enum. p. 435; O. Fedtschenko l. c. p. 131; *S. carinata* C. A. M. l. c., Ldb. l. c., Bunge Reliq. Lehm. p. 471; Bois fl. or. IV, p. 955; Lipski l. c. p. 17.

N. 1700. Buchara, on uncultivated land. May 23. 1899.
N. 1793. Buchara, in sandy desert by Chodsha Dawlet. June 10. 1899.
Area: Middle- and Central-Asia.

47. *S. spissa* M. Bieb. Mém. Soc. Imp. Nat. Moscou I. 1806; Ldb. fl. ros. III, p. 808; Trautv. Enum. pl. songor. p. 68; Bunge Reliq. Lehm. p. 472; Bunge Enum. p. 435; Bois. fl. or. IV, p. 459. *Halogeton Olivieri* Moq.; Jaub. Sp. Ill. pl. orient. t. 134.

This annual plant resembles the perennial *S. verrucosa* M. Bieb. so much, that it could be considered as an annual variety of it.

N. 2030. Chiwa, on dry plains between Chodsheli and Kunja Urgentsh. June 27. 1899.
Area: Southern Russia, Southern Siberia, middle- and central Asia.

48. *S. rigida* Pall.; Ldb. fl. ros. III, p. 809; Trautv. Enum. pl. songor. p. 68; Bunge reliq. Lehm. p. 471; Bunge Enum. p. 435; Bunge in Rgl. et Herd. l. c. p. 403; Buhse l. c. p. 189; Bois. fl. or. IV, p. 962; Aitchison Afghan. Delim. p. 103; O. Fedtschenko l. c. p. 131.

N. 1884. By the river Amu Daria between Tshardshui and Chiwa, in desert (of „Löss") by Kara Aigir. June 26. 1899.
N. 2001. Chiwa, on the mountain Sultan Babá. July 24. 1899.
? N. 2003. Ibid (sterile, white-hairy).
N. 2029. Chiwa, on dry plains between Chodsheli and Kunja Urgentsh. July 27. 1899.
N. 2123. Transcaspia, by Babadurmaz near Askabad. Sept. 6. 1899.

— — v. *tenuifolia* Bois. fl. or. IV, p. 963.

N. 2214. Persia, in the mountains near Teheran. Sept. 28. 1899.
Area: South-western Sibiria, middle- and central-Asia, Persia, Afghanistan.

49. *S. verrucosa* M. Bieb.; Mém. Soc. Imp. Nat. Moscou I. 1806; Ldb. fl. ros. III, p. 814; Bunge Enum. p. 436; Buhse l. c. p. 189; Bois. fl. or. IV, p. 961; Hooker fl. brit. Ind. V, p. 18; Litwinow Herb. Fl. ros. N. 436; *S. ericoides* C. A. M. in Eichw. Pl. casp. cauc.; Bunge reliq. Lehm. p. 471.

N. 2024. Chiwa, on dry plains between Chodsheli and Kunja Urgentsh. June 27. 1899.
N. 2057. Chiwa, near Kunja Urgentsh. Aug. 1. 1899.
Area: Southern Russia, Southern Sibiria, Asia-Media.

50. *S. sp.*

This is a perennial white-hairy plant, nearly without leaves, but with many flower-balls and very succulent. The floral leaves are longer than the bracteoles. The flowers are so young, that the plant cannot be determined with safety. Perhaps it is a new

species, who then would be allied to *S. verrucosa*, which plant it is resembling.

N. 2071. Chiwa, in sandy desert near Nukus. Aug. 8. 1899.

51. *S. foetida* Delile; Bois. fl. or. IV, p. 961; Hooker fl. brit. India V, p. 18.

My specimens are without flowers, but this species is so characteristic, that I have almost no doubt in referring them to it, although this species hitherto is not known from Turkestan. Shrub, scarcely 1 m. high.

N. 1861. By the river Amu Daria between Tshardshui and Chiwa, in sandy desert by Kis-Kalá. June 9. 1899.
Area: Arabia, northern India, Belutshistan.

52. *S. arbuscula* Pall. Ill. pl. imp. cogn. t. 17; Ldb. fl. ros. III, p. 816; C. A. M. in Eichw. Pl. casp. cauc. t. 29, 30, 31; Bunge Enum. p. 436; Bunge in Rgl. et Herd. l. c. p. 403; Bois. fl. or. IV, p. 960; Aitchison Afghan Delim. p. 103; O. Kuntze l. c. p. 232; Lipski l. c. p. 18; O. Fedtschenko l. c. p. 131. *S. arborescens* L., Bunge reliq. Lehm. p. 471.

N. 1743. Transcaspia, in sandy desert by Barachané. June 2. 1899.
N. 1905. Chiwa, in desert (of „Löss") by Akjar. June 28. 1899.
N. 1999. Chiwa, on the mountain Sultan Babà. July 24. 1899.
N. 2069. Chiwa, in sandy desert near Nukus. Aug. 8. 1899.
N. 2120. Buchara, in sandy desert by Farab. Sept. 3. 1899.
N. 2122. Transcaspia, in sandy desert by Ravnina. Sept. 5. 1899.

N. 1905, 1999, 2069 are specimens of the small form, figured by C. A. Meyer (l. c.) t. 30, while the others are of the big form with long leaves (v. *angustifolia* Bois. l. c.), figured by Eichwaldt t. 31. Both forms are variable, e. g. with regard to hairs, some being fine setulose and some glabrous.

Area: South-eastern Russia, southern Sibiria, Afghanistan, middle- and central Asia.

53. *S. subaphylla* C. A. M. in Eichw. Pl. casp. cauc. t. 24; Ldb. fl. ros. III, p. 818; Trautv. Enum. pl. songor. p. 69: Bunge Enum. p. 437; Bois. fl. or. IV, p. 259; Aitchison Afghan. Delim.

p. 103; Lipski l. c. p. 18; O. Fedtschenko l. c. p. 131; Litwinow Herb. Fl. ros. No. 584; *Caroxylon subaphyllum* Bunge Reliq. Lehm. p. 470.

N. 1742. Buchara, in sandy desert by Murgak. June 2. 1899.
N. 1837. Buchara, in sandy desert by Ustyk. June 19. 1899.
N. 2065. Chiwa, in desert (of „Löss") by Kunja Urgentsh. Aug. 4. 1899.
N. 2117. Buchara, in sandy desert by Farab. Sept. 9. 1899.
Area: Afghanistan, middle- and central Asia.

XX. **Haloxylon** Bunge.

54. *H. Ammodendron* (C. A. M.) Bunge reliq. Lehm. p. 469; Ldb. fl. ros. III, p. 820; Trautv. Enum. pl. songor. p. 69; Bunge Enum. p. 437; Bunge in Rgl. et Herd. l. c. p. 403; Bois. fl. or. IV, p. 948; Aitchison Afghan Delim. p. 102; O. Kuntze l. c. p. 231; O. Fedtschenko l. c. p. 131. *Anabasis Ammodendron* C. A. Meyer, Ldb. fl. alt. I, p. 375; Ldb. Ic. pl. fl. ros. t. 47.

N. 61 A. Transcaspia, in sandy desert by Repetek. April 25. 1898.
N. 1752. Ibid. June 2. 1899.
N. 1862. By the river Amu Daria, between Tshardshui and Chiwa, in sandy desert by Kis Kalá. June 23. 1899.
Area: Southern Sibiria, Afghanistan, middle- and central Asia.

XXI. **Noaea** Moq. (determ. O. Hoffmann).

55. *N. spinosissima* (L. fil.) Moq. in D. C. Prodr. XIII, 2 p. 209; Bunge Anabas. Revis., Mém. Ac. Imp. Sc., St. Pétersb. 1862, p. 23; Bunge Enum. p. 440; Bois. fl. or. IV, p. 965; Aitchison Afghan Delim. p. 103; Lipski l. c. p. 18; Litwinow Herb. Fl. ros. Nr. 389; *Anabasis spinosissima* L., *Halogeton spinosissima* C. A. M. Ind. cauc. p. 159; Ldb. fl. ros. III, p. 831; Buhse l. c. p. 190; *Salsola spinifex* Pall.

N. 2215. Persia, in dry mountains near Teheran. Sept. 28. 1899.
Area: Greek, peninsula, western Asia, Caucasus, Persia, Transcaspia.

XXII. **Anabasis** L.

56. *A. wakhanica* n. sp.

Fruticulosa glabra pluricaulis, caules 15—22 cm. longi, erecti, sæpe ramosi, basi lignescentes perennantes cinerei, parte superiore cylindrici pallide virides, ad bases articulorum albo-villosi. Articuli $1^1/_2$—2 cm. longi, folia opposita 3—4 mm. longa, in cupulam

connata, obtusa vel acutiuscula, triangulari-semiteretia, in sicco convoluta. Flores in apice omnium ramulorum in axillis solitarii, oppositi, interrupte spicati. Bracteolæ latæ, margine membranaceæ, ovato-suborbiculares, concavae. Calyx ad basin usque quinquepartitus. Sepala margine membranacea integra, in fructu omnia alata. Filamenta cum staminodiis rotundatis margine ciliolatis in cupulam coalita, his angustiora. Ovarium ovato-subglobosum, stylus brevissimus, stigma capitato-triloba. Perigonii fructiferi alarum tres majores, duo minores, omnes striatæ flabelliformes margine undulatæ, horizontaliter patentes. Sepalorum partes superiori fructum tegentes.

This species in habitus resembles *A. phyllophora* Kar. Kir., from which it is distinguished by 5, not 3 wings, which are not erect and are thinner and less scariose than the wings of *A. phyllophora*.

N. 1354. Pamir, prov. Wakhan, in dry mountains by Langarkisht, frequent. Alt. 3000m. Sept. 10. 1898.

57. ***A. salsa*** (C. A. M.) Benth. et Hook gen. Pl. III p. 73; *Brachylepis salsa* C. A. M. in Ldb. fl. alt. I, p. 372; Ldb. Ic. fl. ros. t. 48; Ldb. fl. ros. III, p. 827; Bunge Reliq. Lehm. p. 481; Bunge Anabas. Revis. p. 48; Bunge Enum. p. 443; Bois. fl. or. IV, p. 971.

N. 1908. By the river Amu Daria between Tshardshui and Chiwa, in desert by Pitnjak. June 28. 1899.

N. 2028. Chiwa, on dry plains between Chodsheli and Kunja Urgentsh. July 27. 1899.

58. ***A. eriopoda*** (C. A. M.) Benth. et Hook l. c.; Aitchison Afghan. Delim. p. 104; *Brachylepis eriopoda* C. A. M.; Ldb. fl. ros. III, p. 827; Bunge reliq. Lehm. p. 841; Bunge Anabas. revis. p. 49; Bunge Enum. p. 443; Bois. fl. or. IV, p. 971.

N. 2082. By the river Amu Daria between Tshardshui and Chiwa, in stony desert by Giaur Kalá. Aug. 11. 1899.

Area: Afghanistan, middle- and central Asia.

XXIII. **Halocharis** Moq.

59. ***H. hispida*** (C. A. M.) Bunge Anabas. revis. p. 62; Bunge Enum. p. 446; Bois. fl. or. IV, p. 974; O. Fedtschenko l. c. p. 132;

Halimocnemis hispida C. A. M.; Ldb. fl. ros. III, p. 844; Bunge Reliq. Lehm. p. 476; Litwinow Herb. Fl. ros. N. 336.

N. 264. Buchara, in saline steppe by Kerki. May 5. 1898.
N. 1707. Buchara, in cultivated land by Chok-i Mullamir. May 25. 1899.
Area: Middle- and central Asia.

XXIV. **Halimocnemis** C. A. M.

60. *H. villosa* Kar. Kir.; Ldb. fl. ros. III, p. 847; Trautv. Enum. pl. songor. p. 73; Bunge reliq. Lehm. p. 474; Bunge Enum. p. 446; Bunge Anabas. revis. p. 69; Bois. fl. or. IV, p. 977; Lipski l. c. p. 18.

N. 1879. By the river Amu Daria between Tshardshui and Chiwa, in sandy desert by Kis Kalá. June 23. 1899.
N. 1883. ibid., in desert by Kara Aigir. June 26. 1899.
Area: Middle- and central Asia.

61. *H. macranthera* Bunge Reliq. Lehm. p. 475; Bunge Enum. p. 447; Bunge Anabas. Revis. p. 70; Bois. fl. or. IV, p. 977.

N. 1866. By the river Amu Daria between Tshardshui and Chiwa, in sandy desert by Kara Aigir. June 23. 1899.
Area: Asia Media.

62. *H. Karelini* Moq. in D. C. Prodr. XIII, 2 p. 196; Ldb. fl. ros. III, p. 846; Trautv. Enum. pl. songor. p. 73; Bunge Reliq. Lehm. p. 476; Bunge Enum. p. 446; Bunge Anabas. Revis. p. 67; Bois fl. or. IV, p. 976; Lipski l. c. p. 18.

var. *canescens* n. var.

Planta tota breviter pubescenti-canescens.

In all other characters this plant agrees with *H. Karelini*, of which I have seen the specimen of Lehmann, determined by Bunge.
N. 2031. Chiwa, on dry plains between Chodsheli and Kunja Urgentsh.

XXV. **Halanthium** C. Koch.

63. *Halanthium* Lipskii n. sp.

Annua glauca breviter sed dense pubescens. Caulis erectus (?) alternatim ramosus, rami arcuato-adscendentes. Folia 1—1,5 cm.

longa semiteretia superne canaliculata basi lata apice obtussisima, omnia florigera, superne sensim breviora. Flores in omnibus axillis solitarii, bracteolæ inferioræ foliiformes semiteretes superne canaliculatæ foliis floralibus breviores, superioræ squamiformes foliis floralibus sæpissime longiores. Sepala 5 acuta in fructu fere omnino libera membranacea, 2 exteriora dorso pubescentia aligera parte inferiore sexnervia, tertium alam parvam gerens parte inferiore trinerve, 2 interiora alam non gerentia vel auriculam minimam gerentia parte inferiore uninervia. Filamenta linearia, antheræ 1,5 mm. longæ lineares basi leviter sagittatæ ad trientem partem fissæ, flavæ. Appendicula sessilis pæne 1 mm. longa ovato-oblonga. Ovarium anguste ovatum superne attenuatum, sub anthesi cum stigmatibus elongatis subulatis 4 mm. longum, stylus subnullus.

I have named this plant after Mr. W. Lipski in St. Petersburg, an authority in the flora of Turkestan. *H. mamanense* Bunge, to which it seems to be most allied, I have not seen.

N. 2066. Chiwa, in desert (of „Löss") by Kunja Urgentsh. Aug. 4. 1899.

64. ***Halanthium gamocarpum*** (Moq.) Benth. et Hook. gen. pl. III, p. 75; *Halimocnemis gamocarpa* Moq. in Belang fl. pers.; Moq. Chenopod. Monogr. Enum. p. 155; *Halocharis gamocarpus* Moq. in D. C. Prodr. XIII, 2 p. 201; *Gamanthus gamocarpus* Bunge Anabas. revis. p. 77; Bois fl. or. IV, p. 980; Lipski l. c. p. 18.

N. 1885. By the river Amu Daria between Tshardshui and Chiwa, in desert by Kara Aigir. June 26. 1899.

Area: Persia, Afghanistan, Asia-media.

XXVI. **Cornulaca** Del.

65. *C. Korshinskyi* Litwinow, Schedae ad Herb. fl. ros. l. c. Nr. 889.

N. 1842. Buchara, in desert by Ustyk. June 19. 1899.

Area: Buchara.

XXVII. **Halogeton** C. A. M.

66. *H. glomeratus* (M. Bieb.) C. A. M., Fl. Alt. I, p. 378; Ldb. Ic. pl. fl. ros. t. 40; Ldb. fl. ros. III, p. 832; Bunge Reliq. Lehm.

p. 477; Bunge Anabas. revis. p. 95; Bunge Enum. p. 451; Bois. fl. or. IV, p. 985; Hooker fl. brit. Ind. V, p. 20; Hemsley fl. of Tibet p. 196.

N. 765. Pamir, near the river Kara-Su. Alt. 3900m. July 12. 1898.
N. 1198. Pamir, on the shore of the salt-lake Tuz Kul. Alt. 3800m. Aug. 31. 1898.
Area: South-western Sibiria, middle- and central Asia.

XXVIII. **Sympegma** Bunge.

67. *S. Regeli* Bunge, Mél. biol. Bull. Acad. St. Pétersb. X, p. 306; Bunge Enum. p. 450.

N. 719. Pamir, on dry plains by the river Murghab. Alt. 3800m. July 9. 1898.
Area: Asia-Media.

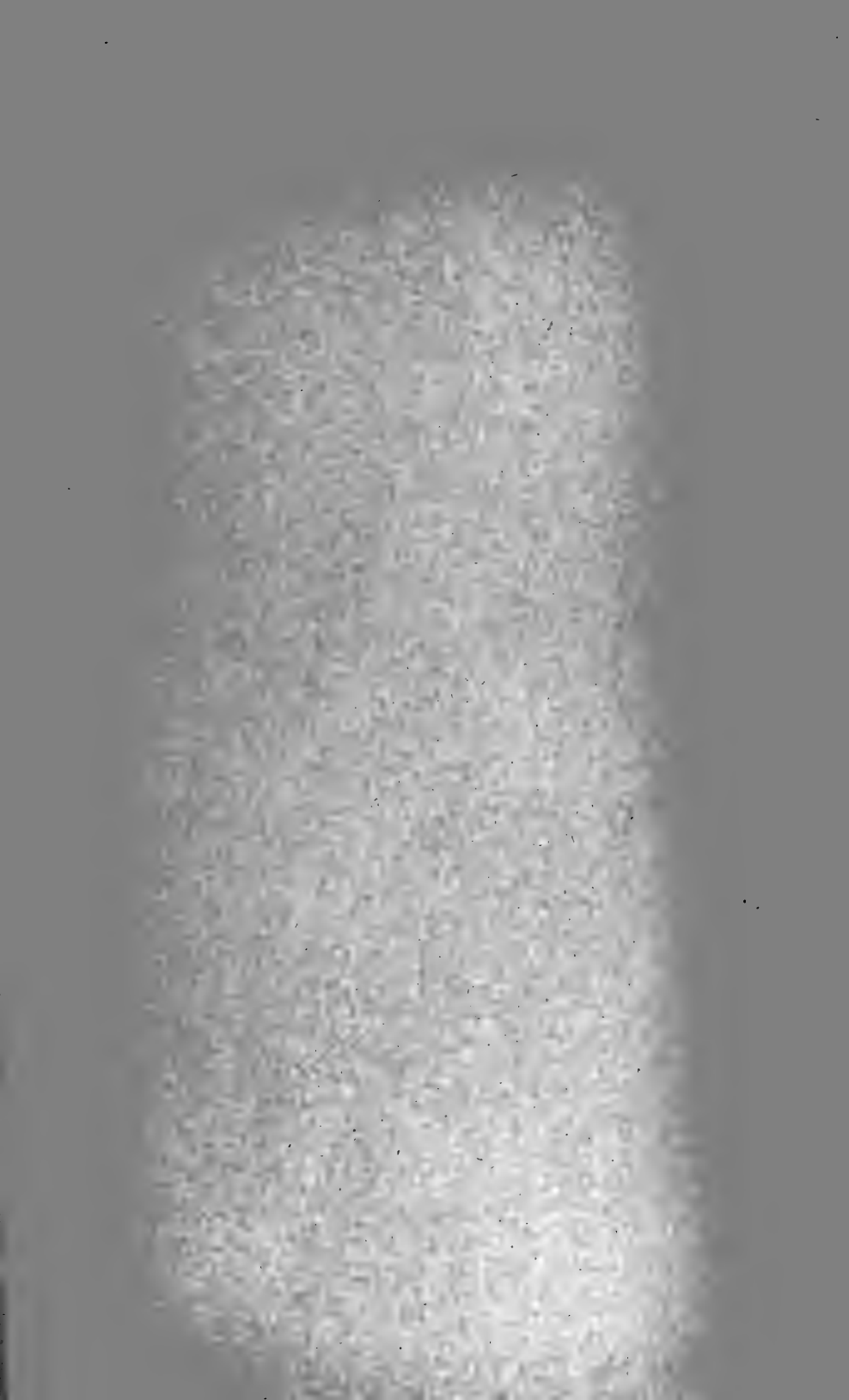
As to the nomenclature of the „Areas", Turkestan is the same as Asia-Media (middle Asia), western Asia is Asia Minor and surrounding countries (Syria, Armenia etc.), and Central Asia is the countries east of Pamir (Tibet, Songaria etc.).

15—4—1903.

Bianco Lunos Bogtrykkeri.

Suaeda Olufsenii n. sp.

Salsola sogdiana Bunge. *Salsola aperta* n. sp.



(Særtryk af Vidensk. Meddel. fra den naturh. Foren. i Kbhvn. 1903.)

Arbejder fra den Botaniske Have i København. Nr. 13.

Pentaphragma ellipticum sp. nov.

Et Bidrag til Kundskab om Slægten *Pentaphragma* Wall.

(Med Tabb. IV og V.)

Af

V. A. Poulsen.

(Meddelt i Mødet d. 26de Marts 1903.)

I 1814 beskrev Roxburgh [1]) en mærkelig Plante under Navn af *Phyteuma begonifolium* og henførte den saaledes til Campanulaceernes Familie. Den var funden paa Pulo Pinang, hvor den senere oftere er genfunden, og til hvis ejendommeligste Planter den hører. I 1824 [2]) offentliggjorde Jack (gennem Wallich) en udførligere Beskrivelse af den under samme Navn, hvilket gentoges [3]) 1832 uagtet den allerede i 1828 [4]) af Wallich med Rette var gjort til Type for en egen Slægt: *Pentaphragma*, som endnu idag er opretholdt [5]), ligesom man ogsaa stadig henfører den til den ovennævnte Familie, hvoraf flere Forfattere [6]) dog regner den for en anomal Form.

[1]) Hort. Bengal., 85.
[2]) Flora Indica, ed. Carey a. Wallich, Vol. II, pag. 108.
[3]) Flora Indica, ed. Carey (reprinted), vol. I, p. 505.
[4]) Catalogus, Herb. Ind. n. 1313.
[5]) Cfr.: Baillon, Hist. des pl., vol. VIII, pagg. 323 og 358.
Bentham & Hooker: Genera plantarum, II, pag. 558.
Engler & Prantl: Nat. Pflanzenfam., IV, Abth. 5, p. 60.
Miquel: Flora Ind. Bat., II; p. 568.
Boerlage: Handleiding tot de Kennis der Flora van Nederlandsch Indië, II, p. 1, pag. 257.
[6]) F. Ex.: Lindley: Vegetable Kingdom, 1846, pag. 691.
Cfr.: De Candolle: Prodromus; Vol. VII, p. 495.

I Tidens Løb ere nu enkelte andre Arter af denne Slægt fundne, alle i det sydlige Asien, det indiske Ørige og paa Ny-Guinea, enkelte dog kun en enkelt Gang; man kender i alt fem, nemlig, foruden den ovenfor omtalte *P. begonifolium*, *P. macrophyllum* Oliver [1]), *P. grandiflorum* Kurz [2]), *aurantiacum* Stapf [3]) og *P. albiflorum* Pearson [4]). Hver af de opstillede Arter synes at være let kendelig, og flere af dem ere ret anselige Planter. Beskrivelserne ere efter al Sandsynlighed affattede efter Herbariemateriale; kun den længst kendte *P. begonifolium* er utvivlsomt allerede af Roxburgh, men siden hen ogsaa af Jack beskreven efter levende Materiale [5]).

Ved Johore paa Malakka har Hr. Marius Jensen i 1901 fundet et blomstrende Exemplar af en til Slægten *Pentaphragma* hørende Art [6]); det er bragt til botanisk Museum opbevaret efter Schweinfurths Methode, ligesom ogsaa afplukkede Blomsterstande af samme Art, fundne paa Bukit Tima paa Øen Singapore og opbevarede i Spiritus, ere afleverede til Museet. Ved dettes Velvilje har jeg kunnet undersøge dette sjældne Materiale og bl. a. kunnet foretage Studier over Plantens anatomiske Forhold, der hidtil have været ganske ukendte, saa vel som over Blomstens Bygning, ved hvilken jeg har fundet flere Ejendommeligheder, som jeg skal tillade mig at skildre i det følgende.

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[1]) Journal of Linn. soc., XV, 1875; pag. 29.

[2]) Flora, 1872; p. 136.

[3]) Transactions of Linn. soc. of London. Ser. II, vol. IV, 1894; pars 2.

[4]) Hookers Icones Plantarum, IV ser., Vol. VIII, plate 2706.

[5]) I Baillons Beskrivelse, men ikke i hans Figur, er der indløben en temmelig utorklarlig Fejl: han siger om Støvdragerne (hos P. begonifol.), at de „ont des anthères collées en tube par leur bords"; det er aldeles urigtigt og er heller ikke tegnet saaledes [cfr. hans Figg. 153 og 154, l. c.]. Hos De Candolle (Prodr., l. c.) staar ogsaa udtrykkelig „stamina libera".

[6]) Samme Art tilhører det i Berlinerherbariet værende, som *P. begonifolium* bestemte, paa Bukit Tima paa Singapore fundne Exemplar, som jeg har haft til Revision [samlet af Mayer i Oktober 1895 og uddelt under Nr. 233 i „Plantae ex India extra Gangem].

Den mig foreliggende Art er ny for Videnskaben; jeg har kaldt den

Pentaphragma ellipticum;

dens Diagnose kan gives, som følger:

Caulis erectus, teres, glaberrimus; folia petiolo ad 1 poll. longo glabro canaliculato suffulta, late elliptica, basi haud inaequalia, crenato-serrulata, glaberrima, carnosula, 6—7 poll. longa, 3—3$^1/_2$ poll. lata, venis venulisque subtus prominulis. Cymae axillares densiflorae, cernuae, breviter pedunculatae; bracteae flores numerosos sessiles congestos arcte involucrantes, late ovatae, 4—6 lin. longae, glabrae. Flores aurantiaci sessiles: calycis lobi erecti glabrati late rotundati, versus apicem scabriusculi, 1$^1/_2$ lin. longi, 1 lin. lati; corolla persistens, parva, tubo perbrevi, petalis late obovatis, carnosulis, apice valde recurvatis. Stamina parva inclusa, saepe sine antheris. Stigma magnum capitatum indivisum sine pilis collectoribus; Ovarium inferum ob florum congestorum positionem coarctatam acute pentagonum, biloculare, foveis paritetalibus nectariiferis 5 instructum.

Fructus carnosus; semina perparva numerosa ellipsoidea; testa brunnea reticulato-foveolata; embryo (indivisus?) medio in albumine oleoso perparvus.

Planta bipedalis silvarum humidarum incola Malaccae prope Johore et insulae Singapore (Bukit Tima) (M. Jensen leg. 1901). Floret mense Aug. — Novemb. (Tab. IV, fig. 1: tota planta; fig. 2: flos superne visus foveas quinque nectariferas ovarii exhibens.)

I Blomstens Bygning er det særlig Frugtknudens Beskaffenhed og dens Udvikling til Bær, som har tildraget sig min Opmærksomhed. Paa Grund af Blomsternes sammentrængte Stilling paa Oversiden af den skorpioide Svikkels Axe ere de saa godt som siddende Frugtknuder skarpt femkantede. Befrugtningen slaar ofte fejl; det er særlig de ældste Blomster, som faa Lejlighed til at udvikle Frugt, og denne bliver, saaledes som Baillon rigtig angiver, et Bær

og ikke, som det siges af ældre Botanikere (Roxburgh, Jack), en Kapsel. I mange Blomster, særlig i de yngre, ere Støvdragerne uden veludviklede Knapper. Bægerbladene ere smaa, glatte, i Spidsen paa Indersiden lidt papilløse og indbyrdes aldeles fri; efter Blomstringen voxe de ikke til, saaledes som hos *P. aurantiacum*, men visne heller ikke bort. Kronbladene ere smaa, orangerøde, meget tykke og solide, tilbagerullede, næsten aldeles frie; Kronrøret er meget kort; efter Blomstringen bliver Kronen vel siddende, men den voxer ikke til og bliver grön, saaledes som hos *P. begonifolium* efter Jacks Angivelser.

Et Tværsnit af Frugtknuden (Tab. V, Fig. 1) viser os en tilsynladende höjst mærkelig Bygning: udenom de to Rum, der indeholde Æggene, ses fem andre, adskilte ved fem Længdevægge eller Septa. Har Snittet truffet Frugtknuden paa Midten eller ovenover Midten, synes disse Rum (*h*) tomme; dybere liggende Tværsnit vise os imidlertid, at de enten alle fem eller et ringere Antal ere udstyrede med honningafsondrende Kirtler (*n*); de indeholde altsaa florale Nektarier, Væggen omkring de to Frugtknuderum er noget tyndere end den ydre, der begrænser de fem Honninggruber; den indeholder ingen Karstrænge; derimod findes der femten temmelig svage saadanne i den ydre Væg, nemlig een ud for Midten af hver Nektargrube (den løber ud i Kronbladet) og to, en ydre og en indre (der sjeldnere og da som oftest kun strækningsvis kunne være forenede), lige ud for hvert Septum (den ydre gaar til Bægerbladet, den indre op i Støvtraaden). Fra en svag, central Karstræng i Frugtknudeskillevæggens Midte udgaa svage Grene, der ophøre i Placenterne; i Æggene findes ingen Ledningsstrænge. Gruberne kunne altsaa ikke siges at være anbragte mellem „Underbægeret" og Frugtbladene; de ere Fordybninger i Frugtknudevæggen. Et Længdesnit vil vise, at de fem Hulheder udmunde foroven gennem en relativ vid Munding imellem Støvdragernes Tilhæftningssteder (Tab. IV, Fig. 2).

En saadan Bygning af Frugtknudevæggen omtales aldeles ikke i nogen af de nyere og noget ældre Beskrivelser af de hidtil kendte

Pentaphragma-Arter. Paa Baillons[1]) Figur af Længdesnittet af Blomsten af *P. begonifolium* findes heller ikke den mindste Antydning af dette interessante og, saa vidt mig bekendt, enestaaende Strukturforhold. Derimod er det aabenbart iagttaget i en af de allerældste Beskrivelser af denne Arts Blomster; Roxburgh[2]) siger nemlig: „Calyx one lobed; tube gibbous, and growing to the lower half of the germ"; paa Længdesnit af Blomsten er det aabenbart forekommet ham, at „Underbægeret"s øverste Halvdel ikke har været sammenvoxet med Frugtknuden; i sin Diagnose af Slægten (han henregner Planten til *Phyteuma*) siger han ogsaa „Calyx semisuperus". Jack[3]) beskriver Arten mere udførlig og i flere Henseender bedre; han siger bl. a.: „Ovarium surrounded by the calyx and connected with it by five longitudinal septa or processes from which the stamens spring", og „the septa which unite the calyx and ovary appear continuous with the filaments of the stamens". Omendskönt jeg ikke har kunnet finde Wallich's originale Diagnose af den Slægt *Pentaphragma* (i den autograferede „List", hvori Navnet første Gang nævnes, er det et nomen nudum), er det dog temmelig rimeligt, at det er denne mærkelige Bygning af Frugtknudevæggen, som har dikteret ham Navnet[4]). Mærkeligt er det, at de fem Nektarialgruber ikke senere ere omtalte[5]); hvorvidt de nu hos *P. begonifolium* ikke strække sig længere end halvvejs ned i Frugtknudevæggen, skal jeg lade være usagt; Udtrykket „semisuperior" kunde jo tyde derpaa; hos *P. ellipticum* strække de sig helt ned til Bunden. Jeg har oftere iagttaget Artens ejendommelige, trekantede Pollenkorn i dem, nogle Gange endog spirende,

[1]) Hist. des pl.

[2]) Flora Indica, 1832; vol. I, pag. 505—06.

[3]) Malayan Misc., in Hooker: Botan. Misc., vol. I, pag. 277.

[4]) Ogsaa i Slægtsdiagnosen i Endlichers Genera pl. (1836—40, pag. 509) er der hentydet til Nektargruberne: „Calyx tubo ovato, basi cum ovario connato, superne libero, processubus quinque septiformibus ovario adhærente".

[5]) Cfr. Miquel, Fl. ind. bat., II, p. 568. Her siges om Støvfanget, at det er forsynet med „pili collectores"; hos min Art findes saadanne ikke.

ligesom Svampehyfer ogsaa kunne findes sammesteds; dette synes mig at tyde paa, at Gruberne have været fyldte med (sukkerholdig) Vædske. Selve Nektariet (der ikke er angivet hos *P. begonifolium*) sidder med meget bred Basis udenpaa den egentlige Frugtknude ligesom en lille, gullig Pude; dets tyndvæggede Parenkymvæv indeholder et stærkt grenet Karstrængsystem og er overtrukket af en svagt kutikulariseret, secernerende Epidermis uden Spalteaabninger.

Hos *P. ellipticum* er Frugtknuden to-rummet, i de yngste Blomster ofte kun en-rummet; for saa vidt som Frugtknuderummenes Antal er optaget i Slægtsdiagnosen (hvilket er Tilfældet hos Miquel, Bentham & Hooker), bör denne ændres i Overensstemmelse hermed. Fra Midten af Skillevæggen udgaar i hvert Rum en paa Tværsnit ankerformet el. tvegrenet Placenta, som er besat med meget smaa, halvgennemsigtige, omvendte Æg med eet Integument og temmelig lang Funiculus (Tab. V, Fig. 2).

Integumentets inderste Cellelag er udviklet som et plasmafyldt Epithel omkring Kimsækkens nedre Halvdel (*ep*); dets yderste Cellelag er meget storcellet, tyndvægget og gennemsigtig klart; imellem disse tvende Cellelag findes endnu et bestaaende af relativt smaa Celler (se ogsaa Tværsnittet, Tab. V, Fig. 3).

Disse Æg, som ved Behandling med Klornatron blive smukt gennemsigtige, naturligvis paa Bekostning af deres protoplasmatiske Indhold, frembyde en temmelig enestaaende Ejendommelighed, idet den paa Midten noget indsnævrede Kimsæk rager langt ud af Mikropyle ligesom hos *Torenia* og visse *Utricularier*, et Forhold, som hidtil ikke har været kendt hos nogen Campanulacé.

Forøvrigt fremviser Kimsækken den yderligere Ejendommelighed, at dens af ovennævnte Epithel omsluttede Halvdel er kutikulariseret, hvilket let paavises med Klorzinkjod, Hæmateïn-Vesuvin el. Svovlsyre.

Paa den meget tykke og temmelig korte Griffel, der gennemløbes af fem svage Karstrænge, sidder der et hovedformet Ar, som i Modsætning til Arret hos *P. begonifolium* og *albiflorum* er ganske

udelt. Det „indusium", som tilskrives *P. begon.* først hos De Candolle[1]), senere hos Endlicher, og som vel har været Aarsag til, at han anbragte Planten i Goodeniaceernes Familie, findes aldeles ikke, og det er gaadefuldt, hvad der kan have foranlediget Antagelsen af denne Dannelse. De for Campanulaceerne saa ejendommelige „Samlerhaar" paa Griffelen el. Griffelgrenene, og som udtrykkelig angives i Slægtsdiagnosen af Miquel, findes heller ikke.

Efter Befrugtningen, som langt fra fuldbyrdes i alle Æggene, begynder der en ejendommelig Udvikling, som samtidig med at føre til Dannelsen af et Frugtkød tilintetgör de ubefrugtede Æg. Idet Frugtknuden voxer til og derved mere afrundes, udpose dens indre, lavt tavleformede Epidermisceller sig til mægtige, eencellede, saftfyldte Haar (Tab. V, fig. 4); paa Grund af Placentas ejendommelige Form bliver den ligesom fra alle Sider presset af disse, der trænge sig paa alle Maader imellem hverandre som et storcellet Plektenkym saa tæt, at de dels antage de besynderligste, forvredne Former, dels ikke efterlade noget nævneværdigt Intercellularrum. Selve Placentarvævet har Turgescens nok til at modstaa Trykket; det bidrager sin Del til Frugtkødet. Men alle de ikke befrugtede Æg presses lidt efter lidt sammen indtil komplet Ukendelighed; de befrugtede Æg derimod uddanne deres Epidermis til en meget haard Frøskal og modstaa derved Pulpacellernes Tryk; Funiculus komprimeres komplet og bliver ukendelig, saa at de modne, temmelig smaa, men relativt storcellede, ellipsoidiske Frø (Tab. V, Fig. 5) ligge ganske indstøbte i den meget storcellede Pulpa. Det fortjener at bemærkes, at Cellevæggene i denne farves blaa af (frisk tilberedt) Jodjodkaliumopløsning (naturligvis ogsaa af Klorzinkjod), et Fænomen, som vel ikke er ukendt hos de höjere Planters Cellulosemembraner[2]),

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[1]) Cfr. Monographie des Campanul., 1830, pag. 95 („videtur Scaevolis affinis propter stigma indusiatum", men der tilföjes saare rigtig: „Habitu toto coelo a genere Phyteuma differt").

[2]) Cfr. Hofmeister: Die Pflanzenzelle, pag. 253 f.
Poulsen: Mikrokemi, II. Udg., 1891, pag. 3.

men dog neppe meget almindeligt. De farves intensivt røde af Rutheniumoxyklorür ligesom for øvrigt alle Frugtknudens Parenkymceller, men ved Udvadskning fastholde de Farven med större Sejhed end disse; dette kunde tyde paa Pektinstoffer.

Under Udviklingen af dette ejendommelige Frugtkød har Frugtknuden naturligvis udvidet sig betydelig; herved sammenpresses de fem Nektargruber til ganske smalle Spalter, og Nektarierne komprimeres stærkt, efter at de forlængst ere traadte ud af Funktion.

Frøskallens Celler ere store; Ydervæggene ere meget tynde og indbulede (Frøene ere paa Overfladen grubede), men Side- og Indervæggene ere enormt fortykkede med særdeles talrige, ugrenede Porer i den brune, svagt forvedede Vægsubstans. Frøhvidens Celler ere meget store, tyndvæggede, men meget faa; Oplagsnæringen er fed Olie og Proteïnkorn. Kimen (Tab. V, Fig. 6) var i de ældste, og mest udviklede af mig undersøgte Frø (hvis Skal allerede var brun og haard, omend Bærret langt fra syntes helt udviklet) et kugleformet Legeme, kun dannet af meget faa Celler. Om den udvikler sig til en sædvanlig Kim, eller den, hvad jeg har Grund til at tro, kun bliver et „embryo indivisus", maa jeg her lade være usagt; i sidstnævnte Tilfælde vilde denne Slægt afvige ganske betydelig fra Campanulaceernes sædvanlige Familiekarakter.

Hvad vor Plantes vegetative Deles anatomiske Forhold angaar, lover en Undersøgelse heraf jo for saa vidt noget, som Slægten er ganske ukendt i denne Henseende. Særlig mærkelige Forhold findes imidlertid ikke; som et almindeligt Træk gælder, at Planten er saare storcellet.

De af mig undersøgte Rødder vare i primær Tilstand særdeles tynde. Sekundærvæxten begynder meget tidlig og frembringer et axilt Vedlegeme, i hvilket de oprindelige Hadromstraaler ere vanskelige at skelne. Umiddelbart indenfor den hurtig sammenfaldende Epidermis findes en meget tydelig Exodermis med forkorkede, bølgede Radialvægge. Efter en af store, klare Celler med smaa Intercellularer sammensat Primærbark, der indadtil afsluttes af en

af ulige store Celler dannet Endodermis med casparyske Pletter paa den inderste Del af Radialvæggene, træffes Centralcylinderen, hvis pentarke Hadroms Straaler støde sammen i Rodens Axe; Leptomstrængenes og den temmelig smaacellede Pericykels Forhold frembyde lige saa lidt som den øvrige Rodbygning noget som helst omtaleværdigt.

Stængelen, som er trind og glat, har i sin nedre Del en Tykkelse af $1^1/_2$ à 2 Ctm. Epidermiscellerne ere paa Tværsnit lave; Ydervæggene ere kun svagt fortykkede og overtrukne af en gullig Kutikula. Den meget storcellede og saftrige Bark er sammensat af noget langstrakte, klorofylholdige Celler, som yderst danne et svagt kollenkymatisk fortykket Væv uden Intercellularer, medens saadanne derimod optræde længere inde; der findes ingen særegne Elementer i den, hverken Sejbast, Stenceller el. a., og navnlig forekommer der ingen Mælkekar, ligesom der heller ikke i mit Materiale var udskilt Inulinsfæriter.

Indad mod Centralcylinderen afsluttes Barken af en meget tydelig, tyndvægget Endodermis (Tab. V, Fig. 9, *ed*), hvis Radialvægge for störste Delen ere dannede af Cellulose, men som besidde „casparyske" Pletter, hvilket især træder tydeligere frem paa Tværsnittene ved disses Behandling med Svovlsyre. Den casparyske Plet, som paa meget tynde Tværsnit, der farves med Hæmateïn-Vesuvin, træder saare skarpt frem især ved stærke Forstörrelser, befinder sig paa den inderste Del af Radialvæggen og har kun en meget ringe radial Udstrækning.

Centralcylinderens Karstrænge ere ikke indbyrdes adskilte, men Ledningsvævet danner paa Tværsnit (Tab. V, Fig. 9, *l* og *k*) en sammenhængende ret spinkel Ring, i hvis Hadromparti Karrene danne talrige, temmelig korte Radialrækker, adskilte ved storcellede Parenkymstraaler paa een à to Cellers Bredde, medens Leptomet er uddannet som talrige, i Reglen til Karstraalerne svarende, smaa Grupper af Sirør med smaa, men meget tydelige Annexceller. Begge Ledningsvæv adskilles af et svagt Kambium. Sejbast er ikke udviklet, lige saa lidt som et intrahadromatisk Leptom, hvilket som

bekendt findes hos flere Campanulaceer[1]); Mælkekar forekomme heller ikke.

En stor og meget storcellet, ensartet Marv med store, tydelige, paa Tværsnit trekantede Cellerum indtager Stængelens Axe.

Bladet viser sig paa Tværsnit (Tab. V, Fig. 7) tydelig dorsiventralt; i Overensstemmelse med Plantens Voxested er der ikke udviklet egentlige Palissader, men det under Oversidens meget storcellede, udadtil kun svagt fortykkede Epidermisceller liggende Assimilationsvæv (*pa*) bestaar af et Lag temmelig tæt klorofylfyldte, noget flade, med indbugtede Sidevægge forsynede Celler, hvis Ydervægge ofte ligeledes have lave Indbugtninger (svag Armpalissadedannelse) og som nedadtil støde op til et af meget store, særlig i Retning af Bladpladens Flade strakte Celler dannet Lag af Samleceller (*s*) med store Intercellulærrum; herunder findes det egentlige Luftvæv, bestaaende af store, tangentialstrakte, mindre klorofylholdige Armparenkymceller, imellem hvilke Karstrængene, om hvis Bygning intet nævneværdigt er at anføre, forløbe; de finere Nerver ere omgivne af tydelige Parenkymskeder. Kun Undersidens Epidermis bærer Spalteaabninger. Disse ere i Reglen omgivne af tre, lidt mindre Epidermisceller (Tab. V, Fig. 8), sjældnere af fire; i sidstnævnte Tilfælde er Cellearrangementet som hos *Tradescantia*, i førstnævnte som hos flere Saxifragaceer; det forekommer mig dog, at man ikke hos *Pentaphragma* kan tale om egentlige Biceller. Paa Bladtværsnittet ses Lukkecellerne at ligge i Undersidens Niveau; har Snittet truffet Midten af Spalten, vise de sig udstyrede med en ydre, fremspringende, kutikulariseret Liste, saaledes som vi pleje at se hos alle Spalteaabninger, der som den foreliggende Arts ere udstyrede med „Forgaard". En tilsvarende, indre Liste findes her imidlertid ikke; paa Tværsnittet ere Lukkecellerne aldeles afrundede indad imod den store og tydelige Aandehule.

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[1]) Ikke mindst hos *Phyteuma*, af hvilken Slægt den her beskrevne jo oprindelig var en Art. Cfr. O. G. Petersen: Bikollaterale Karbundter, 1882; p. 48 ff.
Solereder: Syst. Anat. d. Dikot., 1899, p. 535.

De i Bladranden anbragte Tænder er det eneste Sted, hvorpaa Bladoversiden er udstyret med Spalteaabninger; disse ere her meget aabne, Aandehulen under dem meget lille eller slet ikke udviklet, og Bladkødet, i hvilket der her findes en væsentlig af Skruekar dannet Nerveende, er sammensat af mindre og tættere Celler: vi have med andre Ord her utvivlsomt særegne Hydathoder.

Det fugtige Klima og Mangelen af stærkt, direkte Sollys har saaledes tydelig sat sit Præg paa Bladet; men ogsaa en anden Omstændighed viser os Voxestedets klimatiske Ejendommelighed: paa flere Blades Overside fandtes adskillige, kredsrunde, skiveformede, lidt lappede Løv af epifylle, *Phycopeltis*-lignende Alger [1]).

Slægten *Pentaphragmas* systematiske Plads bliver efter ovenstaaende ikke ganske let at angive; de ejendommelige Gruber i Frugtknudevæggen ere ganske enestaaende Dannelser, Kimsækkens Forhold er ogsaa meget ejendommeligt, men hverken det ene eller det andet af disse Fænomener er afgörende som Familiekendemærke. Man kan let blive enig om, at gode Campanulacé-Karakterer ikke findes, og *Pentaphragma* er jo ogsaa især tidligere bleven betragtet som en „anormal" Type indenfor denne Familie; de senere Systematikere anbringe den dog heri uden Diskussion, Bentham & Hooker endog i Gruppen Campanuleae ikke langt fra *Canarina*; jeg er mest tilböjelig til at tro, at det kun er hin første Beskrivers uheldige Idé at kalde *P. begonifolium* for en *Phyteuma*, der har været Skyld i, at Planten senere stadig er slæbt om med i denne Familie; det synes mig, at der endog er meget större Lighed mellem Lobeliaceerne (som jeg helst ser betragtede som en særegen Familie!) og Campanulaceerne, end mellem denne og vor her behandlede Slægt. Mangelen af Mælkesaft, Blomsterstandens Beskaffenhed, Placentaens Form [2]) og endelig Frøets eller rettere Kimens Bygning (hvis denne

[1]) Cfr. især: Karsten: Annales du jardin de Buitenzorg, Vol. X, 1891, p. 18 ff.

[2]) Cfr.: van Tieghem: Recherches sur la structure du pistil, 1871; tab. XVI.

viser sig at være som af mig formodet) samt Mangelen af Samlerhaarene paa Griffelen synes mig at være tilstrækkelige Ejendommeligheder til at fjærne Slægten fra Campanulaceernes Familie. Om man saa maa lade den udgöre en egen Familie blandt de oversædige helkronede, eller en nærmere Undersøgelse af en anden ligeledes „abnorm“ „Campanulacé“, *Sphenoclea* (der som *P. ellipticum* kun har to Rum i Frugtknuden og ligeledes overmaade smaa Frø, og hvis Blomster have megen Lighed med *Pentaphragmas*, kun at Bæger og Krone ikke ere saa tykke og solide, medens de ogsaa ere samlede i meget tætte Stande), skulde bringe et nærmere Slægtskab for Dagen mellem disse to, — maa senere Undersøgelser vise.

Universitetets botaniske Laboratorium.
København i April 1903.

Explanation of illustrations.

The figures of plate V were drawn with the aid of Abbé's camera lucida and with Zeiss microscope and afterwards reduced.

Plate IV.

Fig. 1 represents the whole plant of *Pentaphragma ellipticum* sp. nov., diminished.

— 2. One single flower seen from above; the five openings of the nectaries are shown as darker spots between the stamens.

Plate V.

Pentaphragma ellipticum, anatomical détails.

Fig. 1. Transverse section of ovary; *h*: empty nectarial pit, *n*: nectarium. (Ocul. 1, Obj. a_2.)

— 2. Longitudinal section of mature ovule, cleared with Eau de Javelle. The long protruding embryosac is empty owing to application of reagent. (Oc. 2, Obj. DD.)

— 3. Transverse section of ovule; *r*: raphe; *ep* (as in fig. 2): epithel covering embryosac; (Oc. 2, Obj. DD.)

— 4. Part of cross section of ovary's inner wall at the beginning of formation of the large hairlike outgrowings of inner epiderm forming the fleshy pulp surrounding the grains. (Oc. 1, Obj. DD.)

— 5. Longitudinal section of nearly ripe seed; the brown testa, *t*, is made of one layer of very large cells, the inner walls of which are considerably thickened and densely pitted, the outer walls being thin and collapsing; *ed*: albumen; *em* few-celled embryo. (Oc. 4, Obj. A.)

— 6. Embryo of a nearly ripened seed. (Oc. 4, Obj. DD.)

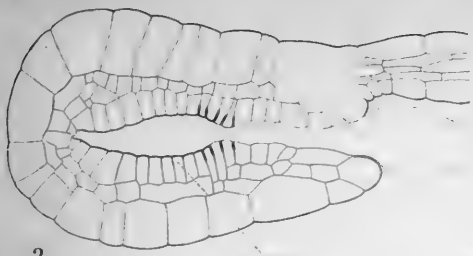
— 7. Transverse section of leaf; *eo*: upper epiderm; *pa*: assimilating layer; *s*: collecting layer; *lu*: spongy parenchyma; *eu*: epiderm of lower surface. (Oc. 4, Obj. A.)

— 8. Stoma and surrounding cells from lower surface of the leaf. (Oc. 1, Obj. DD.)

— 9. Cross section of vascular system of the stem; *ed*: endodermis; *p*: pericycle; *l*: sieve-tube-bundles; *k*: vessels.

København. — Bianco Lunos Bogtrykkeri.

Thomann del. I II



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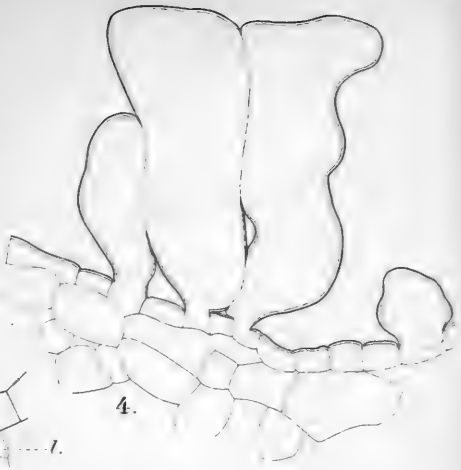

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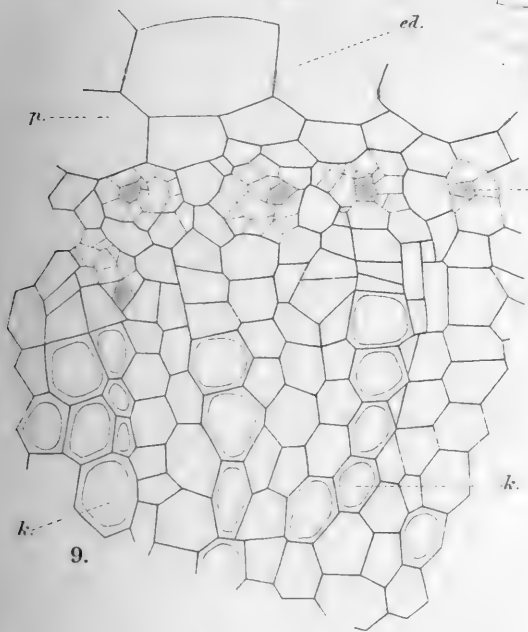

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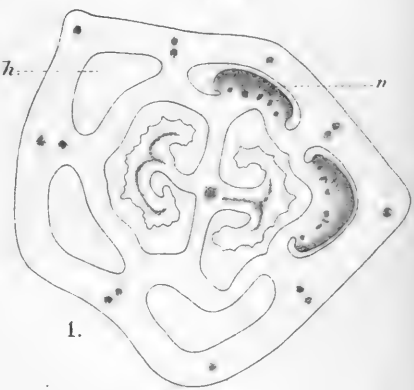

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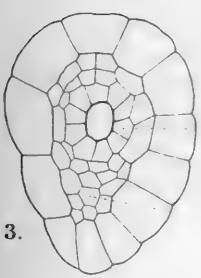

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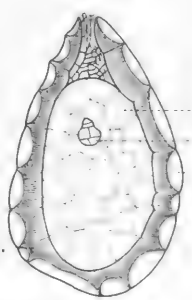

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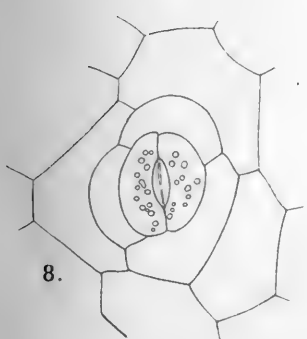

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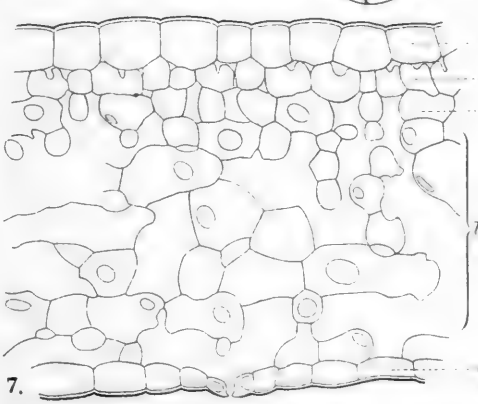

7.

Særtryk af Botanisk Tidsskrift. 26. Bind. 2. Hefte. København 1904.

Arbejder fra den Botaniske Have i København. Nr. 14.

Et mærkeligt Bygningsforhold hos *Milla biflora* Cav.

Af

C. Raunkiær.

Da jeg for tre Aar siden reviderede de blomstrende Liliaceer i Kjøbenhavns botaniske Have, blev jeg ved Undersøgelsen af Blomsten hos *Milla biflora* Cav. opmærksom paa et ejendommeligt Bygningsforhold, der bestaar i, at der fra Indersiden af Blosterets Grund, ud for Frugtknudens Bugsømme, gaar tre Kanaler ned gennem den indtil 20 Ctm. lange Blomsterstilk næsten lige til dennes Grund.

Cavanilles, der først har beskrevet *Milla biflora*, har i det mindste antydet dette Forhold, thi det er jo uden Tvivl det, han tænker paa, idet han skriver „Florum pedunculi, magna parte corollae tubo vestiti, sunt tripollicares, sensimque crassiores“ [1]). Men de af mig udhævede Ord, som det her kommer an paa, giver kun et meget ufuldkomment Billede af Sagen, især da de to Led: „pedunculi“ og „magna parte corollae tubo vestiti“ udelukker hinanden, thi er den omtalte Stilk en Blomsterstilk, kan det, der omgiver den, jo ikke være en Del af Blosterrøret; er, paa den anden Side, det, der omgiver Stilken, en Del af Blosterrøret, kan Stilken jo ikke være Blomsterstilk men maa være Frugtknudestilk.

For saa vidt jeg har haft Lejlighed til at efterse Litteraturen, berører alle senere Forfattere, der omtaler *Milla*, slet ikke denne

[1] Cavanilles, A. J., Icones et descriptiones plantarum, quae aut sponte in Hispania crescunt, aut in hortis hospitantur. Vol. II, 1793, p. 76, (Tab. 196.)

Sag, f. Eks. Lindley[1]), Endlicher[2]), Kunth[3]), Baker[4]), Bentham & Hooker[5]), Engler[6]) og Baillon[7]).

Den Mulighed er jo ikke udelukket, at det nævnte Forhold kan være omtalt et eller andet Sted i Litteraturen, som kan være undgaaet min Opmærksomhed; men selv om dette skulde vise sig at være Tilfældet, saa er Sagen dog i hvert Tilfælde atter glemt, idet den ikke er bleven optaget i de systematiske Haandbøger hverken i Beskrivelsen af Slægten *Milla* eller i Beskrivelsen af denne Slægts eneste Art *Milla biflora*. Det paapegede Forhold er imidlertid af en saadan Beskaffenhed, at det i fremtrædende Grad særtegner Slægten *Milla*, og jeg vil derfor her give Resultatet af min Undersøgelse, for at den omtalte Karakter i Fremtiden kan blive optaget i *Milla*'s Slægtsdiagnose. Samtidig vil jeg kort omtale Bladets og Stængelens Anatomi.

Slægten *Milla* Cav., der hører til Allium-Gruppen indenfor Liliaceerne, udmærker sig ved at have et sambladet Bloster med et temmelig snævert Blosterrør og udstaaende Blosterflige, 6 i Svælget fæstede Støvblade med meget korte Støvtraade og med Støvknapper, der slutter sig sammen omkring Griffelen; endvidere er, som Baillon nævner (l. c.), den nederste Del af den 3-kantede Frugtknude med Kanterne sammenvokset med Blosterrøret, hvorved der dannes 3 dybe Gruber omkring Frugtknudens Grund.

Saaledes begrænset omfatter Slægten *Milla* kun een Art, *M. biflora* Cav., der hører hjemme i Mejiko og Arizona. Fra denne Arts Løg, der ligesom hos mange andre Liliaceer er udstyret med tykke, roeformede Saftrødder, udgaar nogle faa linieformede Blade og et indtil 30 Ctm. højt Skaft med 1—4 hvide Blomster i Spidsen.

Bladene er smalle, kun et Par Mm. brede, linieformede, nærmest halvtrinde, med hvælvet Underside og næsten flad Overside; de er svagt kantede og paa Kanterne vortet-tornede af fremspringende Hudceller (Fig. 2); deres Bygning er i det væsentlige

[1]) Lindley, J., i Botanical Register, 18, 1832, Tab. 1555.
[2]) Endlicher, S., Genera plantarum, 1836—40, p. 142.
[3]) Kunth, C. S., Enumeratio plantarum etc., IV., 1843, p. 478.
[4]) Baker, J. S., a revision of the Genera and Species of Herbaceous Capsular Gamophyllous Liliaceae. Journ. of the Linnean Society, Botany. Vol. XI, London 1871, p. 380.
[5]) Bentham & Hooker, Genera plantarum, III, 1880, p. 799.
[6]) Engler, A., i: Engler und Prantl, Die nat. Pflanzenfamilien, II. Teil, 5. Abth., 1888, p. 58.
[7]) Baillon, H., Histoire des plantes, tom. 12, 1894, p. 559—60.

som hos visse Løg-Arter, f. Eks. *Allium vineale* og *A. oleraceum*. Indenfor Huden (*h*) ligger først et Lag af c. 100 μ lange Palissadeceller (*pa*), der er meget stærkt skraastillede, idet de med en Plan, der staar vinkelret paa Bladets Længdeakse, danner en Vinkel paa c. 45°. Indenfor Palissadelaget følger saa et Lag af Grønceller, der paa Tværsnit er isodiametriske (*rg*), men som paa Længdesnit viser sig at være stærkt strakte i Bladets Længderetning. Indenfor dette Cellelag bestaar Bladet af Saftvæv (*sa*), hvis inderste Del efterhaanden falder sammen og opløses, hvorved der opstaar en vid Kanal (*hr*) midt i Bladet; kun de 2—4 yderste Cellelag af Saftvævet opløses ikke, og her ligger op til Grønvævet en Kreds af Karstrenge, i Regelen 6 større (*k*) og, afvekslende med disse, 6 mindre (k_1). Op til Grønvævet ligger mange Rafideceller.

Fig. 1. *Milla biflora* Cav. Spidsen af Skaftet med 3 Højblade, *hb*, og en enlig Blomst (c. $^3/_4$).

Stængelen (Fig. 3), Skaftet, er trind og bliver indtil 30 Ctm. høj eller højere. De lange Hudceller har tykke Ydervægge; ogsaa Indervæggene er temmelig tykke; derimod er Sidevæggene tynde. Spalteaabningerne ligger lidt under Ydervæggenes Niveau. Indenfor Huden (*h*) findes 3—4 Lag Grønceller (*g*), der paa Tværsnit er omtrent isodiametriske; derimod er de strakte i Stængelens Længderetning, i Regelen flere Gange længere end brede. Indenfor dette Grønvæv ligger en svag Styrkering (*s*) dannet af Parenkym, hvis Celler er stærkt strakte i Stængelens Længderetning, og som har

forveddede og lidt fortykkede Vægge. Indenfor Styrkeringen findes almindeligt, uforveddet Parenkym, Saftvæv (*p*). Karstrengene er

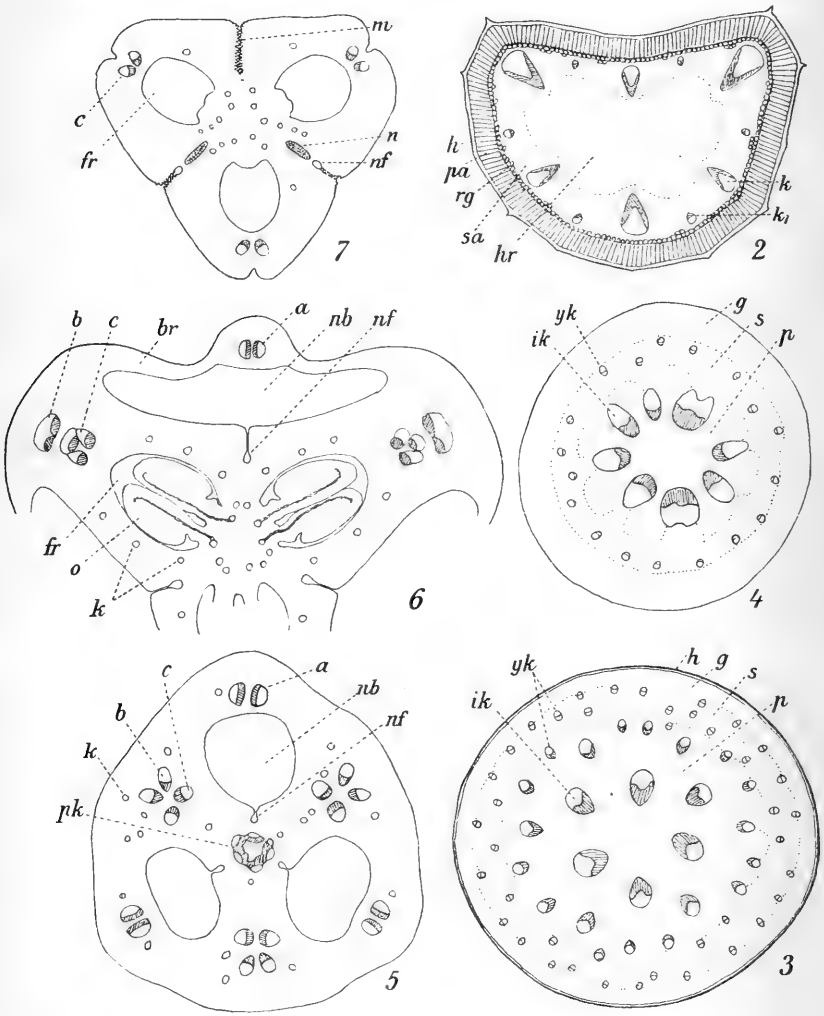

Fig. 2—7. *Milla biflora* Cav. 2. Bladtværsnit; 3. Stængeltværsnit; 4. Tværsnit af Blomsterstilken; 5. Tværsnit c. 1,5 Ctm. ovenfor Blomsterstilkens Grund, ved *t* i Fig. 1; 6. Del af et Tværsnit af den nederste Del af Frugtknuden og det med denne delvis sammenvoksede Blosterrør (*br*); 7. Tværsnit af Frugtknudens øverste Del.

spredte over hele Tværsnittet; de yderste er ganske smaa (*yk*); ind mod Stængelens Midte bliver de større og større (*ik*); de

yderste og mindste er optagne i eller støtter sig til Styrkeringen; de indre og større ligger derimod frit i Saftvævet.

Fra Skaftets Spids udgaar 1—4 Blomster, der ved Grunden er omgivne af 2—3 smaa Højblade (Fig. 1). Blomsterne er, i det mindste tilsyneladende, meget langstilkede, idet Afstanden fra Blomsterstilkens Grund til Grunden af Frugtknuden er indtil 20 Ctm., oftest dog mindre. Denne Stilk er hidtil stadig bleven kaldt Blomsterstilk, og saaledes vil jeg for Nemheds Skyld ogsaa foreløbig kalde den; hvorledes Sagen egentlig forholder sig, vil fremgaa af det følgende.

Blomsterstilken har umiddelbart ovenfor sin Grund en lignende Bygning som Stængelen; kun er Karstrengene her ordnede temmelig regelmæssig i to Kredse (Fig. 4); yderst en Kreds af ganske smaa Strenge (*yk*), der er optagne i Styrkeringen; inderst en Kreds af færre men meget større Strenge (*ik*), der i Reglen støtter sig til Styrkeringens Inderside, idet Vævet mellem de enkelte Strenge og Styrkeringen er forveddet. Lidt ovenfor Blomsterstilkens Grund foregaar der imidlertid en paafaldende Omlejring af Karstrengene, og samtidig optræder der paa Tværsnittet tre Hulrum, der viser sig at være de nederste Ender af de Side 223 omtalte Kanaler, der fra Frugtknudens Grund strækker sig ned gennem Blomsterstilken. C. 1,5 Ctm. ovenfor Blomsterstilkens Grund har Tværsnittet det i Fig. 5 afbildede Udseende: *nb* er de tre midt for Frugtknudens Bugsømme liggende Kanaler; ud for hver af disse ligger tæt sammen to Karstrenge, *a*, med Kardelen vendt mod hinanden; ud for Skillevæggene mellem Kanalerne, altsaa midt for Frugtknudens Rygsømme, ligger paa hvert Sted 4 Karstrenge, *b* og *c*, i den Orden og Stilling, som Figuren viser; midt i Tværsnittet ligger 6 tæt sammensluttede Karstrenge, der danner en trekantet Figur, *pk*; foruden disse større Strenge findes en Del ganske smaa Strenge, *k*, uden nogen særlig bestemt Orden; dog slutter de sig mere eller mindre nøje til de omtalte Grupper af større Strenge. Bortset fra nogle ubetydelige Forandringer i Karstrengfordelingen fortsættes det foran skildrede Forhold lige til Frugtknudens Grund; kun bliver Stilken opefter tykkere og Kanalerne samtidig lidt videre.

Som allerede nævnt Side 224, er den nederste Del af Blosteret sammenvokset med Frugtknudens Kanter, Rygsømmene, hvorved der dannes 3 Hulrum eller Gruber (Fig. 6, *nb*) omkring Frugtknudens Grund; disse Gruber er imidlertid ikke lukkede i Bunden men fortsættes i de ovenfor omtalte Kanaler, der paalangs løber

gennem Blomsterstilken omtrent til dennes Grund. Af Blomsterstilkens Karstrenge, som ses i Fig. 5, gaar *a* og *b* ud i Blosteret, medens *c* løber op i Frugtknudens Rygsømme.

Som det ses i Fig. 5, er der i Blomsterstilk-Kanalernes indre Hjørne en dyb men meget smal Fure, *nf*; i den yderste, mod Kanalerne vendende Del af Furerne, slutter disses Sider næsten ganske sammen, medens de i den inderste Del viger mere eller mindre fra hinanden, hvorved der dannes en meget snever Kanal; disse Furer fortsættes op paa Frugtknuden paa dennes Bugsømme, Fig. 6 og 7, *nf*; her er Hudcellerne paa Furernes tætsluttende Rande forsynede med Papiller, der griber ind mellem hverandre, og hvis Overflade er udstyrede med Kutikularstriber, hvilket iøvrigt ogsaa er Tilfældet med Overfladen af Frugtknudens øvrige Hudceller.

Hos adskillige Liliaceer, f. Eks. *Anthericum*, *Ornithogalum* og *Allium*, findes der i hver af Frugtknudens Skillevægge en honningdannende Vægkirtel eller Septalkirtel. Som Tværsnittet i Fig. 7 viser, findes der ogsaa saadanne Kirtler hos *M. biflora*. I den mellemste Del af Frugtknuden er disse Kirtler ganske indelukkede (Fig. 7, *n*); i den øverste Del af Frugtknuden kommer de derimod frem til Overfladen og munder ud i de ovenfor omtalte Furer (Fig. 7, *m*). Jeg har ikke hos *M. biflora* haft Lejlighed til at undersøge, hvorledes det her forholder sig med Honningafsondringerne i Vægkirtlerne; men der er ikke nogen særlig Grund til at tvivle om, at Honningen her, ligesom hos de andre Liliaceer med Vægkirtler, løber ned gennem Furerne paa Frugtknudens Bugsømme til Frugtknudens Grund og derfra videre ned i Blomsterstilkens Kanaler, til hvis Bund de nævnte Furer jo fortsættes. Honningen vil saaledes samles paa Bunden af Kanalerne; men da disse er 10—18 Ctm. lange og tillige ganske snævre, kan kun meget langsnablede Insekter naa Honningen; jeg formoder derfor, at vi i de foran skildrede Bygningsforhold maa se en ejendommelig Tilpasning til Bestøvning ved langsnablede Insekter, formodentlig Aftensværmere; det bør i denne Sammenhæng bemærkes, at Blomsterne er fuldt aabne om Natten og paa Grund af deres skinnende hvide Farve meget iøjnefaldende. Lindley skriver (l. c.): „Perianthium .... per plures dies apertum, nec noctu clausum, ut saepe hujus ordinis mos est“. Jeg vil tillige minde om, at vi fra *M. biflora*'s Hjemstavn, Mejiko, kender i det mindste én Plante til, som har et Blosterrør, der i Længde omtrent svarer til *M. biflora*'s Kanaler, nemlig *Mirabilis longiflora*, hvis Blosterrør kan blive indtil 14 Ctm. langt og maaske endnu

længere. Det vilde være interessant at faa at vide, om der i Mejiko findes flere Planter med saa dybt skjult Honning, og om der samtidig findes bestemte, langsnablede Sommerfugle, der er særligt skikkede til disse Blomsters Bestøvning.

Det vil af det foregaaende kunne ses, at det, der hos *Milla biflora* hidtil er bleven opfattet som en lang Blomsterstilk, kun for den allernederste Dels Vedkommende virkelig er Blomsterstilk, nemlig saa langt som der ingen Kanaler findes, medens den allerstørste Del, fra Kanalernes nederste Ende til Frugtknudens Grund, maa anses for Frugtknudestilk tæt omsluttet af et langt og snevert Blosterrør, der i 3 Længdestriber, nemlig ud for Frugtknudens Rygsømme, er sammenvokset med Frugtknudestilken, hvilken Sammenvoksning endog fortsættes et Stykke op paa Frugtknudens nederste Del. Det er i denne Sammenhæng værd at lægge Mærke til, at det om en *Milla* nærstaaende Slægt, *Brevoortia* Wood., hjemmehørende i Kalifornien, skrives (Engler und Prantl, l. c., Side 58), at den har kortstilket Kapsel.

KBHVN. BIANCO LUNO

Særtryk af Botanisk Tidsskrift. 26. Bind. 2. Hefte. København 1904.

Arbejder fra den Botaniske Have i København. Nr. 15.

Lichenes

ab Ove Paulsen praecipue in provincia Ferghana (Asia media) et a Boris Fedtschenko in Tjanschan anno 1898 et 1899 collecti.

Enumeravit

Edv. A. Wainio.

I. Discolichenes.

Trib. 1. Parmelieae Wain.

1. Parmelia

1. **P. conspersa** (Ehrh.) Ach.

Var. **molliuscula** (Ach.) Wain.

Inter Hypna supra terram ad Sufi-Kurgan in montibus Alai, alt. 2100 m., in prov. Ferghana (O. Paulsen). N. 426. Ster.

2. Dufourea.

1. **D. madreporiformis** (Schleich.) Ach., Lich. Univ. (1810) p. 525; Wain., Lich. Cauc. (1899) p. 277; Elenkin, Lich. Fl. Ross. I (1901) p. 26.

Var. **irregularis** Wain.

Thallus alt. 12—20 mm., flavescens, opacus, crebre dichotome ramosus, ramis 3—1,2 mm. crassis, vulgo leviter compressis aut plus minusve irregulariter subcylindricis, KHO neque extus, nec intus reagens, medulla alba etiam in basi thalli.

In monte Manas (8—10,000′ s. m.) et ad Tjuss-Aschu (13,500′ s. m.) in Talas-Alatau in Tjanschan (B. Fedtschenko). Ster. — Hic notentur etiam *Usnea microcarpa* Arn. in monte Taganai et *Alectoria ochroleuca* (Ehrh.) Nyl. ad Minjar in prov. Ufae a B. Fedtschenko lectae.

Trib. 2. Lecanoreae Wain.

1. Lecanora.

1. **L. (Lecania) triseptata** Wain., Plant. Turcoman. (1888) p. 6.

Apothecia 0,5—1,6 mm. lata, disco nigricante aut fusco-nigricante, nudo, margine thallode sat tenui, subintegro, persistente, cinerascente vel olivaceo-cinerascente. Hypothecium album, tenue, strato gonidioso imposi-

tum, jodo caerulescens. Epithecium rubescens, KHO non reagens. Hymenium circ. 0,050—0,060 mm. crassum, jodo persistenter caerulescens. Sporae 8 : nae, distichae, decolores, oblongae, vulgo curvatae, demum 3-septatae, longitudine 0,013, crassitudine 0,004—0,005 mm. Habitu similis est *Rinodinae sophodi*. Thallus tenuis, parum evolutus.

Ad corticem populi prope Tshinas inter Samarkand et Tashkent (O. Paulsen). N. 129.

2. **L. (Candelariella) cerinella** Floerk.; Wain., Lich. Caucas. (1899) p. 284.

Ad saxa in angustiis Koï-Jol in montibus Alai (n. 1613) et in planitie arida ad lacum Jashil-Kul 3800 m. s. m. in Pamir (n. 860) legit O. Paulsen. Fert.

3. **L. (Fulgensia) bracteata** (Hoffm.) Ach.

Var. **alpina** Th. Fr., Lich. Scand. (1871) p. 223. *Squamaria fulgens* var. *decipiens* Anzi, Catal. Lich. Sondr. (1860) p. 46, Lich. Rar. Langob. Exs. n. 99 (in hb. Nyl.).

Ad terram in silvis Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. (O. Paulsen). N. 543.

4. **L. (Squamaria) rubina** (Vill.) Wain.

Var. **chrysoleuca** (Sm.) Wain., Lich. Cauc. (1899) p. 284.

Ad rupem in montibus prope Teheran in Persia (O. Paulsen). N. 2222. Fert.

5. **L. melanophthalma** Ram.

Ad rupem prope lacum Jashil-Kul in Pamir (n. 889: O. Paulsen) et ad Tjuss-Aschu in Talas-Alatau in Tjanschan 13500′ s. m. (B. Fedtschenko).

6. **L. muralis** (Schreb.) Schaer.

Var. **saxicola** (Poll.) Schaer.

Ad rupem in montibus prope Teheran in Persia (O. Paulsen) N. 2222. Fert.

Var. **Garovaglii** (Koerb.) Wain., Lich. Sibir. Merid. (1896) p. 285.

In rupe ad Chorock in provincia Shugnan in Pamir 2200 m. s. m. (O. Paulsen). N. 1548. Fert.

7. **L. alphoplaca** (Wahlenb.) Ach.; Wain., Lich. Cauc. (1899) p. 286.

Thallus KHO primo lutescens, dein rubescens.

In rupe argillaceo-schistosa ad Sufi-Kurgan in montibus Alai 2100 m. s. m. (O. Paulsen). N. 424.

8. **L. (Eulecanora) frustulosa** (Dicks.) Schaer.

Var. **argopholis** (Wahlenb.) Koerb.

In rupe argillaceo-schistosa ad Sufi-Kurgan in montibus Alai 2100 m. s. m. (O. Paulsen). N. 425.

9. **L. crenulata** (Dicks.) Wain., Lich. Caucas. (1899) p. 288.

Var. **caesioalba** (Koerb.) Th. Fr., Lich. Scand. (1871) p. 252.

Ad rupem in angustiis Koï-Jol in montibus Alai in provincia Ferghana (n. 1613) et in planitie arida ad lacum Jashil-Kul 3800 m. s. m. in Pamir (n. 860) lecta ab O. Paulsen.

10. **L. umbrina** (Ehrh.) Mass.

Var. **umbrinofusca** (Hoffm.) Wain., Lich. Caucas. (1899) p. 289.

In trunco Juniperi ad pratum Olgin-Lug in montibus Alai, 2600 m. s. m., in provincia Ferghana (O. Paulsen). N. 513.

11. **L. melanocheila** Wain. (n. sp.).

Thallus crustaceus, uniformis, crassitudine mediocris, circ. 0,5(—0,7) mm., verruculoso- et ruguloso-inaequalis, areolato- vel rimoso-diffractus, esorediatus, sat opacus, pallide albidus, KHO demum leviter lutescens, $CaCl_2O_2$ non reagens, at his reagentiis unitis lutescens, hypothallo albido, parum distincto, medulla jodo non reagens. Apothecia circiter 0,6—1,2 mm. lata, aut rarius demum —3 mm. lata, adpressa aut demum peltata, disco vulgo planiusculo, nigro, opaco, nudo, aut raro demum tenuissime subpruinoso aut livido-nigricante, excipulo basin versus et subtus thallo concolore, margine mediocri, nigricante, subintegro. Excipulum in margine extus cyanescens, KHO virescens, intus albidum et gonidia continens, strato corticali ex hyphis irregulariter radiantibus ramoso-connexis constante, cavitate cellularum oblonga, angusta, membranis conglutinatis, incrassatis, in KHO turgescentibus. Epithecium cyanescenti-fuligineum, KHO smaragdulo-fuligineum. Hymenium circ. 0,050 mm. crassum, dilute sordide caerulescens, jodo persistenter intense caerulescens. Paraphyses arcte cohaerentes, sat crassae, septatae, apice leviter clavatae. Asci clavati. Sporae 8:nae, distichae, decolores, ellipsoideae aut ovoideo-ellipsoideae, simplices, long. 0,008—0,009, crass. 0,004—0,005 mm. Pycnoconidangia thallo immersa aut apice leviter emergentia, macula nigricante indicata, conceptaculo caeruleo-nigricante. Sterigmata brevia, pauciarticulata, constricta, articulis vulgo ellipsoideis, circ. 0,003—0,005 mm. crassis, vulgo aeruginosis, apice et latere pycnoconidia efferentia. Pycnoconidia acicularia, altero apice vulgo leviter attenuato, altero obtuso, recta aut leviter curvata, long. 0,014—0,012 (rarius —0,007) mm., crass. 0,0015—0,001 mm. Habitu *L. atrosulphuream* (Wahlenb.) in memoriam revocans, at colore ab ea differens.

Ad Tjuss-Aschu (13500′ s. m.) in Talas-Alatau in Tjanschan (B. Fedtschenko). Fert.

12. **L. (Aspicilia) calcarea** (L.) Sommerf.

Var. **Hoffmanni** (Ach.) Sommerf., Suppl. Lich. Lapp. (1826) p. 102; Th. Fr., Lich. Scand. (1871) p. 275.

Apothecia in margine gonidia continentia, infra hypothecium gonidiis destituta.

Ad rupem in montibus prope Teheran in Persia (O. Paulsen). N. 2222. Fert.

13. **L. mutabilis** (Ach.) Nyl., Lich. Lapp. Or. (1866) p. 137.

In ligno trunci Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. in provincia Ferghana (O. Paulsen). N. 513. Fert.

Trib. 3. Theloschisteae Norm.

1. Placodium.

1. **Pl. elegans** (Link) Ach.

Medulla thalli laxe contexta.

Ad rupem in Tjuss-Aschu (13,500′ s. m.) in Talas-Alatau in Tjanschan (B. Fedtschenko) et ad saxa in angustiis Koï-Jol in montibus Alai in provincia Ferghana (O. Paulsen), n. 1613. Fert.

2. **Pl. Heppianum** (Müll. Arg.) Wain., Lich. Caucas. (1899) p. 295. *Lecanora sympagea* Nyl. in Hue, Addend. p. 68 (haud *Lichen sympageus* Ach., Lich. Suec. Prodr. p. 105).

Var. **lucida** Wain.

Thallo intensius fulvescente aut miniato-fulvescente a var. normali *Pl. Heppiani* differt. Laciniae convexae, opacae, medulla crebra.

In rupe schistosa ad Sufi-Kurgan in montibus Alai 2100 m. s. m. (O. Paulsen). N. 423 et 424. Fert.

3. **Pl. murorum** (Hoffm.) D. C.

Var. **callopizodes** Wain.

Thallus laciniis crassis, convexis, superne saepe demum tenuissime rimulosis, miniato-fulvescentibus, epruinosis. Thallo paullo crassiore, superne saepe rimuloso a var. *callopiza* (Nyl.) differt. Medulla crebre contexta.

In rupibus graniticis ad Chorock (2200 m. s. m.) in prov. Shugnan (n. 1547 et 1548) et in planitie arida ad lacum Jashil-Kul (3800 m. s. m., n. 861) in Pamir (O. Paulsen). Fert.

4. **Pl. tegulare** (Ehrh.) Wain., Lich. Caucas. (1899) p. 295. *Physcia decipiens* Arn., Fl. 1867 p. 562.

In vallis argillaceis urbis Buchara valde frequenter (O. Paulsen). N. 1806. Ster.—Thallus sorediosus, pruinosus, medulla crebra (f. *umbratica* Wain., Lich. Vib., 1878, p. 54).

5. **Pl. aurantiacum** (Lightf.) Hepp.

F. **lignicola** Nyl., Lich. Scand. (1861) p. 143 (secund. herb. Nyl.).

In trunco Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. (O. Paulsen). N. 513. Fert.

6. **Pl. Paulseni** Wain. (n. sp.).

Thallus crustaceus, effusus, uniformis, areolatus aut rimoso-areolatus, crassitudine mediocris aut sat crassus (circ. 0,2—1 mm.), areolis planis

aut demum convexis aut rarius difformibus, saepe rimulosis aut verruculosis, circ. 0,5—1,5 mm. latis, esorediatus, opacus, sordide albicans aut sordide pallescens, KHO non reagens, hypothallo albido parum distincto. Apothecia 0,7—1,2 mm. lata, adpressa, basi bene constricta, disco plano, nigro, nudo, opaco, margine thallode, thallo concolore aut cinereo-albicante, crassitudine mediocri, discum haud aut parum superante, persistente. Excipulum gonidia in margine et infra hypothecium continens. Hypothecium album. Epithecium fuscum, KHO violascens. Hymenium persistenter caerulescens. Paraphyses sat crassae, septatae, haud constrictae, apicem versus leviter clavato-incrassatae. Asci clavati. Sporae 8 : nae, distichae, decolores, oblongae aut ellipsoideae, polari-dyblastae, septo tenui, poro vulgo lato, long. 0,013—0,022, crass. 0,005—0,009 mm. Pycnoconidangia thallo immersa, macula nigricante indicata. Sterigmata articulata, cellulis subglobosis. Pycnoconidia ellipsoideo-oblonga, long. 0,003, crass. 0,001 mm., recta. Hæc species affinis est *Pl. chalybaeo* (Fr.) Nyl. et *Pl. variabili* (Pers.) Ach., a quibus præsertim apotheciis adpressis distinguitur. Habitu vix differt a *Lecanora atra* (Huds.) Ach.

In rupibus calcareis in angustiis Koï-Jol in montibus Alai in provincia Ferghana (n. 1613), in monte Sultan-Baba prope Kiptjak in Chiva (n. 2008), in desertis arenosis Kis-Kala ad ripam fluminis Amur Dariae inter Chiva et Tshardshui (n. 1870), ad Langar Kisht in provincia Wakhan in Pamir 3000 m. s. m. (n. 1377), lectum ab O. Paulsen.

7. **Pl. subceratum** (Stizenb.) Wain. *Lecanora subcerata* Stizenb., Lich. Afr. (1890) p. 99. *L. subcerina* Nyl., Fl. 1876 p. 282 (haud Fl. 1869 p. 119); Wain., Plant. Turcoman. (1888) p. 4. *L. cerodes* Nyl. in Hue, Lich. Exot. (1892) p. 132.

Ad corticem Mori albae prope Samarkand (n. 102), in cortice Populi ad Tshinas inter Samarkand et Tashkent (n. 129) lectum ab O. Paulsen. Fert.

Trib. 4. Buellieae Wain.

1. Anaptychia.

1. **A. ulothricoides** Wain. *Physcia ulothricoides* Wain., Plant. Turcoman. (1888) p. 3. *Physcia Asiana* Nyl. in Brother., Contrib. Lich. Asie Centr. (1897) p. 6 (Öfvers. Finsk. Vet.-Soc. Förh. XL), secund. specim. orig.

Thallus superne strato corticali ex hyphis longitudinalibus formato instructus, cinerascens, ambitum versus vulgo tenuiter pruinosus, KHO non reagens, inferne strato corticali destitutus. Gonidia cystococcacea. Affinis est *A. ciliari* (L.) Koerb., at thallo adpresso *Physciae obscurae* (Ehrh.) Th. Fr. similis. Pertinet ad „*Pseudophysciam*“ Müll. Arg. (Consp. Syst. Lich. Nov. Zel. 1894 p. 10), quae minime genus autonomum con-

stituere potest, formis intermediis inconstantibus (*A. podocarpa* var. *stellata* Wain., cet.) cum *Anaptychia* connexa.

In trunco Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. in provincia Ferghana (O. Paulsen). N. 513. Fert.

2. Physcia.

1. *Ph. stellaris* (L.) Nyl. **Ph. tribacia* (Ach.) Wain., Adj. Lich. Lapp. I (1881) p. 135.

Supra muscos in monte Taght-i-Soliman ad Osh in provincia Ferghana (O. Paulsen). N. 320. Ster.

Trib. 5. Lecideae Wain.

1. Cladonia.

1. **Cl. pyxidata** (L.) Fr.

Var. **pocillum** (Ach.) Flot.

Ad terram humosam et muscos destructos in silvis Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. in provincia Ferghana (O. Paulsen). N. 542. Ster.

2. Lecidea.

1. **L. (Thalloedaema) candida** (Web.) Ach.

Ad saxa in silva Juniperi ad pratum Algin-Lug in montibus Alai 2600 m. s. m. in provincia Ferghana (O. Paulsen). N. 473. Fert.

2. **L. (Psora) decipiens** (Ehrh.) Ach.

Ad terram („Löss") in planitie ad Chavast inter Samarkand et Tashkent (O. Paulsen). N. 270. Ster.

3. **L. (Eulecidea) goniophila** Floerk., Berl. Magaz. 1809 p. 311; Wain., Adj. Lich. Lapp. II p. 90.

F. **spathea** Wain., l. c.

Thallus sordide albicans, tenuis, KHO non reagens aut partes crassiores KHO lutescentes. Hypothecium albidum. Epithecium nigricans aut smaragdulo-fuligineum. Paraphyses laxe cohærentes. Sporæ long. circ. 0,014, crass. 0,009 mm.

Ad lignum in trunco Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. (O. Paulsen). N. 513 pr. p.

4. **L. glomerulosa** (D. C.) Nyl., Fl. 1872 p. 356; Wain., Adj. Lich. Lapp. II (1883) p. 92.

F. **Wulfenii** (Hepp) Wain., Lich. Caucas. (1899) p. 326. *Lecidea elaeochroma λ. muscorum* Th. Fr., Lich. Scand. p. 545 (haud *L. muscorum* Wulf.).

Ad lignum in trunco Juniperi ad pratum Olgin-Lug in montibus

Alai 2600 m. s. m. (O. Paulsen). Nr. 513 pr. p. — Hypothecium fulvescens. Epithecium caeruleosmaragdulo-fuligineum. Apothecia nuda, demum convexa.

F. **Tatarica** Wain.

Thallus crassus aut mediocris, crassit. circ. 1—0,2 mm., primum continuus et verrucoso-inaequalis, dein areolatus et verrucosus, areolis contiguis, opacis, albis, KHO lutescentibus. Apothecia disco aut etiam margine pruinoso, demum vulgo convexa, margine persistente aut demum excluso. Excipulum caeruleo-fuligineum. Hypothecium fulvo-rubescens. Epithecium caeruleo-fuligineum. Paraphyses laxe cohaerentes. Sporae simplices, decolores, 8:nae, ellipsoideae, long. 0,011, crass. 0,007 mm.

Ad lignum in trunco Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. (O. Paulsen). N. 513 pr. p.

5. **L. Alaiensis** Wain. (n. sp.).

Thallus crustaceus, uniformis, crassus aut partim mediocris, crassitudine 1—0,5 mm., rimosus aut partim subcontinuus, verruculoso- et verrucoso-inaequalis, albidus aut pallescenti-albidus, opacus, neque KHO, nec $CaCl_2O_2$, nec his reagentiis unitis reagens, medulla jodo non reagens, hypothallo albo indistincto. Apothecia demum adnata et thallum leviter superantia, 1,2—0,7 mm. lata, primum plana marginataque, demum leviter convexa immarginataque, atra, sat opaca. Excipulum in margine plus minusve intense caeruleo-smaragdulo-coloratum, ceterum sordide coloratum aut subalbidum. Hypothecium albidum. Epithecium caeruleo-smaragdulo-fuligineum aut partim violascens. Hymenium circ. 0,070 mm. crassum, jodo intense caerulescens, dein ascis violascentibus. Paraphyses sat laxe cohaerentes, simplices aut parce furcatae, haud ramoso-connexae, sat tenues, apice crassiores. Sporæ 8:nae, distichae, decolores, simplices, ellipsoideae, long. 0,014—0,016, crass. 0,007—0,009 mm. Pycnoconidangia globosa, parum elevata, diam. circ. 0,180—0,120 mm., fuliginea. Pycnoconidia filiformia, cylindrica, long. circ. 0,024—0,016, crass. 0,001 mm., vulgo bene curvata. — Affinis est *L. goniophilae* Floerk.

Ad rupem calcaream in angustiis Koï-Jol in montibus Alai (O. Paulsen). N. 1613.

6. **L. lapicida** (Ach.) Wain., Adj. Lich. Lapp. II (1883) p. 54, Lich. Caucas. (1899) p. 327.

F. **ecrustacea** Nyl. in Arn., Lich. Tirol. XVIII (1878) p. 283, Lich. Exs. n. 716 b; Wain., Adj. Lich. Lapp. II p. 56.

Thallus evanescens aut partim circa apothecia leviter evolutus dispersusque; medulla jodo caerulescens. Hypothecium parte superiore plus minusve dilute fuscescens, parte inferiore albidum. Epithecium caeruleo-smaragdulo-fuligineum, KHO non reagens. Excipulum KHO non reagens.

Paraphyses arcte cohaerentes. Sporae oblongae, long. 0,008—0,010, crass. 0,003—0,0045 mm.

Supra rupem ad Tjuss-Aschu in Talas-Alatau in Tjanschan occid. 13500′ s. m. (B. Fedtschenko). Supra rupem ad Kuh-i-Lal in provincia Goran 2600 m. s. m. (n. 1528) et in planitie arida ad lacum Jashil-Kul 3800 m. s. m. (n. 862) in Pamir (O. Paulsen).

Trib. 5. Acarosporeae.

1. Acarospora.

1. **A. molybdina** (Wahlenb.) Mass., Symmict. Lich. (1855) p. 21; Th. Fr., Lich. Scand. (1871) p. 209; Wain., Exp. Antarct. Belg. Lich. (1903) p. 34.

Var. **rufa** Wain.

Thallus sat crassus, rufescens aut testaceo-rufescens, laciniis convexis, late expansus. Apothecia thallo immersa, indistincte marginata, disco concavo aut plano, thallum parum superante, fusco-nigricante, opaco. Sporae numerosissimae, long. 0,003—0,004, crass. 0,0015—0,002 mm.

Ad rupem gneissaceam in planitie arida ad lacum Jashil-Kul 3800 m. s. m. in Pamir (O. Paulsen). N. 859. — In Fellm., Lich. Lapp. Or. n. 137 (Nyl., Lich. Lapp. Or. 1866 p. 138) adest planta a var. *rufa* parum recedens.

2. **A. interrupta** (Ehrenb.) Wain. *Lecanora interrupta* Nyl., Lich. Aegypt. Ehrenb. (1864) p. 5.

Thallus albido-pruinosus, superficie integra aut saepe demum ex apotheciis subradiatim rimosa. Gonidia pleurococcacea. Apothecia difformia, impressa, immarginata aut rarius margine tenui albido instructa, disco fusco-nigricante, vetusta demum interdum e papillis thallinis scabrida. Sporae long. 0,004—0,008, crass. 0,003 mm., numerosissimae, ellipsoideae aut raro oblongae. In *A. percaenoidem* (Nyl., Lich. Arm. et Delph. 1863 p. 399, Stizenb., Lich. Helv. 1882 p. 132, Arn., Lich. Jur. 1884 p. 99) transire videtur, at ab ea differt thallo saepe demum rimoso.

Ad rupes graniticas, gneissaceas et schistosas ad Pamirski Post prope flumen Murghab 3800 m. s. m. (n. 1605), ad Sarimullah 4000 m. s. m. (n. 690), in planitie arida ad lacum Jashil Kul 3800 m. s. m. (n. 851) in Pamir (O. Paulsen). Ad rupes calcareas in deserto arenoso ad Kis-Kala ad ripam fluminis Amu Daria inter Chiwa et Tshardshui (O. Paulsen, n. 1870 pr. p.).

3. **A. glaucocarpa** (Wahlenb.) Koerb.

Ad saxa calcarea in monte Sultan-Baba prope Kiptjak in Chiwa (O. Paulsen). N. 2008. Fert.

2. Sarcogyne.

1. **S. perileuca** Wain.

Thallus albidus, dispersus et parum evolutus aut evanescens. Apothecia circ. 0,4—0,8 mm. lata, demum peltata basique constricta, difformia aut raro suborbicularia, disco demum plano aut leviter convexo, nigro, nudo, opaco, margine mediocri aut tenui, integro aut flexuoso, nigricante, cinerascente aut albido. Excipulum inferius pallidum aut albidum, gonidiis destitutum, margine nigricante excluso aut inflexo, marginem albidum circa apothecia formans. Hypothecium pallidum et albidum. Epithecium rufescens. Hymenium jodo intense caerulescens, dein partim dilutius coloratum et ascis demum violascentibus. Sporae numerosissimae, long. 0,005, crass. 0,003 mm.

Ad rupes calcareas in deserto arenoso ad Kis-Kala ad ripam fluminis Amu Daria inter Chiwa et Tshardshui (O. Paulsen). N. 1870 pr. p.

2. **S. simplex** (Dav.) Nyl., Etud. Lich. Alg. (1854) p. 337; Wain., Lich. Caucas. (1899) p. 331.

Var. **strepsodina** (Ach.) Th. Fr., Lich. Scand. (1874) p. 408.

Ad lapides gneissaceas ad Sarimullah 4000 m. s. m. in Pamir (O. Paulsen). N. 689 et 690.

Var. **urceolata** (Anzi) Th. Fr., Lich. Scand. (1874) p. 408. *Sarcogyne urceolata* Anzi, Lich. Rar. Langob. fasc. VII n. 285 (secund. hb. Nyl.), Manip. Lich. Langob. (1862) p. 157; Arn., Lich. Tirol XXX (1897) p. 30.

In var. *strepsodinam* (Ach.) et var. *Sebiranam* (Wain., Plant. Turc. 1888 p. 9) transit.

In rupibus calcareis in angustiis Koï-Jol in montibus Alai in provincia Ferghana (O. Paulsen, n. 1613). In rupe qvartzitica ad Tjuss-Aschu in Talas-Alatau in Tjanschan 13500′ s. m. (B. Fedtschenko).

II. Pyrenolichenes.

1. Dermatocarpon.

1. **D. (Entosthelia) miniatum** (L.) Th. Fr., Lich. Arct. (1860) p. 253; Wain., Lich. Caucas. (1899) p. 340.

Ad saxa in silva Juniperi ad pratum Olgin-Lug in montibus Alai 2600 m. s. m. (O. Paulsen). N. 474.

2. Verrucaria.

1. **V. Paulseni** Wain. (n. sp.).

Thallus crustaceus, uniformis, sat crassus aut mediocris, crassit. circ. 0,6—0,2 mm., minute rimoso-areolatus, areolis planis, albidus aut partim sordide cinerascens, opacus, hypothallo albido parum distincto. Apothecia

vertice fuligineo circ. 0,3—0,25 mm. lato denudato depresse hemisphaerico aut applanato leviter prominente aut thallum haud superante opaco, ad ostiolum non aut anguste leviterque impressa. Perithecium fuligineum, integrum, globosum, tenue, superne crassius, latit. 0,3—0,4 mm. Paraphyses obsoletae. Periphyses circa ostiolum evolutae. Nucleus jodo leviter vinose rubens, dein fulvescens. Asci clavati. Sporæ 8:nae, distichæ, ellipsoideae, simplices, decolores, long. 0,012—0,015, crass. 0,009 millim. Affinis est *V. rupestri* Schrad., at thallo crassiore et sporis minoribus ab ea differens.

In rupibus calcareis in angustiis Koï-Jol in montibus Alai in provincia Ferghana (O. Paulsen, n. 1613).

KBHVN. BIANCO LUNO

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Arbejder fra den Botaniske Have i København. Nr. 16.

Lieutenant Olufsen's second Pamir-Expedition.

Plants collected in Asia-Media and Persia. II.

By

Ove Paulsen.

Pteridophyta.

I. **Equisetum** L.

1: *E. ramosissimum* Desf.; Rgl. Acta H. Petrop. VII p. 660; O. Fedtschenko: Spisok rastenij, in Isvestija Imp. Obschtschestwa liubit. estestwosnanija anthropol. i etnogr. CIII, Moskva 1900 p. 72; O. und B. Fedtschenko: Die höheren Kryptogamen des russ. Turkestan, in Trudi Obs. estestwopit. pri Imp. Kasanskom Universitete 36,3 1903 p. 31. *E. ramosum* Schl.; Bois. fl. or. V p. 742; Ldb. fl. ros. IV p. 490; Bunge reliq. Lehm. p. 530; Trautv. Enum. pl. Songor., Bull. Moscou 1867,2 p. 121. E. *elongatum* Willd.; Rgl. et Herd. Pl. Semen., Bull Moscou 1862,2 p. 308; Aitchison Botany o. t. Afghan delim. com., Transact. Lin. Soc. 1888 p. 127. E. *pannonicum* Kit; Kar. Kir. (sec O. et B. Fedtschenko).

Ferghana: N. 295, on moist ground near Margilan. May 27 1899; N. 1823, on an island in the river Amu Daria near Tshardshui. June 19. 1899.

Area: Southern and middle Europe, Asia-Media, northern and southern America.

II. **Botrychium** Sw.

2. *B. Lunaria* (L.) Sw.; Rgl. Acta H. Petrop. VII p. 662: Bois. fl. or. V p. 719; O. Fedtschenko Spisok rast. l. c. p. 172; O. und B. Fedtschenko l. c. p. 27.

Alai mountains: N. 545, in the Juniper forests at Olgin Lug. Alt. 2800^{m}. June 24. 1898.

Area: Northern and middle Europe, Asia-Media, northern America, Australia.

III. **Polypodium** L.

3. *P. vulgare* L.; Kar. Kir. Enum pl. Alt. Bull. Moscou 1841 p. 869; Trautv. Enum Song. l. c. p. 121; Ldb. fl. ros. IV p. 508; Bunge reliq.

Lehman., p. 530; Buhse Aufz. transcauc. pers. Pfl. p. 234; Bois. fl. or. V p. 723; Rgl. Acta H. Petrop. VII p. 662; Rgl. et Herder pl. Semen. l. c. p. 309; O. und B. Fedtschenko l. c. p. 23.

Persia: prov. Gilan, in the forests at Imam Sadé Hashim.

Area: Temperate countries.

IV. **Pteris** L.

4. *P. cretica* L.; Ldb. fl. ros. IV p. 523; Buhse Aufz. p. 234; Bois. fl. or. V p. 727.

Persia: N. 2180, prov. Gilan, in the forests at Imam Sadé Hashim. Sept. 16. 1899.

Area: Southern Europe, northern Africa, south-western Asia, Japan, northern America.

V. **Pteridium** Gled.

5. *P. aquilinum* (L.) Kuhn; O. und B. Fedtschenko l. c. p. 21; — *Pteris aquilina* L.; Trautv. Enum. Song. p. 123; Buhse l. c. p. 234; Bunge Reliq. Lehman. p. 530; Bois. fl. or. V p. 728.

Persia: N. 2164, prov. Gilan, in the forests at Resht. Sept. 14. 1899.

Area: Allmost all over the world, except the tropics.

VI. **Scolopendrium** Sm.

6. *S. vulgare* Sm. *S. officinarum* Sw.; Ledeb. fl. ros. IV p. 522; Buhse l. c. p. 234; *S. officinale* Sm.; Bois. fl. or. V. p. 729.

N. 2177, prov. Gilan, in the forests at Imam Sadé Haschim. Sept. 16. 1899.

Area: Middle Europe and Asia, northern Africa and America.

VII. **Asplenium** L.

7. *A. Trichomanes* L.; Buhse l. c. p. 234; Bois. fl. or. V p. 731; O. und B. Fedtschenko p. 18.

Persia: N. 2173, prov. Gilan, in the forests at Imam Sadé Haschim. Sept. 16. 1899.

Area: Almost all over the world except in the tropics.

Aspidium Sw.

8. *A. aculeatum* (L.) Sw.; Bois. fl. or. V. p. 736; *Polystichum acul.* (L.) Roth; O. und B. Fedtschenko l. c. p. 17.

— — var. *lobatum* (Sw.) Hook. — *A. lobatum* (Sw.) Mett.; Luerssen in Rabenhorst Kryptogamenflora von Deutschland III p. 330.

Persia: N. 2176, prov. Gilan, in the forests at Imam Sadé Haschim. Sept. 16. 1899.

Area: Europe, western Asia, Himalaya.

IX. **Cystopteris** Bernh.

9. *C. fragilis* (L.) Bernh.; Trautv. Enum. Song. p. 122; Ledeb. fl. ros. IV p. 517; Bunge reliq. Lehman. p. 531; Buhse l. c. p. 234; Bois. fl. or. V p. 740; Duthie Pl. coll. on the Pamirs, in Alcock Rep. on the Pamir boundary commiss. Calcutta 1888. O. Fedtschenko Spisok rast. p. 171; O. und B. Fedtschenko l. c. p. 11; O. Fedtschenko flore du Pamir, Acta H. Petrop XXI St. Pb. 1903 p. 219. — *Aspidium fragile* Sw.; Kar. Kir. Enum. Alt., Bull. Soc. nat. Moscou 1841, p. 870; Kar. Kir. Enum. Song., Bull. Moscou 1842 p. 534; — *Woodsia glabella* Rgl. et *β. bipinnatisecta* Rgl. in Rgl. et Herder l. c.

Alai mountains: N. 480, in the juniper forests at Olgin Lug. Alt. 2600m. June 21. 1898. — Pamir: N. 1364, prov. Wakhan, at a Stream near Langarkisht. Alt. 3000m. Sept. 13. 1898.

Area: Almost all over the world, in the temperate countries.

Gnetaceæ.

Ephedra Tourn.

1. *E. distachya* L.; Bois. fl. or. V p. 713; Aitchison Afghan Delim. Com., p. 112; O. Fedtschenko Spisok rast. p. 170; — *E. vulgaris* Rich.; C. A. M. Mon. Eph., Mém. Ac. Pétersb. VI Ser. Sc. nat. Vp. 80 (270); Ldb. fl. ros. III p. 663; Trautv. Enum. song. p. 93; Buhse Aufz. Pers. Transc. Pfl. p. 204; Rgl. et Herd. pl. Semenov. l. c. 1868 p. 423; Hooker fl. brit. Ind. V p. 640; — *E. monostachya* L.; Kar. Kir. Enum. Alt., Bull. Moscou 1841 p. 747; Rgl. Pl. turk., Acta H. Petrop. VI p. 482; — *E. gerardiana* Wall.; Hemsley fl. of Tibet, Journ. Lin. Soc. 35. 1902 p. 198.

Alai mountains: N. 414, at Sufi Kurgan. Alt. 2100m. July 18. 1898. — Pamir: N. 1045, on an insolated spot near the lake Jashil Kul. Alt, 3800m. Aug. 5. 1898.

Area: Southern Europe, middle and Central Asia, Himalaya

2. *E. nebrodensis* Tin.; Bois. fl. or. V p. 713; *E. procera* F. et M.; Meyer Mon. Eph. p. 91 (296); Ldb. fl. ros. III p. 664; Rgl. Pl. turk. Acta H. Petrop. VI p. 480; Franchet Pl. Turkestan, Ann. Sc. nat. Bot. 6 Ser. 18. 1884 p. 253. — *E. equisetina* Bge Reliq. Lehman. p. 500; O. Fedtschenko Spisok rast l. c. p. 170.

Pamir: N. 1078, at the lake Jashil Kul. Alt. 3800m. Aug. 8. 1898 (♀); N. 969, on an insolated spot at the lake Jashil Kul. Alt. 3800m. Aug. 28. 1898 (sterile specimen, but with the characteristic habit of *E. nebrodensis*.)

Area: Southern Europe, western and middle Asia.

3. *E. alata* Dene; Meyer Mon. Eph. p. 94: Buhse Aufz. transcauc. pers. Pfl. p. 205; Bois. fl. or. V p. 717; *E. strobilacea* Bunge Reliq. Lehman. p. 499; Rgl. pl. turk. l. c. p. 484; Franchet l. c. p. 253; O. Fedtschenko Spisok rast. l. c. p. 170.

Buchara: N. 1836, in the desert near Ustyk. June 19. 1898.

Area: Northern Africa, western Asia.

4. *Ephedra Fedtschenkoi* n. sp.

Suffrutex monoica humilis. Rhizoma subterranea horizontaliter late repens, pennæ gallinae crassitie vel crassior, fusca, ramosa, multiceps. Ramuli viridi-striati scabriusculi, in speciminibus meis 2—6 cm longi, recti vel sæpius curvati. Vaginæ novellæ virido-flavæ, breviter bifidæ, seniores griseæ basi brunneæ. Amentæ masculæ breristipitatæ sæpius 4—5 floræ, antheræ 6—7-næ breviter pedunculatæ vel sedentes. Amentæ feminæ brevistipitatæ unifloræ, involucri folia 3, duo exteriora 2 mm longa obtusa, interius fere ad medium sæpissime impariter bifidum, ejus pars una convexa acuta nucula æquilonga vel parum brevior, pars altera plana vel minus convexa acuta nucula multo brevior. Nucula plano-convexa vel triangularis, acuta 4 mm longa. Tubillus brevis rectus.

E. dubia Rgl. ? Pl. turk. Acta H. Petrop. VI p. 482.

This species resembles *E. monosperma* Gmel. very much, it is different by the involucre, the nucleus and the tubillus. Perhaps it were to be regarded as a variety of *E. nebrodensis* Tin,. which has the same feminal characters. I have named it after Mrs. O. Fedtschenko, a remarkable oriental florist.

Pamir: N. 651, on dry mountains on an peninsula in the lake Kara Kul. Alt. 4200 m. July 1. 1898; — ? N. 848, on dry plains near the lake Jashil Kul. Alt. 3800 m. July 21. 1898. (This last having no feminal flowers I am not sure that it is not an *E. monosperma*.)

Cupressaceæ.

I. **Cupressus** Tourn.

1. *C. sempervirens* L.; Ldb. fl. ros. III p. 680; Buhse Aufz. Transc. Pers. Pfl. p. 205; Bois. fl. or. V p. 705; Hooker fl. brit. Ind. V p. 645.

Persia: N. 2225, in the Elburs-mountains at Mendjil. Octbr. 15. 1899.

Area: South-eastern Europe, western Asia.

II. **Juniperus** L.

2. *J. pseudo-sabina* Fisch. et Mey.; Schrenk Enum. Song. 1842 p. 13; Ldb. fl. ros. III p. 682; Trautv. Enum. Song. p. 94; Rgl. et

Herd. Pl. Semenov. Bull. Mosc. 1868, 1 p. 424; Rgl. Pl. turk., Acta H. Petrop. VI p. 487; Franchet Pl. turk. Ann. sc. nat. Bot. 6 Ser. 18. 1884 p. 254; Hooker fl. brit. Ind. V. p. 646; O. Fedtschenko, Spisok rast. p. 171.

A tree 10—12^{m} high.

Alai mountains: Nr. 449, 450, 463, at Olgin Lug. Alt. 2600^{m}—3000^{m}. June 20—21 1888.

Area: Middle and Central Asia.

3. *J. excelsa* M. Bieb.; Ldb. fl. ros. III p. 682; Bunge reliq. Lehman. p. 501; Buhse Aufz. Transc. Pers. Pfl. p. 205; Bois. fl. or. V p. 708; Aitchison Afghan Delim., Transact. Lin. Soc. 1888 p. 113; O. Fedtschenko Spisok rast. p. 170.

A small tree.

Pamir: N. 1465, Prov. Goran, in the Anderab-pass. Alt. 3700^{m}. Oct. 6. 1898.

Area: South-eastern Europe, western, middle and central Asia.

Lemnaceæ.

Lemna L.

1. *L. minor* L.; Ldb. fl. ros. IV p. 16; Trautv. Enum. Song. p. 97; Bois. fl. or. V. p. 29; Hooker fl. brit. Ind. VI p. 556; O. Fedtschenko Spisok rast. l. c. p. 145.

Buchara: N. 1679, in a pond. May 17. 1899.

Area: All over the world.

2. *L. gibba* L.; Bois. fl. or. V p. 30; Hooker fl. brit. Ind. VI p. 17; *Telmatophace gibba* Schleiden; Ldb. fl. ros. IV p. 17; Buhse Aufz. Transcauc. Pers. Pfl. p. 206.

Buchara: N. 1729, in a ditch. May 29. 1899.

Area: All over the world, but as it seems not in the tropics.

Typhaceæ.

Typha L.

1. *T. angustifolia* L.; Ldb. fl. ros. IV p. 2; Kar. Kir. Enum. Song. l. c. p. 520; Rgl. et Herder Pl. Semenov. l. c. p. 425; Bois. fl. or. V p. 49; Lipsky Bot. Eksk. sa Kaspij, Sapiski Kiew. Obs. Jestestw. XI 1900 p. 20, O. Fedtschenko Spisok rast. p. 144.

Chiwa: N. 2090, at the river Amu Daria. Aug. 13 1898.

Area: Europe, Africa, northern America, northern and western Asia.

2. *T. angustata* Bory and Chaub.; Bois. fl. or. V. p. 50; Aitchison Afghan Delim. Com., Transact. Lin. Soc. 1888 p. 120; Hooker fl. brit. Ind. VI p. 489. — *T. æqualis* Schnizlein Die Fam. d. Typhaceen 1845 p. 25 fig. 23.

This species hitherto unknown from the transcaspian countries differs from *T. angustifolia* by more dilated bracteoles.

Transcaspia: N. 1764, in a pond near Merw.

Area: South-eastern Europe, Egypt, Arabia, south-western Asia.

3. *T. stenophylla* F. et M.; Ldb. fl. ros. IV p. 2; Rgl. et Herder l. c. p. 425; Bois. fl. or. V p. 50; O. Fedtschenko Spisok rast. p. 144.

Chiwa N. 2091, at the river Amu Daria, Aug. 13. 1899.

Area: South-eastern Europe, western Asia.

4. *T. Laxmanni* Lepech.; Trautv. Enum. Song. p. 96; Ldb. fl. ros. IV p. 3; Rgl. et Herder l. c. p. 425; Bois. fl. or. V p. 50; Hooker fl. brit. Ind. VI p. 489; O. Fedtschenko Spisok rast. p. 144; — *T. minima* Funk; Bunge Reliq. Lehman. p. 503.

Amu Daria: N. 1814, on an island between Tschardshui and Chiwa. June 18. 1899; — N. 1830, ibid. more nothward than 1814. June 19. 1899.

Area: Central Europe, Transcaspia, Turkestan, Sibiria.

Juncaginaceæ.

Triglochin L.

1. *T. maritimum* L.; Ldb. fl. ros. IV p. 35; Bunge reliq. Lehman. p. 502; Buhse Aufz. transcauc. pers. Pfl. p. 207; Regl. et Herd. pl. Semenov. l. c. p. 427; Bois. fl. or. V. p. 13; Hook. fl. brit. Ind. V. p. 563; Duthie pl. coll. on the Pamirs n. 85; O. Fedtschenko Spisok rast. l. c. p. 145; B. A. et O. A. Fedtschenko: Rastenija Pamira, Mater. k. posnaniju fauni i flori rossijskoi Imp., otd. botan., wyp. 5. Moskva 1903, p. 67; O. Fedtschenko flore du Pamir p. 188.

Pamir: N. 704, in saline marshes at the river Murghab. Alt. 3800^{m}. July 8. 1898; — N. 877, in marshes at the river Alitshur, Alt. 3800^{m}. July 22. 1898; — Nr. 966. in marshes at the lake Jashil Kul. Alt 3800^{m}. July 27. 1898.

Area: Europe, northern, middle and central Asia, northern Africa and northern America.

2. *T. palustre* L.; Ldb. ibid.; Bunge ibid.; Bois. ibid.; Hook. ibid.; O. Fedtschenko ibid.; O. Fedtschenko et B. A. Fedtschenko ibid.

Alai mountains: N. 492, at the river Taldyk, Olgin Lug., Alt.

2600m. June 22. 1898. — Pamir: N. 702. in saline marshes at the river Murghab. Alt. 3800m. July 8. 1898; N. 994, in marshes at the lake Jashil Kul. Alt 3800m. July 27. 1898; N. 1190, at a hot spring near Jashil Kul. Alt. 3800m. Aug. 29. 1898.

Area: Europe. northern and central Asia, America.

Alismaceæ.

Butomus L.

B. umbellatus L.; Ldb. fl. ros. IV p. 43; Bunge Reliq. Lehman. p. 502; Rgl. et Herder Pl. Semenov. l. c. p. 428; Bois. fl. or. V p. 12; Franchet Pl. turk. Ann. sc. nat. 1884 p. 254; Hooker fl. brit. Ind. V p. 562; O. Fedtschenko Spisok Rast. l. c. p. 146.

Transcaspia: N. 1774, in a pond near Merw. June 5. 1899.

Area: Europe, northern, middle and central Asia.

Liliaceæ.

I. Tulipa L.

1. *T. altaica* Pall.; Kar. Kir. Enum. pl. alt. l. c. p. 851; Kar. Kir. Enum. Song. l. c. p. 506; Ldb. fl. ros. IV p. 135; Rgl. et Herder Pl. Semenov. l. c. p. 439; Rgl. Enum. Tulip., Acta H. Petrop. II 1873 p. 456; Rgl. Gartenflora 1878 t. 942; Rgl. Pl. turk. Acta H. Petrop. VI 1879 p. 506.

Ferghana: N. 1661, on a mountain near Osh. April 18. 1899.

Area: Middle and central Asia.

II. Gagea Salisb.

2. *G. chlorantha* (M. Bieb.) Schult. Syst. VII p. 264; Ldb. fl. ros. IV p. 142; Buhse l. c. p. 212; Rgl. et Herder l. c. p. 441; Rgl. Acta H. Petrop. III p. 291; Rgl. Botan. Issled., Isvest. Imp. Obs. Liub. Jest. Anthrop. i Etnogr. XXI,2 1876 p. 114 t. 20; Rgl. Pl. turk. Act. H. Petrop. VI p. 511; Franchet Pl. turk. l. c. p. 256; Bois. fl. or. V p. 209; O. Fedtschenko Spisok rast. p. 152. — ? *G. dschungarica* Rgl. Acta H. Petrop. VI p. 513; Aitchison, Afghan delim. Com. p. 119. — *Ornithogalum chloranthum* M. Bieb Fl. taur. cauc. III p. 264.

My specimens are glabrous caespitose and bear rather long flowers. the corolla varies from 7mm to 14mm in length. They are very like *G. damascena* Bois. et Gaill. (*G. caespitosa* Hausskn., of which I have seen the original specimens), but have not the long pedicels of this species. and the ovary is more truncate, the style a little shorter and somewhat clavate. There are short sheaths at the base of the stem. On the other hand the ovary agrees with the description of Regel („apice truncatum"),

but not with his figure (l. c. f. 7), where it is elliptic acute, whereas the ovary of my specimens is clavate-eliptic and very truncate, in transverse section triangular with concave sides. The filaments are not much shorter than the corolla, as drawn by Regel, but in young flowers „perigonio subdimidio breviores", as Boissier says. Also the ramification is as drawn by Regel.

Ferghana: N. 1617, spontaneous in the gardens of Osh. April 10. 1899.

Area: Turkestan, Persia.

3. *G. reticulata* (Pall.) Schult. Syst.; Ldb. fl. ros. IV p. 142; Bunge Reliq. Lehman. p. 513; Buhse l. c. p. 212; Rgl. bot. Issled. p. 110 tab. 19; Rgl. Acta H. Petrop. VI p. 510; Franchet pl. Turk. l. c. p. 255; Bois. fl. or. V p. 208; Hooker fl. brit. Ind. VI p. 356; Aitchison Afghan. delim. Com. p. 119; O. Fedtschenko Spisok rast. l. c. p. 152; B. A. et O. A. Fedtschenko Rast. Pamir. p. 68; O. Fedtschenko flore Pamir p. 190.

Transcaspia: N. 21, at Krasnowodsk.

Area: South-eastern Europe, northern Africa, middle and western Asia.

4. *G. persica* Bois. Diagn. pl. or. VII p. 108; Buhse l. c.p. 212; Bois. fl. or. V p. 210; Franchet pl. Turk. l. c. p. 255; Hooker fl. brit. India VI p. 355; Aitchison Afghan. delim. Com. p. 119. — *Gagea amblyopetala* (Bois.) Rgl. bot. Issled. p. 112 t. 17 f. 11—12; Rgl. Acta H. Petrop. III p. 290, VI p. 512; Aitchison l. c.

Ferghana: N. 1630, on a mountain near Osh. April 10. 1899.

— — Var. *stipitata* (Merckl.); *G. stipitata* Merckl. in Bunge Reliq. Lehman. p. 512; Rgl. Bot. Issled. p. 116 t. 19; Rgl. Acta H. Petrop. III p. 281, VI p. 512; Franchet pl. Turk l. c. p. 255; O. Fedtschenko Spisok Rast. p. 153; O. Fedtschenko flore Pamir p. 190; — *G. persia* var. *ebulbillosa* Bois. fl. or. V p. 210; *G. persica* (Bois.) Hook. fl. brit. Ind. VI p. 356.

Alaí mountains: N. 479, in the juniper forests at Olgin Lug. Alt. 2600^{m}. June 21. 1898. — Pamir: N. 1014, on moist slopes near the lake Jashil Kul. Alt. 4000^{m}. Aug. 1. 1898.

N. 479 contains very gracile specimens without radical leaves; the inferior cauline leaf is 2—3^{mm} bread. The ovary is distinctly stipitate. I do not know how to distinguish safely between *G. amblyopetala* Bois. et Heldr., *G. persica* Bois. and *G. stipitata* Merckl., the form of the ovary and the leaves I suppose are variable. Perhaps Boissier himself has confounded them: A specimen in the museum of Copenhagen named *Gagea persica* Bois. n. sp. (Th. Kotschy pl. Pers. Austr. Ed. Hohenacher 1845 N. 237) is cited in Diagn. pl. or. l. c. as *G. persica*, in Fl. or. l. c.

as *G. persica* var. *ebulbillosa* „sub. *G. amblyopetala*“. This plant (Kotschy N. 237) is rather like my N. 1014 (leaves filiform, a sheath surrounding the base of the stem), and these two are different from *G. persica* by the ovary which is stipitate by neither of them, and they call to mind Regels figures of *S. Olgæ* (bot. Issled. t. 18 f. 13—18), only the ovary is not linear-oblong (l. c. p. 116) but ovate.

III. **Fritillaria** L.

5. *F. ruthenica* Wickstr.; Ldb. fl. ros. IV p. 147; Bunge reliq. Lehman. p. 512; Rgl. et Herd. pl. Semen. l. c. p. 442; Rgl. bot. Issled. l. c. p. 147; Bois. fl. or. V p. 188.

Alai mountains: N. 481, in the Juniper forests at Olgin Lug. Alt. 2700m. June 21. 1898.

Area: Southern Russia, Turkestan, Songoria.

6. *F. Sewerzowi* (Rgl.) Bth. et Hook. Gen. Pl. III p. 818; Rgl. et Herd. pl. Semen. l. c. p. 443; — *Korolkowia Sewerzowii* Rgl. Acta H. Petrop. II p. 320; Rgl. Gartenflora 1873 tab. 760; Rgl. bot. Issled. l. c. p. 150.

Ferghana: N. 1657, on a mountain near Osh. April 18. 1899.

Area: Turkestan.

IV. **Lloydia** Salisb.

7. *L. serotina* (L.) Rchb.; Ldb. fl. ros. IV p. 144; Trautv. Enum. song. l. c. p. 102; Kar. Kir. Enum. song. l. c. p. 506; Rgl. et Herd. pl. Semen. l. c. p. 442; Rgl. bot. Issled. l. c. p. 130; Rgl. pl. turk., Acta H. Petrop. VI p. 513; Bois. fl. or. V p. 202; Hook. fl. brit. India VI p. 354; O. Fedtschenko Spisok rast. l. c. p. 154; B. A. et O. A. Fedtschenko l. c. p. 68; O. Fedtschenko flore Pamir l. c. p. 190; — *Nectarobothrium striatum* Ldb. fl. Alt. II p. 36; Bunge reliq. Lehman. p. 512; — *Lloydia himalensis* Royle Ill. p. 388 tab. 93 f. 2.

Alai mountains: N. 562, at Olgin Lug. Alt. 3200m. June 24. 1898. — Pamir: N. 1085, on moist ground in clefts at Jashil Kul. Alt. 4200m. Aug. 11. 1898.

Area: High mountains of Europe, Asia, northern America and in arctic regions.

V. **Allium** L. [1])

8. *A. monadelphum* Turcz.; Ldb. fl. ros. IV p. 168; Rgl. All. monogr., Acta H. Petrop. III p. 85; Rgl. bot. Issled. l. c. p. 48 tab. 8; Rgl. pl. turk. l. c. p. 516; Rgl. All. As. centr., Acta H. Petrop. X p. 307; Franchet

[1]) Mr. W. Lipsky of St. Petersburg has revided my determinations of these plants, and I have followed him (l. c.) in the limitation of the species.

pl. turk l. c. p. 258; Lipsky Material. flor. srednij Asiji, Acta H. Petrop. XVIII p. 111; O. Fedtschenko Spisok rast. l. c. p. 149. — Synonyma (sec. Lipski): *A. atrosanguineum* Schrenk, Ldb., Rgl.; *A. monadelphum* var. *atrosanguineum* Trautv., Rgl. et Herd., Hook.; *A. Fedtschenkoanum* Rgl., Hook., *A. Kaufmanni* Rgl., Franchet; *A. Semenovi* Rgl., Hook.; *A. tristylum* Rgl.

Alai mountains: N. 563, at Olgin Lug. Alt. 3100m. June 1898.

Area: Turkestan, Himalaya.

9. ***A. Cepa*** L.; Buhse l. c. p. 215; Rgl. All. mon. l. c. p. 92; Rgl. bot. Issled. l. c. p. 53; Rgl. pl. turk. l. c. p. 518; Rgl. All. as. centr. l. c. p. 314; Bois. fl. or. V p. 249; Hook. fl. brit. Ind. VI p. 337.

Chiwa: N. 2022, cultivated near Chodsheli. July 26. 1899.

Area: Cultivated all over the world.

10. ***A. Tschulpias*** Rgl. All. Mon. p. 107; Rgl. bot. Issled. p. 62 t. X; Rgl. pl. turk. l. c. p. 520; Rgl. All. As. centr. p. 319; Franchet pl. turk. l. c. p. 258; Lipski l. c. p. 117; O. Fedtschenko l. c. p. 150; Herb. fl. ros. N. 1190; Synonyma (Lipski l. c.): *A. rubellum* Rgl. in Rgl. et Herd. l. c. p. 446; non M. B., *A. Bahri* Rgl.

Samarkand: N. 252 b., in the steppe at Jangi Kurgan. May 22. 1898.

— — var. ***minus*** Lipsky l. c. p. 120; *A. Kuschakewiczi* Rgl., *A. tenue* Rgl. non Don.

Ferghana: N. 380, at Gultsha. Alt. 1100m. June 17. 1898.

Area: Turkestan.

11. ***A. polyphyllum*** Kar. Kir. Enum. song. l. c. p. 509; Ldb. fl. ros. IV p. 174; Trautv. Enum. Song. p. 105; Rgl. All. mon. p. 129; Rgl. Bot. Issled. p. 71 t. 12; Rgl. pl. turk. l. c. p. 523; Rgl. All. As. centr. p. 328; Franchet pl. turk. p. 258; B. A. et O. A. Fedtschenko l. c. p. 68.

Pamir: N. 958, on dry mountains near the lake Jashil Kul. Alt. 3900m. July 25. 1898.

Area: Mountains of Turkestan.

12. ***A. odorum*** L.; Ldb. fl. ros. IV p. 185; Rgl. All. mon. l. c. p. 175; Rgl. bot. Issled. l. c. p. 86; Rgl. pl. turk. l. c. p. 528; Rgl. All. As. centr. l. c. p. 346; Hooker fl. brit. Ind. VI p. 343.

Pamir: N. 761, in a dry river-bed at Kara-Su. Alt. 3800m. July 12. 1898.

Area: Middle, central- and eastern Asia, Japan.

13. ***A. tataricum*** L.; Ldb. fl. ros. IV p. 185; Rgl. et Herder Pl. Semen. p. 451; Rgl. All. mon. p. 178; Rgl. Bot. Issled l. c. p. 187

t. 14; Rgl. pl. turk. l. c. p. 529; Rgl. All. As. centr. l. c. p. 347; Franchet pl. turk l. c. p. 258; Bois. fl. or. V p. 246; Lipsky l. c. p. 125; O. Fedtschenko Spisok rast. p. 150. Synonyma (Lipski l. c.): *A. Korolkowi* Rgl.; *A. tenuicaule* Rgl.

Samarkand: N. 252 a, in the steppe at Jangi Kurgan. May 22. 1898. — Ferghana: N. 1658, on a mountain near Osh. April 18. 1899.

Area: Southern Russia, middle and central Asia.

14. *A. Schuberti* Zucc.; Rgl. All. mon. p. 239; Rgl. bot. Issled. l. c. p. 97; Rgl. pl. turk. l. c. p. 529; Rgl. All. As. centr. l. c. p. 356; Bois. fl. or. V p. 278; O. Fedtschenko Spisok rast. p. 151.

Ferghana: N. 1665, on the steppe at Dragomirowo near Chodshent. May 2. 1899.

Area: Western and middle Asia.

15. *A. atropurpureum* W. et K.; Rgl. All. mon. p. 247; Rgl. bot. Issled. l. c. p. 101; Rgl. pl. turk. l. c. p. 530; Rgl. All. As. centr. p. 359; Franchet pl. turk. l. c. p. 259; Bois. fl. or. V. p. 757; O. Fedtschenko l. c. p. 151.

Between Tashkent and Tshinas: N. 130. May 8. 1898.

Area: South-eastern Europe, western, middle and central Asia.

VI. **Eremurus** M. Bieb.

16. *E. robustus* Rgl., Acta H. Petrop. II p. 428; Rgl. Gartenflora 1873 t. 769; Rgl. Bot. Issled. l. c. p. 125; Rgl. pl. turk. l. c. p. 534; Curt. bot. Mag. tab. 6726; O. Fedtschenko Spisok rast. p. 153; — *Hemmingia robusta* Rgl. et Herd. pl. Semenov. l. c. p. 455.

Ferghana: N. 346, on hills at Issik bulak near Osh. June 16. 1898.

Area: Turkestan.

Convallariaceæ.

I. **Asparagus** L.

1. *A. verticillatus* L.; Ldb. fl. ros. IV p. 199; Trautv. Enum. Song. l. c. p. 109; Buhse Aufz. Transkauk. Pers. Pfl. p. 218; Rgl. et Herd. Pl. Semenov. l. c. 1868,2 p. 270; Rgl. Bot. Issled. l. c. p. 125; Rgl. pl. turk Act. H. Petrop. VI p. 535; Aitchison, Afghan. delim. Com. p. 116; Bois. fl. or. V. p. 339; O. Fedtschenko Spisok rast. p. 155.

Amu Daria: N. 1859, between Tshardshui and Chiwa, at Kavak-lé, in forests. June 23. 1899. — N. 1873, Ibid., near Ishak ravat, in forests.

Area: South-eastern Europe, western, middle and central Asia.

II. **Danaë** Medic.

2. *D. racemosa* (L.) Moench; Bois fl. or V. p. 341; *Ruscus racemosus* L.; Ldb. fl. ros. IV p. 130; Buhse l. c. p. 211.

Persia; N. 2169, prov. Gilan, in forests at Resht. Sept. 14. 1889.

Area: Syria, Persia, Caucasus.

III. **Smilax** L.

3. *S. excelsa* L.; Ldb. fl. ros. IV p. 128; Buhse l. c. p. 210; Bois. fl. or. V p. 342.

Persia: N. 2169, prov. Gilan, in the forests at Resht. Sept. 14. 1898.

Area: South-eastern Europe, western Asia, Azores.

Amaryllidaceæ.

Ixilirion Fisch.

I. pallasii Fisch et Mey.; Ldb. fl. ros. IV p. 116; Buhse l. c. p. 210; Bois. fl. or V. p. 154; Lipsky Bot. Eksk. sa Kasp., Sap Kiew. Obs. XI 1900 p. 21; — *I. tataricum* Herb.; Bunge reliq. Lehm. p. 508; Rgl. et Herd. pl. Semen. l. c. 1868 p. 434; Rgl. pl. turk. A. H. Petrop. VI p. 492; Franchet pl. turk., l. c. p. 261; O. Fedtschenko Spisok rast. p. 148; — *Amaryllis tartarica* Pall. It. III.

— — var. ***typicum*** Rgl. pl. Semen., pl. turk.

Transcaspia: N. 45, in the steppe at Bami. April 24. 1898. — Samarkand: N. 114. May 5. 1898. — Ferghana: N. 1656, on a mountain near Osh. April 18. 1899.

— — var. *Ledebourii* (F. et M.) Rgl. l. c. *I. Ledebourii* F. et M. Alai mountains: N. 516, near Olgin Lug. Alt. 2600 m. June 24. 1898.

Area: Transcaspia, Turkestan.

Iridaceæ.

I. **Iris** L.

1. *I. caucasica* Hoffm.; Ldb. fl. ros. IV p. 100; Buhse l. c. p. 209; Rgl. et Herd. Pl. Semen. l. c. 1868 p. 433; Rgl. pl. turk l. c. p. 497; Bois. fl. or. V p. 121; Franchet pl. turk. l. c. p. 262; Baker Irideæ, London 1892 p. 45; O. Fedtschenko Spisok rast. p. 147.

Transcaspica: N. 47, in the steppe at Bami. April 24. 1898.

Area: Western Asia, Turkestan.

2. *I. falcifolia* Bunge Reliq. Lehm. p. 505; Rgl. pl. turk. l. c. p. 495; Bois. fl. or. V. p. 433; Baker Irideæ p. 30; Aitchison, Afghan. delim. Com. p. 114.

Transcaspia: N. 58, in the steppe at Babadurmas. April 24. 1898.

Area: Turkestan, Afghanistan, Belutshistan.

3. *I. ensata* Thunb.; Rgl. pl. turk. l. c. p. 496; Rgl. Gartenflora 1880, t. 1011; Bois fl. or. V p. 127; Baker Irideæ p. 8; O. Fedtschenko Spisok rast. p. 147; — *I. biglumis* Vahl; Ldb. fl. ros. IV p. 95; Rgl. et Herder pl. Semen. l. c. p. 432.

Ferghana: N. 305, between Margilan and Andidshan, at Kuwa. May 27. 1898.

Area: Temperate Asia.

II. **Crocus** L.

4. *C. alatavicus* Rgl. et Semen. in Rgl. et Herd. l. c. p. 434; Rgl. Acta H. Petrop. V p. 261; Rgl. pl. turk. l. c. p. 496; Rgl. Gartenflora 1877, t. 906; Baker Irideæ p. 84.

Alai mountains: N. 1608, near Olgin Lug. Alt. c. 3000^{m}. March 30. 1899.

Area: Asia Media.

Juncaceæ.

Juncus L.

1. *J. triglumis* L.; Kar. Kir. Enum. Song. l. c. p. 519; Ldb. fl. ros. IV p. 233; Trautv. Enum. Song. l. c. p. 111; Rgl. in Acta H. Petrop. VII p. 554 (v. *fuscatus* Rgl.); Bois. fl. or. V p. 355; Hook. fl. brit. India VI p. 396; O. Fedtschenko Spisok rast. p. 155 (v. *nigricans* Rgl.).

Pamir: N. 952, in marshes at the lake Jashil Kul. Alt. 3800^{m}. July 25. 1898.

Area: Arctic countries, mountains of northern temperate countries.

2. *J. compressus* Jacq.; Ldb. fl. ros. IV p. 229; Bois. fl. or. V p. 355; Hook. fl. brit. Ind. VI p. 393; *J. bulbosus* L.; Bunge reliq. Lehman. p. 517 (ex p.); Trautv. Enum. song. p. 110; *J. bulbosus* L. v. *compressus* (Jacq.) Rgl. in Rgl. et Herd. Pl. Semenov. l. c. p. 139; Rgl. in Acta H. Petrop. VII p. 553.

Chiwa: N. 2084, in the shore of the river Amu Daria at Kisil-Yi. Aug. 12. 1899.

Area: Temperate Europe and Asia, Turkestan, Himalaya.

3. *J. lampocarpus* Ehrh.; Kar. Kir. Enum. alt. l. c. p. 857, Enum. song. l. c. p. 519; Bunge reliq. Lehman. p. 517; Rgl. et Herd. l. c. p. 138; Bois. fl. or. V p. 358; Hooker fl. brit. India VI p. 395; Aitchison Afghan. Delim. Com. p. 120; O. Fedtschenko l. c. p. 155; — *J. articulatus* L.:

Ldb. fl. ros. IV p. 225; Buhse l. c. p. 220; Trautv. Enum. song. p. 110; Rgl. Acta H. Petrop. VII p. 553.

Pamir: N. 1181, at a hot spring near the lake Jashil Kul. Alt. 3900^{m}. Aug. 29. 1898. — N. 1441, prov. Wakhan, in svamps at Sermut. Alt. 2700^{m}. Sept. 29. 1898. — Chiwa: in the shore of a salt-lake at Chasawat. July 15. 1899.

Area: North-America, Europe, northern Africa, western and middle Asia, Sibiria.

4. *J. bufonius* L.; Kar. Kir. Enum. alt. l. c. p. 857; Bunge reliq. Lehman. p. 517; Ldb. fl. ros. IV p. 231; Trautv. Enum. p. 111; Rgl. et Herd. Pl. Semenov. l. c. p. 141; Rgl. Acta H. Petrop. VII p. 554; Bois. fl. or. V. p. 361; Hooker fl. brit. Ind. VI p. 392; O. Fedtschenko Spisok rast. p. 156.

Pamir: N. 1299, Wakhan, in cultivated land at Langarkisht. Alt. 3000^{m}. Sept. 8. 1898. — N. 1344, Wakhan, in cultivated land at Sunk. Alt. 3000^{m}. Sept. 10. 1898.

Area: Temperate regions.

Orchidaceæ.

Orchis turcestanica Klinge, Acta H. Petrop. XVII,1 p. 183; B. A. & O. A. Fedtschenko l. c. p. 67; — *O. incarnata* L. v. *Kotschyi* Rchb. Ic. fl. Germ. XIII—XIV t. 162, fig. 3.

I have seen no authentic specimen of this species, but my plants agree with Klinges description and Reichenbachs figure, still the leaves are rather broad.

Alai mountains: N. 427, in marches at Sufi Kurgan. Alt. 2100^{m}. June 18. 1898.

Area: Caucasus, Persia, middle and central Asia, Mongolia.

Salicaceæ.

I. **Populus** Tourn.

1. *P. alba* L.; Ldb. fl. ros. III p. 626; Bunge reliq. Lehman. p. 498; Buhse l. c. p. 202; Hooker fl. brit. India V, p. 638.

— — v. *genuina* Wesm. DC Prod. XVI p. 324; O. Fedtschenko Spisok rast. p. 141.

At Samarkand: N. 84. May 3. 1898.

— — var. *alba* Wesm. l. c.; Franchet pl. turk. l. c. p. 253; O. Fedtschenko l. c.

Chiwa: N. 1988, in cultivated land. July 15. 1899.

Area: Europe, western and middle Asia, East-India, Sibiria.

2. *P. balsamifera* L.; Hook. fl. brit. Ind. V p. 638; O. Fedtschenko Spisok rast. p. 142.

— — var. *laurifolia* (Ldb.) Wesm. DC Prod. XVI p. 330; Franchet pl. turk. l. c. p. 253; O. Fedtschenko l. c.; — *P. laurifolia* Ldb. fl. alt. IV p. 297; Ldb. fl. ros. III p. 629; Ldb. Ic. pl. fl. Ros. t. 479.

Pamir: N. 1339, prov. Wakhan, in cultivated land at Langarkisht. Alt. 3000^{m}. Sept. 10. 1898.

Area: Northern America, Europe, Sibiria, Asia-Media.

3. *P. pyramidalis* Roz.; Bois. fl. or. IV p. 1194.

Samarkand: N. 85, cultivated. May 3. 1898.

Area: Europe, western Asia.

4. *P. pruinosa* Schrenk; Ldb. fl. ros. III, p. 628; Trautv. Enum. Song. l. c. p. 91; Rgl. et Herd. pl. Semenov. l. c. p. 97; Rgl. Acta H. Petrop. VI p. 474; O. Fedtschenko Spisok rast. p. 142; Herb. fl. Ros. N. 1135, 1135a et b.

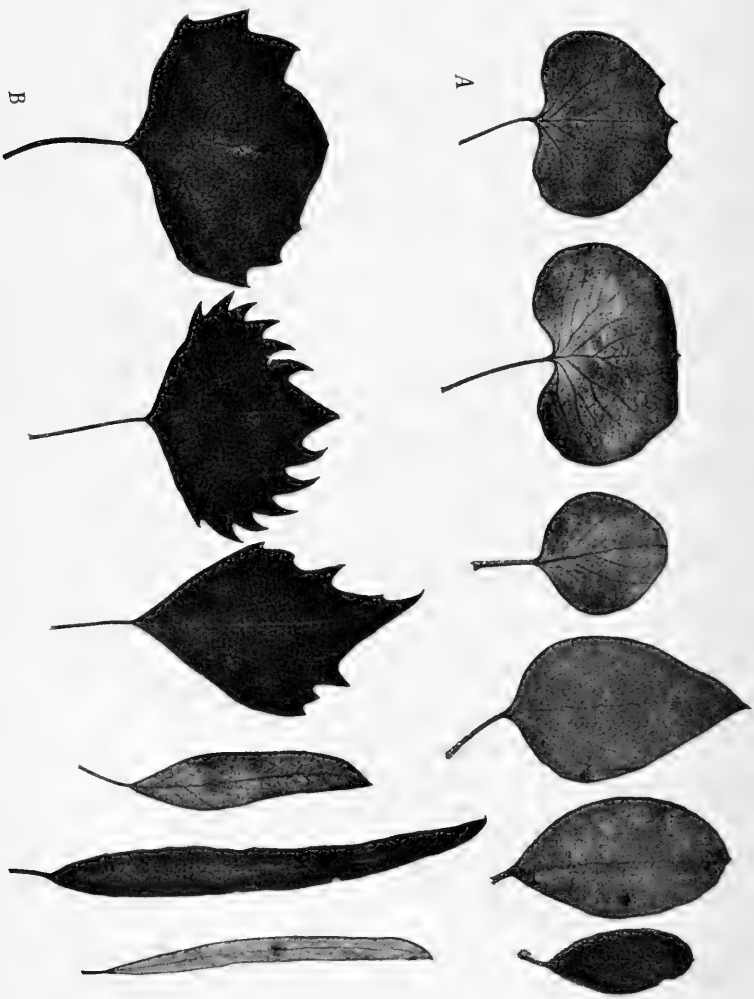
Regel (Acta H. Petrop. VI) consider *P. pruinosa* as a variety of the following species, but he is not right in doing so. Hitherto *P. pruinosa* has been imperfectly described, neither of the descriptions mentioning the catkins. Now, in the „Schedae ad Herbarium florae Rossicae", Mr. Litwinow gives the following remarks on the difference between this species and *P. euphratica*: „A P. euphratica differt praeter indumentum gemmarum ramulorumque juniorum et foliorum formam (quae in P. pruinosa minus variabiles sunt), perigonio ad medium v. ad basin usque in dentes crebriores diviso, non margine tantum dentato, stigmatibus laxioribus (longius pedicellatis), antheris obtuse apiculatis, nec omnino muticis."

Besides, the catkins of *P. pruinosa* often are shorter and more dense-flowered and the capsules are velutine. And having seen a series of samples of both species I can add, that the variation of the leaves in the two species is quite different, *P. pruinosa* varying from reniform and subvelutine to ovoid and densely velutine, and the glabrous *P. euphratica* from reniform through ovoid to linear. See the figures.

Transcaspia: N. 192, cultivated at Tshardshui. May 5. 1898; — Amu Daria: N. 1824, on an Island („Shatman Togai") between Tshardshui and Chiwa. June 19. 1899. A tree 8^{m} high; N. 1825, Ibid. A shrub, 1—2^{m} high. Leaves oblong-ovoid, white velutine; N. 1860, Kavak-lé at the river Amu Daria, between Tshardshui and Chiwa, in forests. June 23. 1899.

Area: Middle and central Asia.

5. *P. euphratica* Oliv.; Buhse l. c. p. 202; Trautv. Enum. Song. l. c. p. 91; Rgl. et Herd. Pl. Semenov. l. c. p. 97; Rgl. Acta H. Petrop. VI p. 473; Bois. fl. or. IV p. 1194; Aitchison Afghan. delim. Com. p. 111; Hook. fl. brit. Ind. V p. 638; O. Fedtschenko Spisok rast. p. 142; Herb.



A: Variations of leaves of Populus pruinosa.
B: — . — . — euphratica.

fl. Ross. N. 1134, 1134a et b; — *P. diversifolia* Schrenk; Trautv. Imag. pl. Ros. t. 16; Ldb. fl. ros III p. 627; Bunge reliq. Lehman. p. 498.

Transcaspia: N. 1756, cultivated in sandy desert at Rabnina. June 2. 1899. — Chiwa: N. 2011, at Kiptjak near the river Amu Daria. July 24. 1899. — N. 2013, Ibid.

Cupuliferæ.

I. **Alnus** Tourn. (Det. J. Repstock).

1. *A. cordifolia* Ten.; Ldb. fl. ros. III p. 658; Bois. fl. or. IV p. 1179.

— — var. *subcordata* (C. A. M.) Rgl. Mon. Betul. p. 112 t. 11 fig. 20; Bois. l. c. *A. subcordata* C. A. M.

Persia: N. 2195, Gilan, in forests at Imam Sadé Hashim. Sept. 17. 1899.

Area: Southern Italia, western Asia.

2. *A. glutinosa* Willd.; Ldb. fl. ros. III p. 657; Trautv. Enum. song. p. 93; Bunge reliq. Lehman. p. 495; Rgl. Mon. Betul. p. 104; Buhse l. c. p. 204; Bois. fl. or. IV p. 1180.

— — var. *barbata* (C. A. M.) Ldb. l. c.; Rgl. l. c.; Buhse l. c.; *A. barbata* C. A. M.

Persia: N. 2168, Gilan, in forests at Resht. Sept. 14. 1899.

Area: Europe, northern Africa, Sibiria.

II. **Betula** Tourn.

3. *B.* sp. (*B. songorica* Rgl.?).

A small tree without catkins, agrees with Pallas' fig. D in Fl. ros. t. I pars I t. 39 *(B. alba)*. — *B. alba* v. *songorica* Rgl. in Rgl. et Herder pl. Semenov. l. c. p. 99.

Pamir: N. 1274, Djangarlik at the river Pamir daria. Alt. 3700^{m}. Sept. 6. 1898.

III. **Carpinus** Tourn.

C. Betulus L.; Ldb. fl. ros. III p. 587; Buhse l. c. p. 199; Bois. fl. or. IV p. 1177.

Persia: N. 2196, Gilan, in forests at Batshinar. Sept. 17. 1899.

Area: Europe, western Asia.

IV. **Quercus** Tourn.

5. *Q. Cerris* L.?; *Q. castaneaefolia* C. A. M.; var. ***foliis subtus glabris*** Buhse l. c. p. 200.

Without flower or fruit. The leaves seem to appear to *Q. Cerris*, beeing very short petioled and almost glabrous.

Persia: N. 2185, Gilan, in forests at Imam Sadé Hashim. Sept. 16. 1899.

Urticaceæ.

I. **Urtica** Tourn.

1. *U. dioica* L.; Kar. Kir. Enum. song. l. c. p. 450; Bunge reliq. Lehman. p. 493; Ldb. fl. ros. III p. 637; Trautv. Enum. Song. l. c. p. 92;

Bois. fl. or. IV p. 1146; Franchet pl. turk. l. c. p. 249; Hook. fl. brit. Ind. V. p. 548; O. Fedtschenko Spisok rast. p. 143.

— — var. *angustifolius* Ldb. l. c.

Pamir: N. 1510, Garan, in cultivated land at Darmarght. Alt. 2400m. Oct. 10. 1898.

Area: Northern America, Europe, northern Africa, northern and high Asia.

II. **Parietaria** L.

2. *P. officinalis* L.; Bois. fl. or. IV p. 1149; *P. erecta* M. K.; Ldb. fl. ros. III p. 639, Buhse l. c. p. 203; Aitchison Afghan. delim. Com. p. 110.

Persia: N. 2178, Gilan, in forests at Imam Sadé Hashim. Sept. 16. 1899.

Area: Europe, northern Africa, western Asia.

III. **Morus** L.

3. *M. alba* L.

Samarkand: N. 90. May 3. 1898 (flowering). — Ferghana: N. 284, at Margelan. May 27. 1898 (fruiting). — Buchara: N. 1740, May 29. 1899 (cultivated).

Cannabaceæ.

I. **Cannabis** L.

1. *C. sativa* L.

Chiwa: N. 2042, at Kunja Urgentsh, cultivated. July 30. 1899.

II. **Humulus** L.

H. Lupulus L.; Kar. Kir. Enum. song. l. c. p. 451; Ldb. fl. ros. III p. 635; Buhse l. c. p. 202; Bunge reliq. Lehman. p. 494; Bois. fl. or. IV p. 1152; Hook. fl. brit. Ind. V p. 487.; Aitchison Afghan. delim. com. p. 109.

Persia: N. 2163, Gilan, in forests at Resht. Sept. 14. 1899.

Area: Europe, north America, western and middle Asia.

Polygonaceæ.

I. **Rumex** L.

The specimens of this genus I have given to Mr. W. Lipsky in St. Petersburg, who has the intension to study the species from Central-Asia of this genus.

II. **Rheum** L.

1. *R. spiciforme* Royle Ill. Himal. 1839 p. 318, t. 78; Rgl. et Herd. pl. Semenov. l. c. p. 82; DC. Prodr. XIV p. 36; Hook. fl. brit. Ind. V p. 55; Hemsley fl. of Tibet. Journ. Lin. Soc. 35, 1902 p. 197; O. Fedtschenko Spisok rast. p. 134; B. A. et O. A. Fedtschenko l. c. p. 64; O. Fedschenko flore Pamir p. 181. — *R. rhizostachyum* Schrenk Bull. Ac. St. Petersb. X, 1842; Ldb. fl. ros. III p. 498; Trautv. Enum. Song. p. 76; DC. Prodr. l. c. *R. aplostachyum* Kar. Kir.

Alai steppe: N. 617, at Bordo Ba. Alt. 3400m. June 28. 1898. — Pamir: N. 660, at the river Muskol. Alt. 4100m. July 2. 1898. — N. 983: at the river Mardjanai. Alt. 3800m. July 28. 1898.

Area: Pamir, Central-Asia, Himalaya.

2. *R. Webbianum* Royle Ill. Himal. p. 318 t. 17 a; Hook. fl. brit. Ind. V p. 57.

Alai mountains: N. 575, in the Juniper forests at Olgin Lug. Alt. 3000m. June 25. 1898.

Area: Pamir, Himalaya.

III. **Oxyria** Hill.

3. *O. digyna* (L.) Campd.; Bois. fl. or. IV p. 1004; Franchet pl. turk. l. c. p. 243; Hook. fl. brit. Ind. V p. 58; Duthie plants coll. on the Pamirs, N. 82; O. Fedtschenko fl. Pamir p. 182; *O. reniformis* Hook.: Kar. Kir. Enum. Alt. l. c. p. 742, Enum, Song. l. c. p. 441; Ldb. fl. ros. III p. 498; Buhse Aufz. transk. pers. Pfl. p. 191; Trautv. Enum song. l. c. p. 76; Rgl. et Herd. pl. Semenov. l. c. p. 83; O. Fedtschenko Spisok rast. p. 134.

Alai mountains: N. 539, at the Taldyk-river. Alt. 2600m. June 24. 1898.

Area: Europe, north America, northern and high Asia.

IV. **Atraphaxis** L.

4. *A. pungens* (M. Bieb.) Jaub. et Spach Ill. pl. or. II p. 14; Trautv. Enum. Song. p. 78; Rgl. et Herd. pl. Semenov. p. 85; Rgl. in Acta H. Petrop. VI p. 398; O. Fedtschenko Spisok rast. p. 135; *Tragopyrum pungens* M. Bieb fl. taur. cauc. III p. 285; Ldb. fl. ros. III p. 515; *A. pyrifolia* Bunge Reliq. Lehman. p. 483; Bois. fl. or. IV p. 1023; Franchet pl. turk. l. c. p. 243.

α latifolium Ldb. l. c.; *α typica* Rgl. l. c., O. Fedtschenko l. c.

Ferghana: N. 1902, in the bed of the Kurshab-river, near Gultsha. June 6. 1898.

Area: Caucasus, Asia-Media, southern Sibiria.

5. *A. spinosa* L.; Ldb. fl. ros. III p. 514; Buhse Aufz. transk. pers. Pfl. p. 193; Bunge reliq. Lehman. p. 482; Trautv. Enum. Song. p. 77; Rgl. et Herder pl. Semenov. p. 83; Trautv. in Acta H. Petrop. I p. 280; Rgl. in Acta H. Petrop. VI p. 395 (errore *A pungens* L.); Bois. fl. or. IV p. 1020; Aitchison Afghan. delim. Com. p. 105; O. Fedtschenko Spisok rast. p. 135.

Persia: N. 2192a, Gilan, in forests at Batschinar. Sept. 17. 1899.

— — var. *compacta* (Ldb.) Trautv. Acta H. Petrop. I p. 280; Rgl. in Acta H. Petrop. VI p. 395; O. Fedtschenko l. c.; *Atraphaxis compacta* Ldb. fl. ros. III p. 513; Bois. fl. or. IV p. 1021; Franchet pl. turk. l. c. p. 243.

Chiwa: N. 1998, on the mountain „Sultan Babá". Juli 24. 1899.

Area: Southern Russia, Caucasus, middle and central Asia.

V. **Pteropyrum** Joub. et Sp.

6. *P. Olivieri* Jaub. Sp. Ill. pl. or. II p. 9 tab. 108; Bois. fl. or. IV p. 1002; Hook. fl. brit. Ind. V p. 23.

Persia: N. 2192b, Gilan, in forests on the Elburs mountains near Batschinar. Sept. 17. 1899.

Area: East India, Afghanistan, Persia.

VI. **Calligonum** L.

7. *C. Caput Medusæ* Schrenk; Kar. Kir. Enum. Song. l. c. p. 443; Ldb. fl. ros. III p. 495; Bunge reliq. Lehman. p. 485; Borszczow Aralo-Casp. Callig., Mém Ac. Imp. sc. St. Petersb. 1860 p. 39; Trautv. Enum. Song. p. 75; O. Fedtschenko Spisok. rast. p. 133; Hb. fl. Ros. N. 437.

— — var. *rubicundum* Herd.; Rgl. in Acta H. Petrop. VI p. 394; O. Fedtschenko l. c. Hb. fl. Ros. N. 737.

It seems to me that the direction of the torsions in the fruit is of no specific value. The fruits of my specimens have a left-hand screw, and the same is the case in some of the fruits given to me by Mr. Paleski of Tshardshui, while others from the same hand have right-hand screws. According to Borszczow the screw shall be right-hand as he figures is. Many plants (e. g. *Atriplex*) bear left- and right-hand screws on the same specimen.

Transcaspia: N. 1751, in the desert at Repetek. June 2. 1899.

Area: Middle and central Asia.

C. comosum l'Hér.; Bunge reliq. Lehman. p. 488; Borszczow Aralo Casp. Callig p. 28; Bois. fl. or. IV p. 1000;? Aitchison, Afghan. delim. Com. p. 104.

Transcaspia, N. 1745, in the desert near Barachaná. June 2. 1899 (imported species).

Area: Northern Africa.

VII. **Polygonum** L.

9. *P. viviparum* L.; Ldb. fl. ros. III p. 519; Trautv. Enum. Songor. p. 79; Bunge reliq. Lehman. p. 487; Rgl. et Herd. pl. Semenov. p. 86; Bois. fl. or. IV p. 1027; Franchet pl. turk. l. c. p. 246; Hook. fl. brit. Ind. V p. 31; Duthie l. c. N. 80; Hemsley fl. of Tibet p. 197; O. Fedtschenko Spisok rast. p. 135; B. A. et O. A. Fedtschenko Rast. Pamira p. 64; A. T. Gage: A Census o. t. Indian Polygonums, Records o. t. bot. Survey of India II 1903 p. 388; O. Fedtschenko Flore du Pamir St. Petersb. 1903 p. 183.

Pamir: N. 800, near the Alitshur-stream at Bosalá. Alt. 2900^{m}. July 16. 1898; N. 965, in marshes at the lake Jashil Kul. Alt. 2800^{m}. July 26. 1898.

Area: Arctic regions, high mountains of the temperate regions.

10. *P. pamiricum* Korshinsky in Mém Ac. Imp. Sc. St. Pétersb. 1896 p. 98; B. A. et O. A. Fedtschenko Rast. Pamira p. 65; O. Fedtschenko fl. du Pamir p. 183.

Pamir: N. 645, on the seashore of the salt-lake Kara Kul., Alt. 4000^{m}, July 1. 1898; N. 880, in marshes at the Alitshur-stream, Alt. 3800^{m}, July 22. 1898; N. 1203, at the salt-lake Tus-Kul., Alt. 3800^{m}, Aug. 31. 1898.

Area: Pamir.

11. *P. amphibium* L., var. *natans* Moench; Kar. Kir. Enum. alt. l. c. p. 740; Ldb. fl. ros. III p. 520; Trautv. Enum. Song. p. 79; Bunge reliq. Lehman. p. 487; Rgl. et Herd. Pl. Semenov. l. c. p. 86; Bois. fl. or. IV p. 1028; Hook. fl. brit. Ind. V p. 34; O. Fedtschenko Spisok Rast. p. 125; Gage Polyg. India l. c. p. 394.

Pamir: N. 1443, prov. Ishkashim, in a pond at Rang, Alt. 2700^{m}, Oct. 1. 1898. — Chiwa: N. 2078, in a pond, former an arm of the river Amu Daria, at Giaur Kala, Aug. 11. 1899.

Area: Northern Europe, northern America, Sibiria, western and middle Asia.

12. *P. Hydropiper* L.; Ldb. fl. ros. III p. 523; Buhse Aufz. transk. pers. Pfl. p. 194; Trautv. Enum pl. Songor. p. 80; Bunge reliq. Lehman. p. 488; Bois. fl. or. IV p. 1029; O. Fedtschenko Spisok rast. p. 136; Gage Polyg. India l. c. p. 401.

Persia: N. 2160, prov. Gilan, near Resht, Sept. 14. 1899.

Area: Europe, northern Africa, northern America, Sibiria, central, middle and western Asia.

13. *P. lapathifolium* L.; Kar. Kir. Enum. alt. l. c. p. 740; Ldb. fl. ros. III p. 521; Trautv. Enum. Song. p. 80; Bunge reliq. Lehman. p. 487;

Rgl. et Herd. Pl. Semenov. p. 86; Bois. fl. or. IV p. 1030; Franchet pl. turk. l. c. p. 245; Hook. fl. brit. Ind. V p. 35; Gage Polyg. India l. c. p. 395.

Pamir: N, 1285, prov. Wakhan, in cultivated land near Langarkisht, Alt. 3000^{m}, Sept. 8. 1898.

Area: Europe, America, Asia.

14. *P. rumicifolium* Royle; Hook. fl. brit. Ind. V p. 51; Bab. Transact. Lin. Soc. XVIII p. 112; Aitchison Kuram Valley, Journ. Lin. Soc. XVIII p. 90; Gage Polyg. India l. c. p. 415; ? *Fagopyrum ramoso-spicatum* Klotzsch. Bot. Ergebn. Prz. Waldemar 1862 tab. 87.

Alai mountains: N. 464, in the Juniper forests at Olgin Lug, alt. 2700^{m}, June 21. 1898.

My specimen is quite like a specimen in the herbarium of St. Petersburg, collected in Kungei Alatau by Mr. Brotherus (N. 778) and determinated by Mr. Lindau, and it is very like another specimen in hb. Petrop. of the Herbarium of Royle. The leaves of my specimen are $2^{1}/_{2}$—3^{cm} long and 4—$4^{1}/_{2}{}^{cm}$ broad; the petioles are $2^{1}/_{2}$—4^{cm} long. The ochreæ are retrorsely hairy, the flowers red, very young.

Area: Himalaya, Alatau, Altai.

15. *P. alpinum* All.; Kar. Kir. Enum. alt. l. c. p. 740; Bunge reliq. Lehman. p. 488; Bois. fl. or. IV p. 1031; Franchet pl. turk. l. c. p. 246; Hook. fl. brit. Ind. V p. 49; Gage Polyg. India l. c. p. 413. — *P. polymorphum* Ldb. fl. ros. III p. 524; Trautv. Enum. Song. p. 80; Rgl. et Herd. pl. Semenov. l. c. p. 87; O. Fedtschenko Spisok rast. l. c. p. 136.

Pamir: N. 1048, at the western end of the lake Jashil Kul., Alt. 3800^{m}, Aug. 5. 1898 (flowering spec.); N. 1525, prov. Garan, at Kuh-i-lal, Alt. 2600^{m}, Oct. 14. 1898 (fruiting spec.).

Area: Southern Europe, Sibiria, central, middle and western Asia.

16. *P. acerosum* Meissn. DC Prodr. XIV p. 92; Trautv. Enum. Song. l. c. p. 83; Rgl. et Herd. Pl. Semenov. p. 85; O. Fedtschenko Spisok rast. p. 137; O. Fedtschenko fl. Pamir p. 185.

Alai mountains: N. 410, at Sufi Kurgan, Alt. 2100^{m}, June 18. 1898; N. 502, at Olgin Lug, Alt. 2600^{m}, June 22. 1898 (a small form).

Area: Middle and central Asia.

17. *P. Bellardi* All.; Ldb. fl. ros. III p. 530; Bunge reliq. Lehman p. 488; Buhse Aufz. transk. pers. Pfl. p. 193; Bois. fl. or. IV p. 134; Aitchison Kuram Valley l. c. p. 90; Aitchison Afghan. delim. Com. p. 105; Gage Polyg. India l. c. p. 380. — *P. aviculare* var. *stricta* Trautv. Enum. Song. p. 82.

Ferghana: N. 294, in cultivated land at Margelan, May 27. 1898.

— — var. *gracilius* Ldb. l. c.

Chiwa, in mud at the river Amu Daria, near Kisil-yi. Aug. 12. 1898.

Area: Southern Europe, northern Africa. Sibiria, Asia-media. western Asia, Afghanistan.

18. *P. aviculare* L.; Kar. Kir. Enum. alt. l. c. p. 740; Enum. song. p. 440; Ldb. fl. ros. III p. 531 (var. *procumbens*); Bunge reliq. Lehman. p. 488; Trautv. Enum. Song. p. 81; Buhse Aufz. transc. per. Pfl. p. 193; Rgl. et Herd. pl. Semenov. l. c. p. 85; Bois. fl. or. IV p. 1036; Franchet pl. turk. l. c. p. 245; Hook. fl. brit. Ind. V p. 26; Aitchison Afghan. delim. Com. p. 105; O. Fedtschenko Spisok Rast. p. 136: Gage Polyg. India l. c. p. 379.

Pamir: N. 1283, prov. Wakhan, in cultivated land at Langarkisht. Alt 3000m, Sept. 8. 1898.

Area: All the world.

19. *P. cognatum* Meissn. Mon. Polyg. 1826 p. 91; Ldb. fl. ros. III p. 533; Meissn. in DC. Prodr. XIV p. 96; Trautv. Enum. Song. p. 84; Buhse Aufz. transk. pers. Pfl. p. 193; Rgl. et Herd. Pl. Semenov. p. 85; Hook. fl. brit. Ind. V p. 25; O. Fedtschenko Spisok Rast. p. 137; Gage Polyg. India l. c. p. 378. — *P. alpestre* C. A. M. 1831; Jaub. Sp. Ill. pl. or. II t. 118; Bois. fl. or. IV p. 1037.

— — var. *alpestre* (C. A. M.) Meissn. DC. Prodr. l. c. — *P. cognatum* var. *α* Ldb. l. c.; O. Fedtschenko l. c.

Pamir: N. 818, on dry mountains near the lake Jashil Kul.. Alt. 3800m.

— — var. *rupestre* (Kar. Kir.) Meissn. l. c.; Trautv. Enum. song. p. 84. — *P. rupestre* Kar. Kir. enum. alt. l. c. p. 740, Enum. song. p. 440; — *P. cognatum* var. *β* Ldb. l. c.

Alai steppe: N. 605, at the river Kisil-su, near Sarytash., Alt 3300m, June 27. 1903.

Area: Central. middle and western Asia.

20. *P. paronychioides* C. A. M.; Meissn. in DC. Prodr. XIV p. 89; Bois. fl. or. IV p. 1040; Franchet pl. turk. p. 245; Hook. fl. brit. Ind. V p. 26; Aitchison Kuram Valley p. 90; Duthie Pl. coll. on the Pamirs N. 79; B. A. et O. A. Fedtschenko Rast. Pamira p. 65; Gage Polyg. India l. c. p. 379; O. Fedtshenko fl. du Pamir p. 184. — *P. Paronychia* Ldb. fl. ros. III p. 534.

Pamir: N. 1516, Goran, at Anderab, Alt 2600m, Oct. 13. 1888.

— — f. *compactum* (nom. nud.) B. Fedtschenko, Material. d. flora Pamira i Alaiskago chrebta. (Prilosh. k. semlev. 1900) p. 9; O. Fedtshenko flore du Pamir l. c.

The leaves of this form are, when edges recurved, lanceolate linear. In the young flowers the tube is $^1/_3$ shorter than the lobes. Stamens 8, very enlarged at the base. Styles as figured by Jaubert et Spach t. 116, for *P. thymifolium*.

Pamir: N. 779, Tshatir Tash., Alt. 4000^m, July 14. 1898; N. 850, on dry plains near Jashil Kul, Alt. 3800^m.

Area: Western and middle Asia.

21. ***P. molliaeforme*** Bois. fl. or. IV p. 1043; Duthie Pl. coll. on the Pamirs N. 81; B. A. et O. A. Fedtschenko Rast. Pamira p. 65; Gage polyg. India l. c. p. 382; O. Fedtchenko flore du Pamir p. 185.

Pamir: N. 770, on stony plains at Karasu, alt. 3800^m, July 12. 1898; N. 883, near the lake Jashil Kul., alt. 3800^m, July 23. 1898; N. 1199, near the lake Tus Kul., alt. 3800^m, Aug. 31. 1898.

Area: Persia, middle and central Asia.

Previous papers concerning my collections are published in: Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjøbenhavn. 1901, 1903.

KBHVN. BIANCO LUNO

Særtryk af Botanisk Tidsskrift. 26. Bind. 2. Hefte. København 1904.

Arbejder fra den Botaniske Have i København. Nr. 17.

On the American Species of Leptochilus Sect. Bolbitis

by

Carl Christensen.

Several authors have referred to a single genus, *Gymnopteris*, all the *Acrosticha* of the „Synopsis Filicum" with irregularly netted veins, while authors as Presl, J. Smith and Fée have referred these ferns to a number of genera, based principally on differences of the venation. The genus *Gymnopteris* was founded in 1799 by Bernhardi on *Pteris ruffa* L. (*Gymnogramme* Desv.) and is, as Prof. Underwood correctly has shown, synonymous with the later *Neurogramme* Link (1841), founded on the same species. Consequently another name should be taken up for *Gymnopteris* af authors, and newly Prof. Underwood has proposed *Anapausia* Presl[1]), but this author, the most modern and the most consequent also as to the question of fern-nomenclature, has here evidently overlooked that both *Leptochilus* Klf. (1824), *Poikilopteris* Eschweiler (1827; *Poecilopteris* Presl 1836) and *Bolbitis* Schott (1834) are older names than *Anapausia* Presl (1836, as genus 1849). The genus *Leptochilus* was founded on *Acrostichum axillare* Cav. in 1824 by Kaulfuss (Enum. Fil. 147), and being the oldest generic name applied to any species of *Gymnopteris* of authors I propose it used for all the species of this genus of Acrostichaceous ferns.

Prof. Underwood has in the same publication taken up a few other old names, which surely incorrectly should suspersede later and wellknown generic names. Thus he prefers *Alcicornium* Gaud. to *Platycerium* Desv., *Callipteris* Bory to *Anisogonium* Presl and *Belvisia* Mirbel to *Hymenolepis* Klf.

[1]) L. M. Underwood: A Summary of our Present Knowledge of the Ferns of the Philippines. — Bull. Torr. Club. **30**: 655. 1903.

Alcicornium has never been *rite* published and described, and is moreover a later name than *Platycerium*. The botanical volume of the Freyc. Voy. bears on the title-page the year 1826, but as several citations in the book show (pag. 303 is cited Hook. and Grev. Ic. Fil. tab. 21, edited 1827; pag. 307 is cited Desvaux: Ann. Soc. Linn. Paris, juillet 1827, etc.), the descriptive part of the book was edited later than July 1827, in which month *Platycerium* Desvaux was published. Gaudichaud says, pag. 48 in his work, that *Acrostichum alcicorne* may form a new genus, provisionally in parenthesis named *Alcicornium*, but later, pag. 307, he again withdrew this name.

Callipteris Bory (Voy. dans 4 Isles princ. des mers d'Afrique **1**: 282. 1804) is not the same as *Callipteris* J. Smith 1841 = *Anisogonium* Presl. Bory names the following species of *Callipteris*: *C. castaneæfolia*, *C. sylvatica*, *C. prolifera* and *C. arborescens*, out of these the three are true *Diplazia*, and only *C. prolifera* belongs to *Anisogonium*. In consequence of the principles of nomenclature followed by Underwood thus *Callipteris* Bory cannot supersede *Anisogonium* Pr. Bory in 1804 unaware of Swartz in 1801 having founded the genus *Diplazium*, makes himself in a later publication justly *Callipteris* absolutely synonymous with *Diplazium*.

Besides these old names Underwood prefers *Belvisia* Mirbel to *Hymenolepis* Klf., a very improper name indeed, as *Belvisia* by Mirbel was applied to five species belonging to five different genera; as the type of *Belvisia Asplenium septentrionale* should be considered rather than *Acrostichum spicatum*. At last Underwood proposes the new name *Arcypteris* instead of *Dictyopteris* Presl. (1836, not Lamouroux 1809). I cannot separate *Dictyopteris* from *Sagenia*, but, however, a new name for this group is necessary. Yet, I find, that Trevisan (Rendiconti Istit. Lombardo sci. et lett. II. **9**. 816. 1876) says that he in 1851 had proposed the name *Sagenopteris* instead of *Dictyopteris*. I cannot anywhere find that name published in Trevisan's writings on ferns, but, if published, it should probably be preferred to *Arcypteris* Und. In my search after this name I have observed that Trevisan has published a series of works on ferns, works which seem perfectly unknown to most pteridologists; he has described several new genera of ferns, which are not at all mentioned in „Die natürl. Pflanzenfamilien". As examples I shall here call attention to the following:

Anisosorus Trevis. Atti dell' Ist. Veneto II. **2**: 166. 1851.
Type: *Pteris laciniata* Willd., and thus synonymous with *Antiosorus* Römer, Kuhn 1882.

Neurosorus Trevis. Atti dell' Ist. Veneto II. **2**: 168. 1851.
Types: *Grammitis caudata* Wall. and *Gymnogramme javanica* Bl.; thus synonymous with (if not older than) *Coniogramme* Fée 1850—52.

Eschatogramme Trevis. Atti dell' Ist. Veneto II. **2**: 168. 1851.
Types: *Pteris furcata* L. and *Taenitis Desvauxii* Kl. This name is surely the best generic one for the named species, as the following list of synonyms shows.
Eschatogramme furcata (L).
Pteris L. 1753; *Taenitis* Willd. 1810; *Pteropsis* Desv. 1827; *Cuspidaria* Fée 1850—52 (not *Cuspidaria* DC. 1821); *Dicranoglossum* J. Sm. 1854; *Taeniopsis* Moore 1857; *Vittaria* Baker 1870; *Elaphoglossum* Keyserling 1873; *Oetosis* O. Ktze. 1891.

Mildella Trevis. Rendic. Ist. Lombardo sci. et lett. II. **9**: 807. 1876.
Type; *Pellaea intramarginalis* (Klf.) J. Sm.

Cheilosoria Trevis. Atti dell' Ist. Veneto V. **3**: 579. 1877.
Type: *Cheilanthes tenuifolia* Sw.

Eremopodium Trevis. Atti dell' Ist. Veneto V. **3**: 589. 1877.
Types: *Asplenium vittæforme* Cav. and *A. sundense* Bl. The genus falls under, but it is not identical with *Micropodium* Mett.

I take here the opportunity to state, that the first fascicle of the important work, Reliquiæ Haenkeanæ, containing the Filices by Presl, was edited 1825, not 1830 as Underwood and several others think, and thus antedates Desvaux: Prodrome, Blume's Enumeratio and other books on ferns; this mistake has caused very great confusion in the nomenclature.

The genus *Leptochilus* in my sense is mainly an old-world's genus and exclusively tropical. Out of about half a hundred described species only about a dozen are restricted to tropical America, but here widely spread from the West-Indies and Mexico to Paraguay and southern Brazil. The majority of the American species belong to the genus *Bolbitis* Schott (*Poecilopteris* Pr.; *Cyrtogonium* J. Sm.; *Heteroneuron* Fée), the others, viz.: *L. alienus* (Sw), *L. Fendleri* (Eat.), *L. nicotianifolius* (Sw.), *L. oligarchicus* (Bak.)

and *L. pandurifolius* (Hook.), are essentially different. In the „Synopsis Filicum“ only 4 species belonging to the section *Bolbitis* are described; later Baker has added to his section *Gymnopteris* five others (Annals of Bot. **5**:495), but these are, after the descriptions and figures given by the author, not true *Bolbitis*, but may rather, I think, be considered species of *Polybotrya*. I have not seen specimens.

The American species of true *Bolbitis*, 8 in number, fall into two groups.

1. Species with the pinnæ distinctly articulated to the rachis and with the leaf towards the apex pinnatifid only. Hereto *L. guianensis*.

2. Species with the pinnæ very inconspicuously, if at all, articulated, simply pinnated with a terminal pinna similar to the lateral ones.

Possibly *L. guianensis* should form a peculiar subgenus, or even genus, but as to several characters it agrees with the species of the second group and connected with them by the andine *L. serratus*. All the species have a creeping or wide-scandent rhizome, which bears the leaves in two rows; the distance between two leaves is often considerable. An exception makes *L. Bernoullii*, which has the leaves fasciculated on the top of the scandent rhizome.

The opinions as to the limitations of these species are very different; in the herbaria two or even three species are often to be found under the same name. In his latest publication Dr. Lindman of Stockholm mentions four Brazilian species of this group, while the handbooks only enumerate two. Dr. Lindman has in a most friendly manner sent me his specimens of these ferns and comparing them with the collection in the museum of the Botanical Garden at Copenhagen, I found, that he has correctly separated out three species from forms, which hitherto commonly are referred to the old species *Acrostichum serratifolium* Mert., but that he has named them incorrectly. As these ferns also by several other authors are erroneously determinated, and as I am furnished with original specimens of about all the species described, it is not, I think, a useless work to give a review of all the species. My descriptions are only supplementary to the original ones and do not thus describe the whole plant, and as the most exact description does not give any clear idea of a plant, I have added to my

descriptions some figures, which are absolutely exact, drawn up after a sort of nature-printing, and show parts of the original specimens.

I am greatly indebted to the curators of the Royal herbaria of Copenhagen and Berlin, of the Riksmuseum of Stockholm, to Dr. H. Christ of Basle and to Dr. Carl Lindman of Stockholm, who have placed specimens in my hand to examination. — The abbreviations used in the following mean:

HB = Herb. Berolinense, Berlin.
HH = Herb. Hauniense, Copenhagen.
HS = Herb. Stockholmiæ.

A key to the species.

I. Costulæ (venæ laterales secundariæ) nullæ. Maculæ (supra maculam costalem) uni-vel subbiseriatæ.
  A. Rhizoma scandens. Folia pinnata cum apice pinnatifida. Pinnæ distincte ad rachidem articulatæ, multijugæ 1. *L. guianensis* (Aubl.)
  B. Rhizoma repens. Folia pinnata cum impari. Pinnæ non articulatæ, 3—5 jugæ . . . . . 2. *L. serratus* (Kuhn).

II. Costulæ distinctæ. Maculæ (supra maculam costalem) 2—6 seriatæ.
  A. Folia disticha, distantes (*L. Lindigii*?).
    1. Maculæ rarissime appendiculatæ.
      a. Pinna terminalis lateralibus conformis, non cum superioribus confluens.
        α. Rhizoma repens. Maculæ 2—3 seriatæ. Pinnæ folii sterilis 10—15^{cm} longæ . . 3. *L. serratifolius* (Mert.)
        β. Rhizoma scandens (fide Mettenius). Maculæ 5—6 seriatæ. Pinnæ folii sterilis 15—25^{cm} longæ . . . . . 4. *L. Lindigii* (Mett.)
      b. Pinna terminalis decurrens et cum lateralibus superioribus decurrentibus confluens. Maculæ irregulares, 5—6 seriatæ . . . . . 5. *L. opacus* (Mett.)
    2. Maculæ sæpe appendiculatæ, 3—4 seriatæ, irregulares.
      a. Folia sterilia ovato-elongata. Pinnæ versus apicem frondis decrescentes, leviter serratæ 6. *L. contaminoides* (Christ).

b. Folia sterilia late-ovata. Pinnæ fere æquilongæ, subsessiles, crenatæ . . . . . 7. *L. Curupirœ* (Lindm.)

B. Folia in apice rhizomatis scandentis fasciculata. Maculæ 2—3 seriatæ, plerumque appendiculatæ . . 8. *L. Bernoullii* (Kuhn).

1. **Leptochilus guianensis** (Aublet) C. Chr. — Fig. 1.

Syn. *Polypodium* Aublet, Hist. pl. Guian. **2**: 962. 1775. — *Acrostichum scandens* Raddi, Opusc. sci. Bologna **3**: 284. 1819; Pl. Bras. **1**: 6 tab. 18. 1825. — *A. Raddianum* Kze.; Hook. spec. **5**: 264. Hk. Bak. Syn. 423.

Lamina folii sterilis lanceolato-elongata, 3—4^{dcm} longa, pinnata, versus apicem pinnatifida. Pinnæ numerosæ, 20—25 jugæ, sursum in apicem laminæ pinnatifidam decrescentes, superiores ala angusta connectæ, ceteræ sessiles vel inferiores breviter petiolatæ, distincte ad rachin articulatæ, ovato-acuminatæ, 6—10^{cm} longæ, 1$^1/_2$—2^{cm} latæ, basi breviter cuneatæ, virides, firmæ, subcoriaceæ, omnino nudæ. Margo manifeste serratus. Costulæ nullæ. Maculæ costales maximæ, triangulares, ceteræ uniseriatæ, exappendiculatæ. Venulæ exteriores liberæ apicibus vix incrassatis intra marginem desinentes. — Rachis squamis paucis lineari-subulatis integris præsertim ad basin pinnarum instructa.

A well-known species. As to some characters: the distinctly articulated pinnæ, the pinnatifid apex of the frond, the wide-scandent rhizome, it is peculiar in the group. The venation is principally the same as that of *L. serratifolius*, and the absence of lateral veins („main veins", costulæ), a character highly valued by Baker, is due only to the relative narrowness of the pinnæ. A glance at the accompanying figures may show it. The rachis is not — as stated in Syn. Fil. — quite glabrous, but furnished with a few, hairlike scales, it is also commonly winged in the upper part, not unfrequently in the upper half, and a young leaf, leg. Spruce, has the rachis and stipe rather broadly winged to the ground. This leaf thus much resembles a frond of the next species. — *L. guianensis* varies as to the number and the length of its pinnæ — a plant, leg. Miers, has them 1$^1/_2$^{dcm} long by 1$^1/_2$^{cm} broad — but otherwise it is very constant. The species is common in southern Brazil, known also from Guiana, and gathered in Puerto Rico by Sintenis.

Specimens examined:

Brasilia: *sine loco*: Sellow (HB); Riedel (HB); P. V. Lund (HH); Burchell n. 3598 (HB). — *Rio de Janeiro*: Gaudichaud (HB); Miers (HB); Schottmüller (HB); Glaziou n. 372 (HH); Mosén n. 2732 (HB, HH). — *St. Catharina*: Gaudichaud (HB). — *Bahia*: Blanchet (HB). — *Tanaii*: Spruce n. 15 (HB).

Guiana gallica: Sagot n. 776 (HB).

Puerto Rico: Sintenis n. 428 (HS), and more numbers, according o Urban: Symb. Antill. **4**: 26. 1903.

Fig. 1. Pinna with somewhat irregularly serrated edges, 3/4 nat. size.

2. **Leptochilus serratus** (Kuhn) C. Chr. — Fig. 2.

Syn.: *Chrysodium* (Kuhn), Linnaea **36**: 63. 1869. — *Acrostichum* Bak. Syn. Fil. 524. 1874.

I have not seen the original specimen of this species but in Herb. Berol. is to be found a sketch of Spruce's plant besides a single, small sterile frond. For a full description see Linnaea as cited. The species resembles very closely *L. guianensis* as to the venation and shape of the sterile pinnæ, but the veins are very inconspicuous, the substance of the frond being nearly intransparent, the number of the not-articulated pinnæ very small (3—5 on a side) and the rachis of the sterile leaf with the stipe above is winged.

Hab. Peruvia: *Tarapota*, Spruce N. 4123 (non vidi); Godet (HB).

Fig. 2.

Fig. 2. Terminal pinna and rachis of sterile frond; after a sketch in Herb. Berol. of the original specimen. 3/4 nat. size.

3. **Leptochilus serratifolius** (Mertens) C. Chr. — Fig 3.

Syn. *Acrostichum* Mertens; Kaulf. Enum. Fil. 66. 1824. — *A. fraxinifolium* Presl, Del. Prag. **1**: 160. 1822 (non R. Br. 1810). — *A. pervium* Lindm. Arkiv för Bot. **1**: 254 tab. 8 fig. 7. 1903.

Lamina folii sterilis ovato-elongata, 3—4^{dcm} longa, pinnata cum impari. Pinnæ 8—11 jugæ, erecto-patentes, lanceolato-elongatæ vel ovato-elongatæ, 10—15^{cm} longæ, $2^1/_4$—3^{cm} latæ, superiores sessiles, inferiores petiolo 1—$1^1/_2{}^{cm}$ longo petiolatæ, basi cuneatæ vel rotundatæ, versus apicem breviter acuminatæ, membranaceæ vel subcoriaceæ, glabræ, sed subtus ad costam squamis parvis, ovato-acuminatis, subintegris instructæ, raro subnudæ. Margo pinnarum subinteger vel undulato-serrato-crenatus, interdum manifeste serratus, versus apicem sæpe grosse, raro acute serratus. Costulæ fere ad marginem currentes sed non prominulæ et vix crassiores quam venulæ tertiariæ. Maculæ costales altæ, subtriangulares, ceteræ biseriatæ — sæpissime 3 in serie — exappendiculatæ vel raro appendicem ferentes, 4—5—6 angulares, radialiter prolongatæ; venulæ exteriores liberæ interdum apicibus incrassatis

intra marginem terminantes, interdum (in speciminibus paucis) marginem attingentes. — Squamæ stipitis rachidisque ovato-acuminatæ, subintegræ.

L. serratifolius is a very constant and uniform species; as forms I can separate only a *forma caudata*: its pinnæ are about 3^{cm} below their point suddenly narrowed to a caudate apex. As in the two next species the meshes include occasionally a single, free veinlet, more accidentally than normally. The terminal pinna is often proliferous, especially in the more thinleaved forms; such forms also are more densely (but always sparely) clothed with scales along the midrib of the, as a rule, more deeply serrated pinnæ beneath and on the rachis, and have evidently grown on a more damp growing-place. The not-proliferous forms (var. *undulatum* Fée, Crypt. vasc. Brésil **1**: 17) are more rigid, the edges of the pinnæ nearly entire and often quite destitute of scales. The venation is very uniform and makes a good and easily recognizable character for this species; the meshes are larger than those of the other species of the group.

Specimens examined:

Brasilia: *Sine loco*: Mertens (type specimens, HH, HB); Langsdorff (*f. caudata*: HB); Martius (HB); Sellow (HB); P. V. Lund (HH); Mendoza n. 1368 (*f. caudata*; HB). — *Rio de Janeiro*: Raben (HH); Miers (HB); Beyrich (HB); Schottmüller (HB): Glaziou n. 953, 954, 1671, 2422 (HH). — *Serra d'Estrella:* Beyrich (HB).

Venezula: Col. Tovar, in sylvis lapidosis, reg. temp., Moritz n. 447 (HB; *Lomaria Bredemeyeriana* Kl.).

Peru, Lechler n. 2305 (HB); a fertile leaf only; the determination rather doubtful.

The species is mainly confined to the mountains near Rio; only one collector (Moritz) has gathered it on another locality, in the Andes of Venezuela. The other andine localities recorded by Hooker in Spec. Fil. are to be referred to other species, possibly hitherto undescribed; the locality, Mexico, mentioned in Syn. Fil. is surely to be referred to *L. Bernoullii*.

Fig. 3. Pinna of the type specimen in Herb. Haun. $^3/_4$ nat. size.

4. **Leptochilus Lindigii** (Mett.) C. Chr. — Fig. 4.

Syn. *Chrysodium* Mett. Ann. sc. nat. V. **2**: 204. 1864. — *Acrostichum* Bak. Syn. Fil. 423.

Lamina folii sterilis late ovata, 7—8^{dcm} longa, pinnata cum impari. Pinnæ 10—12 jugæ, patentes, elongatæ, 2—$2^1/_2{}^{dcm}$ longæ, 4^{cm} latæ, sessiles vel breviter petiolatæ, basi superiore truncata, inferiore rotundatæ, versus apicem longe acuminatæ, inæquilaterales: latere superiore inter costam et marginem $2^1/_4{}^{cm}$ lato, latere inferiore $1^3/_4{}^{cm}$ lato, membranaceæ, læte virides, glabræ et nudæ. Margo pinnarum, præsertim superior, e medio versus apicem grosse crenatus crenis obtuse dentatis, infra medio leviter crenato-

serratus. Costulæ conspicuæ, prominulæ, venæ utrinque elevatæ. Maculæ costales angustæ; ceteræ 5—6 seriatæ — frequenter 4 in serie — fere isodiametricæ, subæquales, 5—6 gonæ, rarissime appendice breve instructæ. Venulæ exteriores plerumque liberæ, apicibus non incrassatis marginem vix attingentes.

A pretty and distinct species, the largest of the group. The description above is drawn up after the original specimen in Herb. Berol.; and another specimen from the same locality is exactly alike, but this form is, I think, not the typical one of the species, being rather a local, luxuriant form. A little frond in Herb. Berol. from Ecuador represents perhaps the normal form. Its pinnæ are equal-sided with a cuneate base, the lower stalked with a stalk 1^{cm} long; costa in the lower part beneath is furnished with a few minute, ovate subulate scales. — The basal parts of the stems and the rhizome are not known to me; Mettenius describes the latter as being scandent. To this species I do not hesitate to refer as variety a plant from Costa Rica, comm. Dr. Christ.

var. *costaricensis* (Christ). — Fig. 4 b.

Syn. *Gymnopteris costaricensis* Christ, Bull. Herb. Boiss. II. **4**: 965. 1904.

Petiolus folii sterilis $2^1/_2{}^{dcm}$ longus, stramineus, strictus, basi squamis $10—12^{mm}$ longis, linearibus, rufo-brunneis, flaccidis, integerrimis dense vestitus, sursum nudus. Lamina ovato-elongata, 6^{dcm} longa. Pinnæ 12 jugæ, distantes ($4—5^{cm}$), subæquilaterales, late-lanceolatæ, $16—18^{cm}$ longæ, $3—3^1/_2{}^{cm}$ latæ, acuminatæ, inferiores petiolo $^1/_2—^3/_4{}^{cm}$ longo petiolatæ, basi inæqualiter cuneatæ, firmæ, pallide virides, subtus ad costam squamis nonnullis minutis, ovato-subulatis, subintegris instructæ. Margo pinnarum a basi ad apicem levissime serratus.

This variety differs from the type mainly by its pinnæ being nearly entire, not deeply crenated, and by its paler colour and firmer texture. As to the venation it exactly agrees with the type. The rhizome is after Christ creeping and sparely clothed with scales like those of the stem below. The fertile frond resembles closely that of the type; its pinnæ are longer (about $8—10^{cm}$) than those of the other species of the group.

Specimens examined:

Columbia: Muzo, $7—900^m$: Lindig n. 258 (type specimen HB); Stübel, Filices n. 560 (HB).

Ecuador: Zwischen Baños u. Pintuc im Pastaza Thal, Stübel, Filices n. 929 (HB).

var. *costaricensis*. Costa Rica sine loco. Werckle & Brune 1903 (Herb. H. Christ, Bale).

Fig. 4*a*. Pinna of the type specimen, $^3/_4$ nat. size. — 4*b*. Ditto of the var. *costaricensis*, nat size.

Obs. *Chrysodium pellucens*, Mett. Ann. sc. nat. V. **2**: 205. 1864, from St. Anna in Columbia (Lewy) is probably a slightly abnormal form of *L. Lindigii* with the lower pinnæ incised 1/3 of the way to the midrib, the others deeply inciso-serrated, the lobes with acute teeth. The venation does not differ from that of *L. Lindigii*. Only a single, sterile leaf is known (HB). Baker (Syn. Fil. 419) considers this form, like the next species, as a near ally of *Acrostichum alienum*, a species of a different group (*Gymnopteris* proper of Presl and Fée). Baker's arrangement of the species in the two subgenera of *Acrostichum, Gymnopteris* and *Chrysodium*, is very unsatisfactory, as the author, making use of the head character for the two groups: distinct or no „main veins", is obliged to place species of the closest alliance in different groups, and, on the other hand, to unite in one subgenus, species of no or little affinity (for example *A. aureo-nitens*, *A. serratifolium*, *A. crinitum* and *A. aureum*, all placed under *Chrysodium*).

5. **Leptochilus opacus** (Mett.) C. Chr. — Fig. 5 *a*—*c*.

Syn. *Chrysodium* Mett. Ann. sc. nat. V. **2**: 204. 1864.

Lamina folii sterilis late-oblonga, 3 dcm longa, pinnata, versus apicem pinnatifida. Pinnæ 6—7 jugæ, erecto-patentes, elliptico-elongatæ, 15—20 cm longæ, infra medium 3—3 1/2 cm latæ, acuminatæ, inferiores petiolo 1 cm longo petiolatæ, basi longe et subæqualiter cuneatæ, superiores sessiles et basi inferiore decurrentes, supremæ cum pinna terminali confluentes, glabræ et omnino nudæ, membranaceæ, firmæ, opaco virides vel nigrescentes. Margo pinnarum præsertim versus apicem serratus, vel duplo-serratus, infra medium leviter serratus. Costulæ conspicuæ, prominulæ. Maculæ costales angustæ; ceteræ irregulares, 5—6 seriatæ — sæpe 5—6 in serie — rarissime appendiculatæ. Venæ exteriores liberæ marginem attingentes. Petiolus versus basin squamis paucis lineari-acuminatis, subintegris instructus. Rachis nuda.

This species, known only in a single specimen, recedes from all the other American species of the group by its terminal pinna and three upper lateral ones being confluent: the upper portion of the leaf not being truly pinnate. It is also marked by its dark colour and the long-cuneated bases of the pinnæ. The venation is very irregular, resembling mostly that of *L. contaminoides*, but the included free veinlets are normally absent. The species, however, resembles closely the African *L. punctatus* (L.) (*Acrostichum punctulatum* Sw.), receding only by its more cuneate pinnæ and more irregular venation.

Specimen examined:

Columbia: Chucuri, Lindig, sine num. (HB).

Fig. 5 *a*. Upper part of a sterile leaf, 1/7 nat. size. — Fig. 5 *b*. Pinna, 3/4 nat. size. — Fig. 5 *c*. Fragment, showing the venation, 3/4 nat. size.

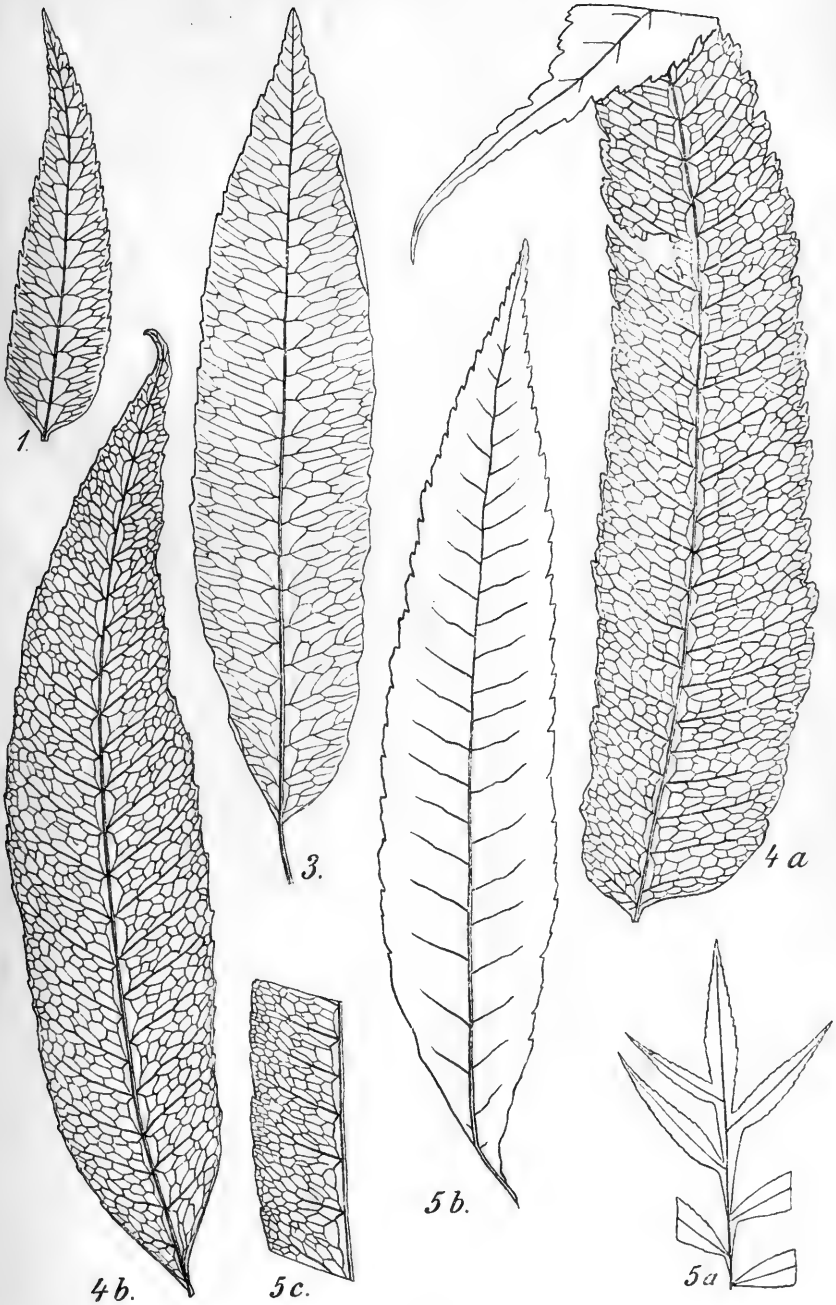


Fig. 1. *L. guianensis.* — Fig. 3. *L. serratifolius.* — Fig. 4. *L. Lindigii.* — Fig. 5. *L. opacus.*

Leptochilus contaminoides (Christ) C. Chr. — Fig. 6 *a—c*.

Syn. *Gymnopteris* Christ, Annuaire Cons. Jard. bot. Genève **3** : 32. 1899. — *Acrostichum serratifolium* Lindman, Arkiv för Bot. **1** : 252 tab. 8 fig. 8. 1903, et auct. plur. (pro parte).

Lamina folii sterilis ovato-elongata, pinnata cum impari, 5—6^{dcm} longa. Pinna terminalis sæpe infra apicem prolifera. Pinnæ laterales numerosæ, 15—20 jugæ, patentes, lanceolatæ vel lineari-lanceolatæ, 15—20^{cm} longæ, 2—2$^1/_2{}^{cm}$ latæ, sursum decrescentes, inferiores breviter petiolatæ, basi subtruncatæ vel rotundato-cuneatæ, versus apicem longe acuminatæ, tenuiter membranaceæ vel chartaceæ, obscure virides vel rubrescentes, glabræ, nudæ vel subtus ad costam squamis paucis ciliatis instructæ. Margo pinnarum leviter, interdum irregulariter serratus, versus apicem acute serratus. Costulæ fere ad marginem currentes, conspicuæ, versus costam prominulæ. Venæ plus minusve distinctæ, irregulariter anastomosantes. Maculæ costales subtriangulares, minores quam in *L. serratifolio*; ceteræ 3—4 seriatæ — 3—5 in serie — irregulares, sæpe appendiculatæ; macula media seriei primæ sæpissime maxima et appendicem includens. Venæ exteriores liberæ, densæ, marginem attingentes. — Squamæ stipitis rachidisque tenues, ovato-subulatæ, ciliatæ.

This species, by several authors confounded with *L. serratifolius*, has a very different habit. The pinna are more numerous, long and often linear; the venation is essentially different from that of *L. serratifolius*, and the fringed and subulate scales also make a character of value. While *L. serratifolius* is an open-ground species, *L. contaminoides* grows on the ground in the dense, tropical forest. The species varies considerably as to colour, number and length of the pinnæ, but I cannot clearly separate out good varieties. It is evidently very common in Paraguay and the adjacent parts of southern Brazil. I have examined the following specimens:

Paraguay. 1) Ravins humides et ombragés de la cordillère de Tschololo, près de Paraguari, Balansa n. 2852 (type specimens HH, HB). 2) Cordillera de Altos: Quellgebiet, zwischen Steinen, Fiebrig n. 96 (HB). 3) Ex eodem loco, Fiebrig n. 91 (HB; young plants; the rhizome towards the apex densely clothed with dark-brown scales). 4) S. Bernardino, ad terram humidam convallis umbrosæ, Lindman, Exped. 1. Regnell A. n. 2337 (HS).

Brasilia. 5) Sine loco: Burchell n. 5929 (HB). 6) Prov. S. Paulo, Mosén n. 2258 (HH, HB, HS).

Fig. 6*a*. Entire plant, $^1/_{13}$ nat. size, with rather short pinnæ. — Fig. 6*b*. Pinna of the type specimen (Balansa 2852), $^3/_4$ nat. size. — Fig. 6*c*. Fragment, showing the venation, $^3/_4$ nat. size.

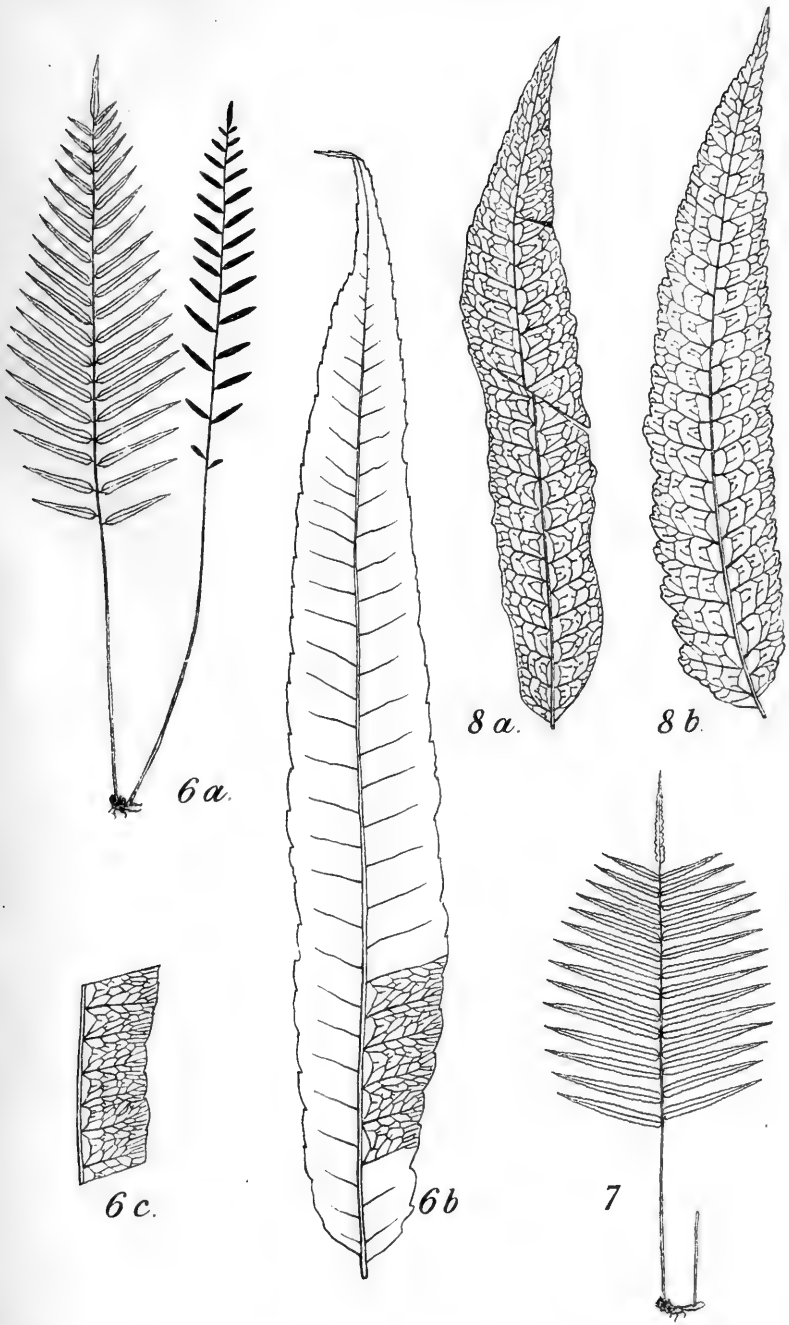


Fig. 6. *L. contaminoides.* — Fig. 7. *L. Curupiræ.* — Fig. 8. *L. Bernoullii.*

7. **Leptochilus Curupiræ** (Lindm.) C. Chr. — Fig. 7.

Syn. *Acrostichum* Lindman, Hedwigia **43**: 311. 1904. — *A. scalpturatum* Lindm. Arkiv för Bot. **1**: 253 tab. 8 fig. 9, 1903 (non *Heteroneuron scalpturatum* Fée).

Lamina folii sterilis late ovata, 3—4^{dcm} longa, pinnata cum impari. Pinna terminalis longe stipitata, prolongata, prolifera. Pinnæ laterales 10—15 jugæ, fere horizontales, subæquidistantes, lineares, omnes fere æquilongæ, 2—2$^1/_2{}^{dcm}$ longæ, 2^{cm} latæ, sessiles vel subsessiles, basi truncatæ, versus apicem longe acuminatæ, glabræ, subtus ad costam squamis paucis ciliatis subrigidis instructæ, membranaceæ, firmæ, brunneo-virides, superiores sæpe proliferæ. Margo pinnarum crenatus crenis denticulatis versus apicem grosse serratus; pinna terminalis in speciminibus visis rotundato-lobata. Venæ modo *L. contaminoidis* anastomosantes; maculæ sæpe biseriatæ, raro triseriatæ.

This species is a very critical one. It can, possibly, be a form of *L. contaminoides*, the venation of the two being nearly the same (see Lindman's figure), but the shape of the lamina, edges and bases of the pinnæ, scales, coulour, the long-stipitated terminal pinna are characters of *L. Curupiræ*, which do not agree with the corresponding ones of *L. contaminoides*.

Brasilia. Matto Grosso: Matto do Curupira, ad terram silvæ primævæ umbrosam, Lindman, Exped. 1. Regnell A. 3061 (HS).

Fig. 7. Entire plant, $^1/_{13}$ nat. size, to compare with Fig. 6*a*.

8. **Leptochilus Bernoullii** (Kuhn) C. Chr. — Fig. 8*a-b*.

Syn. *Acrostichum* Kuhn; Christ, Bull. Soc. bot. Belg. **35**: 197. 1896. — *Gymnopteris* Diels, Nat. Pflanzenf. **1**^{4}: 201. 1899.

Lamina folii sterilis ovato-elongata, 4—10^{dcm} longa, pinnata cum impari. Rachis versus apicem anguste alata. Pinnæ 10—25 jugæ, distantes, superiores sessiles, inferiores breviter petiolatæ, lanceolatæ, 12—15^{cm} longæ, 2—2$^1/_2{}^{cm}$ latæ, acuminatæ, basi truncatæ vel rotundatæ, tenuiter membranaceæ, læte- vel flavo-virides, glabræ et omnino nudæ. Margo pinnarum leviter crenato-serratus vel grosse crenatus crenis obtuse denticulatis. Costulæ fere ad marginem conspicuæ, prominulæ, 3 venis curvatis transversariis 3 maculas curvatas formantibus connectæ. Venæ transversariæ dorso 2—4 appendices apicibus incrassatis (radios interruptos) ferentes (i. e. nervatio fere cum nervatione gen. *Campii* Preslii congruens), vel maculæ curvatæ 1—2 radiis in 2—3 maculas minores plerumque irregulariter appendiculatas divisæ. Venulæ exteriores liberæ apicibus incrassatis marginem vix attingentes vel inter se anastomosantes. — Squamæ rhizomatis stipitisque lineari-subulatæ, ciliatæ, ad 1^{cm} longæ.

This species is especially well-marked by its scandent rhizome, which bears the leaves on its top, this being densely clothed with a tuft of long, red-brown, linear-subulate, ciliated scales. But as my description above and the figures should show, the species is also easily recognizable by its venation, characterizised, as it is, by the numerous free veinlets included in the areoles, formed by the tertiary, radial veins, the majority of which very often do not reach the next cross-vein. Sometimes the venation is that of the genus *Campium* of Presl, see fig. 8 *b*. — The locality Mexico for *L. serratifolius*, recorded in Hk. Bak. Syn., is surely to be referred to this species.

Specimens examined:

Mexico: Vallée de Cordova, Bourgeau n. 2008; *Heteroneuron serratifolium* Fournier, Plant. Mexic. **1**: 69 (HH, HB).

Guatemala: Inter Escamillas et Palohucco, Costa Grande, ad arbores scandens, Bernoulli et Cario n. 382 (type specimen: HB, Herb. H. Christ, Bale.).

Costa Rica: Rio Naranjo, 250^{m}, Tonduz (Herb. H. Christ, Bale.).

Fig. 8 *a*. Pinna of the type specimen, $^{3}/_{4}$ nat. size. — Fig. 8 *b*. Pinna of Bourgeau's plant, $^{3}/_{4}$ nat. size.

Besides these 8 species thus described, in the literature two more are mentioned as South-American, viz:

1. *Poecilopteris crenata* Presl, Epim, bot. 174. 1849. — Rio. After a remark on a sheet in Herb. Berol. (by Mettenius?) and after the description this is only a common form of *L. serratifolius*.

2. *Poecilopteris lobulosa* Presl, l. c. — Guatemala. The author has known only a fertile frond with lobed pinnæ. It is, probably, not a true *Bolbitis*, rather a near ally of *L. alienus*. A very doubtful species, unknown to me and, as it seems, to all pteridologists.

Copenhagen June 1. 1904.

A new Elaphoglossum from Brazil

by

Carl Christensen.

In the pretty collection of Brazilian ferns from Dr. Glaziou (Herb, Warming, now in the Botanical Museum of Copenhagen) I have found a little *Elaphoglossum*, apparently new to science. It belongs to *Condyloneura* subsectio *Setosa* of Christ, the monographer of this genus, and stands near to small forms of *E. villosum*. It is, however, a new and very peculiar species, remarkable by its sterile leaves being proliferous. Only one proliferous species of *Elaphoglossum* (*E. undulatum* (Willd.) Moore) is hitherto known; it bears a squamose bud at the apex of the midrib but produces rarely or never small plants. The new species, here described, bears a similar squamose bud on the costa at the emarginated apex of the sterile frond, and this bud very often produces one or two small leaves. Otherwise the little plant is remarkable by its very thin texture. Held to the eye the parenchyma of the leaf is transparent, and with the aid of a lense the cells are clearly visible, nearly as in a species of *Trichomanes* § *Didymoglossum*. Thence I name the species:

Elaphoglossum didymoglossoides n. sp.

Planta pusilla, cæspitosa, rhizomate erecto, squamoso, foliis dimorphis: sterilibus oblongis, translucentibus apicibus proliferis, fertilibus minimis suborbicularibus.

Rhizoma parvum, erectum, squamis rufis, lineari-subulatis, subdentatis, 1 mm longis dense vestitum. *Folia sterilia* cum petiolis 2—4 cm longa, longe petiolata. Petiolus gracilis, ad 2 cm longus, squamis rufo-brunneis, linearibus, patentibus dense instructus, denique denudatus. Lamina ovato-oblonga, 1—2 1/2 cm longa, 5—8 mm lata, membranacea, tenuissima, translucens, ad basin breviter cuneata,

apice rotundata vel emarginata, utrinque squamis rufis, linearibus, deciduis vestita. Margo integer vel leviter repandus squamis linearisubulatis deciduis ciliatus. Costa in emarginationem laminæ excurrens, in apice bulbillum dense squamosum proliferum nascens. Venæ laterales simplices, rarissime furcatæ, 3—5 quoque costæ latere, obliquæ, 3—4^{mm} distantes, c. 1^{mm} intra marginem apicibus valde incrassatis terminantes. — *Folia fertilia* petiolis paleaceis, gracilibus, ad 2^{cm} longis longe petiolata. Lamina suborbicularis vel subspathulata, 4^{mm} longa, 3^{mm} lata, squamis ciliata, subtus in parte centrali sporangifera, parte marginali sporangiis destituta.

Brasilia (probably near Rio), Glaziou n. 12279.

Copenhagen. June 1. 1904.

KØBHVN. BIANCO LUNO

Arbejder fra den Botaniske Have i København. Nr. 18.

The Marine Algæ of East Greenland

by

Helgi Jónsson.

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Introduction.

I have been charged with the determination of the latest collections of marine algæ from East Greenland. These collections have been procured by Mr. C. Kruuse, and the material dates from Amdrup's expedition in which Mr. Kruuse as well known took part, and from Kruuse's own expedition to the district of Angmagsalik. After the publication of L. K. Rosenvinge's exhaustive works on the Marine Algæ of Greenland (Grl. Havalg. and Deux. Mém.) several important papers have been written which have greatly altered the view regarding the limitation of species in some genera, such as *Acrosiphonia*, *Ulothrix* and *Sphacelaria*; therefore I have moreover been charged with a second examination of all the Greenlandic material of the genera *Acrosiphonia*, *Ulothrix* and *Sphacelaria*. In revising this material I have met with some new habitats of some intermingled species, as may be seen by the following list.

According to Rosenvinge's statement[1]) 83 species were previously known from East Greenland. To this number one species, *Actinococcus subcutaneus*, should be added, it is regarded by Rosenvinge (Deux. Mém.) as the nemathecia of *Phyllophora Brodiæi* and thus not included in the number of species. Of the 85[2]) species gathered by Kruuse 29 were not previously

[1]) L. Kolderup Rosenvinge, Om Algevegetationen ved Grönlands Kyster, Særtryk af »Meddelelser om Grönland« XX, Kjöbenhavn 1898, p. 180.

[2]) In Kruuse's collection there were moreover found two species, *Ectocarpus tomentosus* (Huds.) Lyngb. and *Ectocarpus fasciculatus* (Griff.) Harv.

known from there; to the latter should be added 1 species (*Calothrix scopulorum*) found by N. Hartz in Heklahavn and not before mentioned. Thus we know for the present 114 species from East Greenland.

From West Greenland 156 species (to which number *Actinococcus subcutaneus* should be added) are enumerated by Rosenvinge, but on account of a different limitation of the species belonging to the three above mentioned genera (ɔ: *Acrosiphonia*, *Ulothrix* and *Sphacelaria*) 7 species must be added to this number, besides 1 species, *Microsyphar Polysiphoniæ* Kuck., not formerly mentioned from West Greenland. Thus the complete number of species from West Greenland is 165. All Greenland has 176 species.

Kruuse's collections have greatly amplified our knowledge of the marine algæ of East Greenland; the number of species has been considerably increased, and the distribution of the marine algæ along the coast is now far better known than before. 103 species of the 114 East Greenlandic species are also found on the western coast. The 11 species occurring only on the eastern coast are reported by Rosenvinge (l. c. p. 177), still it ought to be mentioned that *Alaria flagellaris* should be regarded as identical with *Alaria esculenta* f. *pinnata*. Thus the latest collections from the eastern coast furthermore confirm Rosenvinge's statement as to the difference between the marine flora of East and West Greenland (l. c. p. 176—178). As both *Alaria esculenta* f. *pinnata* and *Alaria grandifolia* are now known from East Greenland and moreover *Rhodochorton intermedium* Kjellm. from Spitsbergen is identic with *Rhodo-*

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which are not included in this number, and not at all mentioned in the following list, as Kruuse is not able to give any certain statement as to their habitats and does not remember whether they were growing loose or fastened to the bottom. Though it is scarcely probable that these species occur fastened to the bottom in East Greenland, I still mention them, for the purpose of calling the attention to them of future investigators of the eastern coast of Greenland.

chorton Rothii, the resemblence between the marine flora of East Greenland and Spitsbergen (Rosenv. l. c. p. 154) is still greater.

In the following list all species of marine algæ presently known from East Greenland are enumerated, but only the new habitats are mentioned. The East Greenlandic species have numbers, in contradistinction to the species mentioned from West Greenland. The species are arranged in the same way as in Rosenvinge's books (Grl. Havalg. and Deux. Mém.) some few excepted; the localities are disposed from north downwards on the western coast and from south upwards on the eastern coast.

A list of the marine algæ gathered by Kruuse at Jan Mayen will be published in Botanisk Tidsskrift.

List of the mentioned localities:

West Greenland:	N. Lat.
Upernivik	71° 47′
Umanak	70° 40′
Atanikerdluk	70° 2′
Sarkak	70° 00′
Unartok	69° 55′
Ujaragsugsak	69° 50′
Klokkerhuk	69° 30′
Godhavn	69° 14′
Christianshaab	68° 49′
Inilik in Atanek Fjord	68° 00′
Agto	67° 57′
Tatsip-ata	67° 20′
Holstensborg	66° 56′
Sukkertoppen	65° 25′
Ny Hernhut	64° 11′
Godthaab	64° 11′
Merkuitsok	63° 45′
Igdlunguak south of Merkuitsok	63° 38′
Fiskernæsset	63° 5′
An island off the glacier of Frederikshaab	62° 30′
Frederikshaab	62° 00′
Nigamiut pr. Frederikshaab	62° 00′

West Greenland:	N. Lat.
Kvannefjord	62° 00′
Neriak	61° 35′
Smallesund	61° 32′
Issa west of Arsuk Fjord	61° 16′
Ivigtut	61° 13′
Arsuk	61° 10′
Arsuk Storö	61° 5′
Kornok Isbræer	61° 5′
Igdlorsuit	61° 4′
Sermilik Fjord	61° 4′
Ataneritsok (Igaliko)	61° 00′
Narsak	60° 55′
Kakortok	60° 49′
Kagsimiut	60° 48′
Upernivik Ö near Kagsimiut	
Julianehaab	60° 43′
Umanalik east of Kangek Ö	60° 36′
The rock Nunanguak west of Umanak	60° 34′
Sardlok	60° 32′
A rock near Kaersok	60° 29′
Umanarsuk	60° 28′
Umanartut	60° 26′
Sydpröven	60° 26′
The northern side of Sermersok	60° 23′
Tasermiut prope Korsoak	60° 18′
The south end of Amitsok opposite Sermersok	60° 7′
Nanortalik	60° 7′
The south side of Tusardluarnak	60° 7′
Kimatulivigsalik, Kitsigsut Öer	about 60° 2′
East Greenland:	
Ikerasarsuk	60° 2′
Nunatsuk	60° 4′
Kap Dan	65° 31′
The estuary of Kalerajuek near Kap Dan	65° 34′
Tasiusak	65° 37′
Kakasuak	65° 38′
Ikerasak	65° 49′
Unartok	65° 50′

East Greenland:	N. Lat.
Kangarsik	65° 50′
Ikerasausak	about 65° 52′
Tiningnekelak	65° 54′
Ikatek	65° 55′
Angmagsivik	65° 58′
Smalsund	65° 59′
Moræneö	66° 1′
Stenö	66° 2′
Ödesund	66° 11′
Kangerdlugsuatsiak	66° 15′
Bræfjord	66° 20′
Nualik	67° 16′
Kap Dalton	69° 25′
Turner Ö	about 69° 40′
Turner Sund	about 69° 45′
Dunholm	69° 55′
Heklahavn	70° 27′
Polhems Dal in Kong Oscars Fjord	about 72° 30′
Kap Borlase Warren	74° 15′
Sabine Ö	74° 30′

Abbreviations:

Gr. occ. = Groenlandia occidentalis.
Gr. or. = Groenlandia orientalis.
N. H. = N. Hartz.
L. K. R. = L. Kolderup Rosenvinge.

Copenhagen, Botanical Museum, July 1904.

A. Rhodophyceæ.

I. Florideæ.

Fam. *Corallinaceæ.*

Lithothamnion Phil.

1. **L. glaciale** Kjellm., K. Rosenv. Deux. Mém. p. 9.
2. **L. flabellatum** K. Rosenv. Deux. Mém. p. 10.
3. **L. varians** Fosl., K. Rosenv. Deux. Mém. p. 11.
4. **L. foecundum** Kjellm., K. Rosenv. Deux. Mém. p. 12.
5. **L. investiens** Fosl., K. Rosenv. Deux. Mém. p. 13.
6. **L. circumscriptum** Strömf., K. Rosenv. Deux. Mém. p. 13.
7. **L. læve** (Strömf.) Fosl. [1]), K. Rosenv. Deux. Mém, p. 14.

This is the only species of calcareous algæ in the collection. It was collected with conceptacles in July. Further information as to its occurrence is wanting.

Gr. or.: Stenö.

Hildenbrandia Nardo.

8. **H. rosea** Kütz., Rosenv. Gr. Havalg. p. 826.

On stones in the littoral region; collected in June and July with sporangia.

Gr. or.: Stenö, Kap Dalton.

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[1]) This species has kindly been determined by M. Foslie.

Fam. *Squamariaceæ.*

Peyssonellia Dcsne.

9. **P. Rosenvingii** Schmitz, K. Rosenv. Deux. Mém. p. 14.

Cruoria Fries.

10. **C. arctica** Schmitz, K. Rosenv. Deux. Mém. p. 15.

Petrocelis J. Ag.

11. **P. polygyna** (Kjellm.) Schmitz, Rosenv. Deux. Mém. p. 16.

The species was found on stones, together with *Lithoderma fatiscens* and *Lithothamnion*. The greater part of the stones were fastened to the haptera of species of *Laminaria*. *Petrocelis polygyna* was abundant on the stones, and often the Lithoderma crust was overgrown by it. The main part of the material from Kap Borlase Warren and Sabine Ö was sterile, and only in a few cases I have met with carpogonia.

Specimens gathered in July at Stenö were rich in starch, the uppermost cells excepted, as mentioned by Rosenvinge (l. c.) and were supplied with gonimoblasts.

Gr. or.: Stenö, Kap Borlase Warren on exposed shore, in a depth of 5 fathoms, Sabine Ö in a depth of 5—10 fathoms.

Rhododermis Crouan.

12. **Rh. elegans** Crouan, K. Rosenv. Deux. Mém. p. 18.

Fam. *Dumontiaceæ.*

Dilsea Stackh.

13. **D. integra** (Kjellm.) K. Rosenv. Deux. Mém. p. 19.

The specimens I have had for examination are up to 15 cm. long and 4 cm. broad. Most of the specimens have almost perfectly even margins. The species was collected in July, in an exposed place, in a depth of 3—8 fathoms.

Gr. or.: Sabine Ö.

Fam. *Ceramiaceæ.*

Antithamnion Näg.

14. **A. Plumula** (Ellis) Thur. *β.* **boreale** Gobi, K. Rosenv. Grl. Havalg. p. 787, Deux. Mém. p. 21.

This variety has been gathered in many places on the eastern coast of Greenland. It mostly grows on other algæ, such as *Polysiphonia arctica*, *Euthora cristata*, *Ptilota pectinata*, etc. Its normal length seems to be 2 cm., but a few specimens attain a greater length, up to 3 cm. Glandular cells were frequent. The main part of the material gathered in June and July is sterile, and only a few plants collected in the latter part of June had normally developed tetraspores. It was collected in a depth of 3—5 and up to 30 fathoms.

Gr. or.: Kap Dan, Tasiusak (3—30 fathoms), Kakasuak, Angmagsivik, Stenö, Ödesund, Nualik, Kap Dalton, Turner Sund (sheltered shore, rapid current, 3—5 fathoms), Sabine Ö (exposed shore, 3—8 fathoms).

Ptilota C. Ag.

15. **P. pectinata** (Gunn.) Kjellm., K. Rosenv. Gr. Havalg. p. 790, Deux. Mém. p. 22.

This species seems to occur just as frequently on the eastern as on the western coast of Greenland. The material collected in January and May—September was sterile. The largest specimens were 20 cm. long. Found in a depth of 3—19 (—30) fathoms.

Gr. or.: Kap Dan, Tasiusak, Kakasuak, Kangarsik, Smalsund, Ödesund, Sabine Ö (exposed shore, 3—8 fathoms).

Rhodochorton Näg.

16. **R. Rothii** (Turt.) Näg., K. Rosenv. Grl. Havalg. p. 791, Deux. Mém. p. 23.

The specimens I have had for examination were collected in May, June and July, and are almost all sterile; only a few abnormally developed, but conspicuously quartered tetrasporangia were found in a sample gathered in July. The specimens attain

a length of up to 1,5 cm., and the breadth varies from 14—17 μ. Some specimens growing on *Chætomorpha Melagonium* differed in this, that some of the erect filaments sometimes were growing spirally round the *Chætomorpha* filament.

The longest specimens were found growing in the littoral region in a crack on Stenö.

Gr. or.: Tasiusak, Kangarsik, Stenö, Nualik.

17. **R. penicilliforme** (Kjellm.) K. Rosenv. Algues mar. d. Grl. p. 66. Deux. Mém. p. 23. R. mesocarpum (Carm.) v. penicilliforme Kjellm., K. Rosenv. Grl. Havalg. p. 792.

This species grows on Bryozoa as well as on different algæ. On the Bryozoa it always occurs together with *R. membranaceum*. Some specimens found on *Chætomorpha Melagonium* are specially remarkable on account of their elegantly developed basal discs and their luxuriant growth altogether. The erect filaments were vigorously developed with undivided and divided sporangia; 2—3 unilateral branches were not rarely met with. The thickness of the filament varied from 11—16 μ.

Gathered in May, June, August and September. Tetraspores were observed in a gathering from August.

Gr. or.: Tasiusak, Ikerasak, Kangerdlugsuatsiak.

18. **R. membranaceum** Magnus, K. Rosenv. Grl. Havalg. p. 794. Deux. Mém. p. 23.

Some sterile specimens were collected in June and September, growing on Bryozoa together with *R. penicilliforme*.

Gr. or.: Tasiusak, Ikerasak.

Fam. *Rhodomelaceæ*.

Rhodomela C. Ag.

19. **R. lycopodioides** (L.) Ag., K. Rosenv. Grl. Havalg. p. 796. Deux. Mém. p. 24.

α. **typica** Kjellm.

The specimens I have had for examination belong to f. *com-*

pacta Kjellm. and f. *laxa* Kjellm. Their length varies from 2—12 cm. Young shoots were abundant in July and September.

β. **tenuissima** (Rupr.) Kjellm.

The specimens attain a length of 7 cm., are abundant in hair leaves; the youngest branches often corymbous. Gathered in June in the littoral region and in a depth of more than 2 fathoms.

α. typica.

Gr. or.: Tasiusak (Amaga), Stenö, Nualik.

β. tenuissima.

Gr. or.: Moræneö.

Polysiphonia Grev.

20. **P. arctica** J. Ag., K. Rosenv. Grl. Havalg. p. 800, Deux. Mém. p. 25.

The species was gathered sterile in May—September. The length varies from 7—20 cm. The pericentral cells are generally 5—7, and but rarely 4, as mentioned by Rosenvinge. The specimens from Kap Borlase Warren were supplied with monosiphone haptera irregularly placed in the lower part of the frond. These haptera were most often discoidally widened at the end; they are perfectly like those mentioned by Rosenvinge in Deux. Mém. l. c. In May—August the species was richly supplied with new shoots. The older parts of the frond are generally much overgrown with Diatoms. It was gathered in a depth of 3—20 (—30) fathoms both on open and sheltered shores.

Gr. or.: Tasiusak, Ikerasak, Smalsund, Stenö, Ödesund, Kangerdlugsuatsiak, Nualik, Turner Sund, Kap Borlase Warren, Sabine Ö.

Fam. *Delesseriaceæ.*

Delesseria Lam.

21. **D. Baerii** (Post. et Rupr.) Rupr., emend., K. Rosenv. Grl. Havalg. p. 806. Deux. Mém. p. 26.

α. **typica** K. Rosenv. l. c.

The main part of the specimens belongs to the typical form. They were gathered in a depth of 1—3 fathoms, and their length varies from 5—15 cm. The material was collected as well on open as on sheltered shores in June—July and consists of mere sterile plants. The species seems to be common.

β. **corymbosa** (J. Ag.) K. Rosenv. l. c.

This variety has only been found in one place, on sheltered shore, in rapid current. Sterile specimens 6 cm. high.

The main form was found in the following places:

Gr. or.: Kap Dan, Tasiusak, Kakasuak, Kangarsik, Angmagsivik, Turner Ö, Turner Sund, Sabine Ö.

β. corymbosa:

Gr. or.: Turner Sund.

22. **D. sinuosa** (Good. et Wood.) Lam., K. Rosenv. Grl. Havalg. p. 808, Deux. Mém. p. 27.

The main part of the specimens belongs to f. *lingulata*, and only a few plants may be referred to f. *typica* or f. *quercifolia*. The largest plants are 30 cm. long. The species was gathered in May—August in a depth of up to 30 fathoms. Specimens with tetraspores were found in July.

It is worth noticing how common f. *lingulata* is in this collection from the eastern coast; formerly it was only known from a single place in Greenland, Sabine Ö (Rosenv. l. c.), and is not mentioned at all from the western coast. This form which usually occurs in sheltered places, was collected in East Greenland in exposed places, near Kap Borlase Warren (11 fathoms), off Turner Ö (15—20 fathoms) and near Sabine Ö (3—8 fathoms). In Turner Sund it was gathered on sheltered shore, in rapid current and in a depth of 3—5 fathoms. Possibly such places may be called sheltered on account of the considerable depths, and I also suppose that the presence of the ice for the greater part of the year reduces the effects of the exposed position.

Gr. or.: Kap Dan, Tasiusak, Nualik, Turner Ö, Turner Sund, Kap Borlase Warren, Sabine Ö.

Fam. *Rhodymeniaceæ.*

Rhodymenia (Grev.).

23. **R. palmata** (L.) Grev., K. Rosenv. Grl. Havalg. p. 809, Deux. Mém. p. 28.

The main part of the specimens belongs to the typical form. The breadth of the frond varies considerably. Multipartite specimens with narrow lobes somewhat reminding of f. *sarniensis* were found in Tasiusak. Many of the specimens have small prolifications especially in the older parts of the frond. A few fragments from Smalsund seem most probably to belong to f. *prolifera*. The length of the frond varies from 5 to 46 cm. The species was gathered in May—August, and with tetraspores in May—July; in a depth of 3—30 fathoms.

Gr. or.. Tasiusak, Ikerasak, Tiningnekelak, Smalsund, Kangerdlugsuatsiak.

Halosaccion Kütz.

24. **H. ramentaceum** (L.) J. Ag., K. Rosenv. Grl. Havalg. p. 825, Deux. Mém. p. 43.

The specimens I have had for examination belong to f. *robusta* and f. *ramosa*; their length varies from 10—30 cm. In specimens gathered in May young shoots were abundant. The species was collected in a depth of up to 19 fathoms in May—September. Specimens with tetraspores date from June, July and September. The species seems to be common.

Gr. or.: Tasiusak, Ikerasak, Tiningnekelak, Angmagsivik, Smalsund, Ödesund, Kangerdlugsuatsiak, Nualik.

Fam. *Rhodophyllidaceæ.*

Rhodophyllis Kütz.

25. **R. dichotoma** (Lepech.) Gobi, K. Rosenv. Grl. Havalg. p. 812, Deux. Mém. p. 28.

The specimens all have been found in Tasiusak. They were gathered in a depth of up to 30 fathoms and are 10—15 cm. long. The frond of the main part of the specimens is narrow and belongs to f. *fusca* Lyngb., but mingled with this are broader plants belonging to the typical form. The species was gathered with tetraspores in May, with cystocarps in May—June.

Gr. or.: Tasiusak.

Euthora J. Ag.

26. **E. cristata** (L.) J. Ag., K. Rosenv. Grl. Havalg. p. 813, Deux. Mém. p. 28.

The main part of the specimens belongs to f. *angustata* Lyngb., and only a smaller number of plants may be referred to the typical form. The length of the plants varies from 2—17 cm. (f. *typica* 2—5 cm., f. *angustata* 4—17 cm.). These two forms imperceptibly merge into each other; in somewhat exposed places the broader form is found, and the long, narrow one in more sheltered places. The specimens from Turner Sund which were found in a sheltered place in rapid current are intermediate forms between the broad and the narrow ones. Specimens from Tasiusak and Kap Dan attaining a length of 15—17 cm., a length unusual in this species, do not in other respects differ from the ordinary f. *angustata*. Owing to a statement from Kruuse they were gathered in sheltered places.

The species was collected in May—August, in a depth of 3—20 (—30) fathoms. Specimens with tetraspores were gathered in June, and cystocarps were found in May—August.

Gr. or.: Kap Dan, Tasiusak, Stenö, Ödesund, Turner Sund, Turner Ö.

Turnerella Schmitz.

27. **T. Pennyi** (Harv.) Schmitz emend., K. Rosenv. Deux. Mém. p. 29. T. Pennyi, T. septentrionalis K. Rosenv. Grl. Havalg. p. 815 and 817.

The specimens are mostly large, up to 17 cm. long and 12 cm. broad; but mingled with them are however smaller specimens, 2 cm. long, 1,5 cm. broad. Many of the larger specimens have discs and a stalk of up to 2 mm's length; the larger plants supplied with discs were 10—11 cm. long and 10—15 cm. broad. The specimens were gathered in May, July and September, in a depth of 3—20 fathoms. Specimens with cystocarps growing wartlike in the frond were gathered in May. The cystocarps did not seem to be quite ripe.

Gr. or.: Tasiusak, Stenö, Turner Ö, Sabine Ö.

Fam. *Gigartinaceæ.*

Phyllophora Grev.

28. **P. Brodiæi** (Turn.) J. Ag. ***interrupta** (Grev.) K. Rosenv. Grl. Havalg. p. 821, Deux. Mém. p. 32.

All the specimens belong to subsp. *interrupta* which seems to be common; they are up to 16 cm. long and were gathered in a depth of up to 19 fathoms both in exposed places and in Turner Sund in a sheltered place, in rapid current. The species was gathered sterile in May—July and September—October. Young shoots were abundant in May and September.

Gr. or.: Kap Dan, Tasiusak, Tiningnekelak, Ödesund, Turner Sund, Sabine Ö.

Actinococcus Kütz.

29. **A. subcutaneus** (Lyngb.) K. Rosenv. Grl. Havalg. p. 822.

In adhesion to Darbishire's previous view regarding this species[1]), Rosenvinge mentions it in Deux. Mém. (p. 32—34) as the nemathecia of *Phyllophora Brodiæi* * *interrupta*, but in consequence of Darbishire's last treatise on *A. subcutaneus*[2])

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[1]) O. Darbishire: Die Phyllophora-Arten der westlichen Ostsee deutschen Antheils, Kiel 1895.

[2]) O. Darbishire: On Actinococcus and Phyllophora. Annals of Botany Vol. 13, 1899.

it must be regarded as a distinct species growing parasitically in the antheridia of *Phyllophora Brodiæi*.

The specimens were gathered in May and July.

Gr. or.: Tasiusak, Ödesund, Sabine Ö.

Ceratocolax K. Rosenv.

30. **C. Hartzii** K. Rosenv. Deux. Mém. p. 34.

Fam. *Gelidiaceæ.*

Harveyella Schmitz et Rke.

31. **H. mirabilis** (Reinsch) Schmitz et Rke., K. Rosenv. Deux. Mém. p. 39.

Fam. *Helminthocladiaceæ.*

Chantransia Fr.

32. **C. efflorescens** (J. Ag.) Kjellm., K. Rosenv. Deux. Mém. p. 40.

33. **C. microscopica** (Näg.) Fosl., K. Rosenv. Grl. Havalg. p. 825, Deux. Mém. p. 40.

The specimens I have referred to this species ramify abundantly from their very base, which in this species consists of only one cell, as well known. The branches are mostly opposite, but scattered branches are not uncommon. The thickness varies from 6—7 μ. The cells are generally longer than broad, up to more than two times as long as broad.

Epiphytically on *Rhodomela lycopodioides* gathered in September with a few sporangia and long hairs.

Gr. or.: Tasiusak (Amaga).

II. Bangioideæ.

Fam. *Bangiaceæ.*

Porphyra Ag.

34. **P. miniata** Ag., emend. K. Rosenv. Grl. Havalg. p. 826, Deux. Mém. p. 44.

a. **typica** K. Rosenv. Grl. Havalg. l. c.

Only a few specimens have been gathered, all belonging to this variety. It was gathered fructiferous in June. The antheridia contained 16 pollinoids.

In his work about *Porphyra* Hus[1]) attaches much systematic importance to the number of pollinoids. I have therefore tried to apply this character on some specimens from Greenland, Iceland, the Færöes and Norway, belonging to *P. miniata* v. *typica*, v. *amplissima* and v. *tenuissima*, and I have found a number of pollinoids somewhat differing from Hus's statements, as will appear from what follows:

P. miniata v. *typica*. This variety is not described in Hus's work[2]). One specimen from Greenland had 16 pollinoids in each antheridium. Another specimen likewise from Greenland generally had 32 pollinoids in each antheridium, but mingled with antheridia containing 32 pollinoids others were found containing only 16 pollinoids, and the latter seemed to be at the same stage of development as the former. A Færoese specimen mostly had 16 pollinoids in each antheridium but sometimes only 8. Another Færoese specimen had 32 pollinoids in each antheridium in the lower part of the frond but 16 and 8 in the upper part which seemed to be imperfectly divided.

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[1]) Henry T. A. Hus: An Account of the Species of Porphyra found on the Pacific Coast of North America. Proceedings of the California Academy of Sciences, third Series, Botany, Vol. II, No. 6. San Francisco 1902.

[2]) In *P. miniata* v. *cuneiformis* Setchell et Hus the number of pollinoids is stated to be 8.

P. amplissima (Kjellm.) is stated by Hus to have 16 pollinoids in each antheridium. A specimen from Norway (Norv. arct. Mehavn leg. Fosl.) had 16 as a rule, more rarely 32 pollinoids in each antheridium. Sometimes there were only 8 cells, but these were evidently imperfectly divided. A specimen from Iceland likewise mostly had 16 and more rarely 32 pollinoids in each antheridium. In connection with this I shall point out that Kjellman (Arct. alg. Pl. 18, Fig. 8) shows more than 16 pollinoids in two of the antheridia.

P. tenuissima Strömf. is described by Hus as containing 8 pollinoids in each antheridium. A specimen from Iceland, Strömfelt's original specimen, belonging to the Herbarium of the Botanical Museum, had mostly 16 and sometimes 32 pollinoids in each antheridium. A few times I saw only 8, but they seemed to be imperfectly divided.

Thus the number of pollinoids cannot be used as a specifically distinctive character for the above mentioned species, at least not as far as the Arctic and North Atlantic specimens are concerned.

In Grl. Havalg. Rosenvinge mentions that the inferior portion of the thallus of the distromatic forms of *Porphyra* always is composed of a single layer of cells («Observandum praeterea est, imam partem frondis in distromaticis etiam formis semper monostromaticam esse («cfr. Kjellman l. c.» [ɔ: Arct. alg.] «tab. 18, fig. 2») (Rosenv. l. c. p. 829). Hus calls this in question (l. c. p. 185), as he «cannot confirm Rosenvinge's statement, that in the distromatic forms the inferior portion of the tallus is composed of a single layer of cells». In order to investigate this matter more thoroughly I have examined specimens belonging to *P. miniata* v. *typica* and v. *amplissima* both from Iceland, the Færöes and Norway, besides those from East Greenland. In all the specimens examined, the inferior part of the thallus proved to be monostromatic up to a distance of about 0,5 cm. from the base. Thus Rosenvinge's observation is perfectly

right. If Hus is right in stating that the inferior portion of the thallus of the American species is distromatic, there is a strange difference between the American Pacific specimens and the Arctic and North Atlantic plants.

Gr. or.: Ikerasak.

Conchocelis Batt.

35. **C. rosea** Batt., K. Rosenv. Deux. Mém. p. 44.

B. Phæophyceæ.

Fam. *Fucaceæ.*

Ascophyllum Stackh.

36. **A. nodosum** (L.) Le Jol., K. Rosenv. Grl. Havalg. p. 832, Deux. Mém. p. 45.

The specimens I have had for examination were gathered with ripe or almost ripe conceptacles in June, July and September. According to C. Kruuse's statement the species is common in sheltered places, whereas it is wanting completely in exposed localities.

Gr. or.: Kap Dan, Ikerasausak, Unartok, Tiningnekelak, Angmagsivik.

Fucus (L.) Dcne et Thur.

37. **F. vesiculosus** L., K. Rosenv. Grl. Havalg. p. 833, Deux. Mém. p. 45.

The most common form from East Greenland is f. *sphærocarpa* which is closely connected with the other forms, f. *typica* and f. *turgida*, by numerous intermediate forms as in West Greenland. Specimens without bladders are not unfrequent in the material, especially in the collections from the estuary in Angmagsalik.

The species was gathered in May—September. Specimens gathered in May—Juli had young receptacles, whereas the plants from August—September had fully developed receptacles.

Gr. or.: Kap Dan, Tasiusak, Unartok, Ikerasausak, Tiningnekelak, Ikatek.

38. **F. inflatus** L., K. Rosenv. Grl. Havalg. p. 834, Deux. Mém. p. 45.

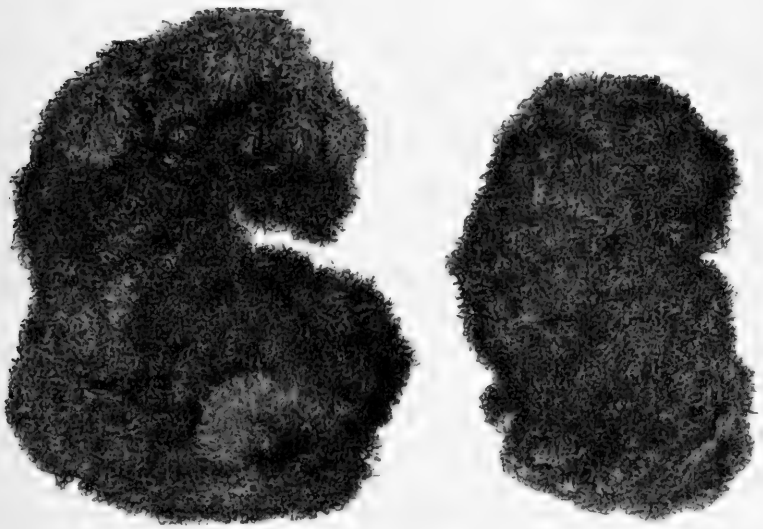

Fig. 1. *Fucus inflatus* L. f. *membranacea* K. Rosenv.
The specimens from Kap Dalton (comp. the text) photographed in dry state.

This very multiform species is varying much, as might be expected, in East Greenland as in its other areas of distribution. Typical specimens (comp. Jónsson Icel. Alg. p. 187) are however rare in this collection, yet at Tasiusak and Angmagsivik broad typical specimens have been collected, richly supplied with bladders. Not one of the specimens I have had for examination has receptacles by far as long as those of the Icelandic (Jónsson l. c.) and the Færöese specimens (comp. Börgesen Fær. Alg. p. 465, fig. 91). As for the rest the East Greenlandic specimens are considerably varying and form on one hand the

transition to f. *nana* Kjellm. and f. *bursigera* J. Ag. and on the other hand to f. *linearis* (Huds.) and f. *membranacea* K. Rosenv. The shorter specimens (1—4 cm.) with relatively thick frond agree with f. *bursigera* (J. Ag.) Kjellm. which is again by intermediate forms closely connected with f. *nana* Kjellm. Forma *linearis* (Huds.) is scarce in this collection. Forma *membranacea* K. Rosenv. is relatively amply represented. This thinner form of *F. inflatus* ought in my opinion rather to be reckoned a form than a variety, as it has surely been produced by environmental influences (Rosenv. Deux. Mém. l. c.). At Kap Dalton an interesting form belonging to f. *membranacea* was gathered. It consists of low plants with narrow and thin frond; they are not fastened to the bottom but densely entangled, a sort of Ægagropila form. Two samples belonging to this form have been gathered, the greater one is 11 cm. long and 10 cm. broad (Fig. 1). According to reports from C. Kruuse this form was found forming «dense but loose» (ɔ: not fastened to the bottom) «and unbroken strata covering the bottom, in shallow water, in a depth of 2—10 fathoms, in two lagoons near Kap Dalton, where the sea was calm, the covering of ice of long duration, the water salt, the bottom of basaltic gravel».

The species was gathered with receptacles in June—August.

f. *typica*.

Gr. or.: Kap Dan, The estuary of Kalerajuek near Kap Dan, Tasiusak, Tiningnekelak, Angmagsivik, Moræneö, Kangerdlugsuatsiak.

f. *bursigera* (J. Ag.).

Gr. or. Ikerasak, Bræfjord, Nualik.

f. *membranacea* K. Rosenv.

Gr. or.: Kap Dalton, Turner Sund, Polhems Dal.

Fam. *Tilopteridaceæ*.

Scaphospora Kjellm.

39. **S. arctica** Kjellm., K. Rosenv. Deux. Mém. p. 48.

Fam. *Laminariaceæ.*

Alaria Grev.

40. **A. Pylaii** (Bory) J. Ag., emend. K. Rosenv. Grl. Havalg. p. 838, Deux. Mém. p. 48.

α. **typica** K. Rosenv. Grl. Havalg. l. c.

Some small specimens perfectly typical with few and broad sporophylls were gathered in September.

β. **membranacea** (J. Ag.) K. Rosenv. Grl. Havalg. l. c.

This variety is more richly represented in the collection than the former one. It is rather variable, and as mentioned by Rosenvinge, plants agreeing in one respect with one and in another respect with another variety are not uncommon; therefore any plain distinction between these varieties cannot easily be made. On the other hand var. *membranacea* is moreover so closely connected with *Alaria grandifolia* J. Ag. that according to our present knowledge of these forms they cannot be said to differ in anything, but their size.

Var. *membranacea* was gathered with sporangia in July.

γ. **grandifolia** (J. Ag.), Alaria grandifolia J. Ag. Grl. Lam. p. 26.

To this variety I have referred two specimens from East Greenland. They remind of var. *typica* as to the breadth of the lamina and the cordate base; on the other hand as to the length of the stipe, the form of the lamina, the form and the size of the sporophylls, they resemble so much var. *membranacea*, that no natural distinction can be made. As these particular specimens fully agree with J. Agardh's description of *A. grandifolia* (l. c.) I have referred them to this species, and as it seems to me that a specific character is only artificially established between this species and *A. Pylaii*, as enlarged by Rosenvinge, I at least provisionally regard *A. grandifolia* as a variety of *A. Pylaii*.

The Greenlandic specimens which were salted down together with species of *Laminaria* were of the following sizes, measured in centimeters:

		A.		B.	
		Soaked	Dried	Soaked	Dried
Total length		380	323	...	200
The lamina	length	260	230	...	140
	greatest breadth	60	50	70	55
Stipe		120	93	...	60
Stipe below rhachis			55	...	23
Sporophylls	length	70	54 +	...	77
	greatest breadth	15	...	...	10

These measures of length[1]) both of the lamina, the stipe, and the sporophylls agree well with the measures stated by J. Agardh (l. c.). On the contrary the breadth of the lamina of the Greenlandic specimens is somewhat larger than stated by J. Agardh. J. Agardh gives the breadth of the lamina as one foot and a half (= about 47 cm.), and according to Kjellman (Spetsb. II) the breadth of the lamina is 30 cm. The greatest breadth of the Greenlandic plants is 70 cm. of soaked and 55 of dried material. As no information is given, as to whether the measures of Kjellman and J. Agardh refer to living, soaked, or dried plants, and as furthermore it is most probable that the measured plants were dried, I reckon the difference of breadth between the Greenlandic specimens and the plants from Spitzbergen perfectly unessential. The Green-

[1]) These measures of plants in wet and dry states prove that their total length is reduced 15 % by the drying process, the length of the lamina 11,5 %, the breadth of the lamina in one case (A.) 16,6 %, in another case (B.) 21 %, and the length of the stipes 22,5 %. A single measuring like this does not allow any general conclusion as to the normal reduction by drying of the frond of the several species of Alaria, but as generally the descriptions do not state whether the measures refer to living, soaked, or dried material, it nevertheless shows, that it is not justifiable to let too small a difference of size (breadth or length) have worth as a character of species, variety, or even of form.

landic plants must rather be regarded as thick plants. The midrib is broad, 1—1,2 cm. in the inferior portion of the lamina measured in dry state, and its transverse section is narrowly elliptical as in other varieties of this species. The sporophylls are distant below, less distant upwards as stated by J. Agardh. In the superior sterile portion they reach their greatest breadth (10 cm. dried, 15 cm. soaked) which by far exceeds the measure stated by J. Agardh («sesquipollicem»); but as the breadth of the sporophylls is considerably variable in *A. grandifolia* (comp. Kjellm. Spetsb. II, p. 11), I do not think that any essential importance may be attached to this difference.

According to Rosenvinge (Grl. Havalg. l. c.) and according to what I have seen myself, the position of the sporophylls is not of any systematic importance; the same may be said of the consistence of the lamina, as it is dependant of age (Kjellm. Spetsb. l. c., Rosenv. Grl. Havalg. l. c.) and locality (Rosenv. l. c.). Nor to the length of the stipe may any systematic importance be attached, as it increases with the age of the plant. Thus the above mentioned Greenlandic plants might possibly be regarded as an old *A. Pylaii* v. *typica*; but on account of our present knowledge of v. *typica*, it is not justifiable to determine them as belonging to this variety. I have therefore chosen to identify them with *A. grandifolia*, as they agree with this species better than any of all the described species of *Alaria*.

Gathered with sporangia in June. The specimens were growing in a luxuriant vegetation of *Laminaria*, in a depth of 3—5 fathoms, in rapid current, on a steep rock-side, sheltered by a sea cliff, where no drift ice normally would appear.

α. typica.

Gr. or.: Smalsund.

β. membranacea.

Gr. or.: Tasiusak, Tiningnekelak, Nualik, Kap Borlase Warren.

γ. grandifolia.

Gr. or.: Ikerasak.

41. **A. esculenta** (L.) Grev. var. **pinnata** (Gunn.) Kjellm. Handbok p. 29, A. flagellaris K. Rosenv. Deux. Mém. p. 49.

In the collection I have had for examination two somewhat badly conserved specimens are found which differ from *A. Pylaii* by the equilateral transverse section of the costa. Their sizes measured in centimeters are as follows:

Total length	The lamina		Stipe	Stipe below rachis	Sporophylls	
	Length	Breadth			Length	Breadth
112	100	20	12	3	27	5,2
132	119	36	13	5	30	5

The base of the lamina is broadly cuneate. The transverse section of the costa is angular, but not rectangular, the two longer sides are always straight and parallel. The sporophylls are dense and not placed in a furrow. The stipe is terete and short, especially the part below the rachis is exceedingly short. In the inferior portion of the rachis scars of fallen sporophylls are visible. In one specimen the rachis is considerably thicker than the inferior portion of the stipe. For the present I refer these specimens with some doubt to *A. esculenta* v. *pinnata*, as a form with short stipe. Any final determination of to which species these plants belong must be put off till some better material will be at our disposal.

Gr. or.: Tasiusak.

Geogr. distribution: Spitsbergen, Iceland, The Færöes, Norway.

Agarum (Bory) Post. et Rupr.

42. **A. Turneri** Post. et Rupr., K. Rosenv. Grl. Havalg. p. 841, Deux. Mém. p. 50.

All the specimens I have had for examination are small; the stipe of the largest one is 15 cm. long, the lamina 50 cm. The species was gathered in May and June in a depth of 3—9 fathoms. According to a report from Kruuse it was found —

but only small specimens, 3 feet long — at Ikerasak mingled with a luxuriant vegetation of *Laminaria*, in a very rapid current, sheltered by a sea cliff, where no drift ice would normally appear. According to C. Kruuse's statement the species is common.

Gr. or.: Kap Dan, Tasiusak, Ikerasak.

Laminaria Lam.

43. **L. digitata** (L.) Lam., K. Rosenv. Deux. Mém. p. 51.

44. **L. nigripes** J. Ag., emend. K. Rosenv. Grl. Havalg. p. 842. *β* **atrofulva** (J. Ag.) K. Rosenv. l. c.

Of this variety a few smaller specimens have been gathered with the lamina undivided or divided in two parts, besides one large specimen with much longer stipe than stated by Rosenvinge. The stipe is terete; only at the upper end, where it merges into the lamina, it is a little broader and somewhat compressed, 40 cm. long. The lamina is 115 cm. long, divided in two lobes, almost equally broad — the greatest breadth 43 cm.; only the inferior portion of the lamina, 13 cm. long, is undivided. The plant is changing the lamina, and the remainder of the old lamina is 60 cm. long. A circle of dense, radially elongated, muciparous canals fully agreeing with Rosenvinge's description is found in the stipe, most often very near the surface, so as to be frequently covered of but a single layer of cells. The large specimen belongs to f. *cucullata*, it grew in Ikerasak, on a steep rocky wall, sheltered by a sea cliff, and mingled with a luxuriant vegetation of Laminaria, in a very rapid current, where no drift ice would normally appear. In a depth of 3—5 fathoms. Gathered in June, changing the lamina.

Gr. or.: Ikerasak, Nualik.

45. **L. longicruris** De la Pyl., K. Rosenv. Grl. Havalg. p. 845, Deux. Mém. p. 52.

This species is formerly known from a single place, Ang-

magsalik (K. Rosenv. Deux. Mém. l. c.) on the eastern coast of Greenland. In Kruuse's collection only a small, young specimen was found which I have referred to this species, although with some doubt. The stipe was almost solid, but the middle layer in several places consisted of a very loose tissue, and small cavities were already formed here and there; thus the stipe is evidently growing hollow. Muciparous canals abundant in the stipe, in a peripherical circle. Sterile, gathered in June, in a depth of 3—30 fathoms. Kruuse's specimen also was gathered in Angmagsalik.

As to the occurrence of this species in East Greenland, north of Angmagsalik C. Kruuse has given me the following information: «*Laminaria longicruris* has not been gathered nor seen by me anywhere (north of Angmagsalik) in East Greenland. In spite of numerous examinations I never found a *Laminaria* with hollow or inflated stipe, neither have I seen any such drifting or driven ashore, though otherwise it is not unfrequently seen drifting about the territory of its distribution».

Gr. or.: Tasiusak.

46. **L. groenlandica** K. Rosenv. Grl. Havalg. p. 847, Deux. Mém. p. 53.

The species is abundantly represented in the collection, and all the specimens are typical, fully agreeing with the description (K. Rosenv. Grl. Havalg. l. c.). The following measures show the size of the specimens, in centimeters.

		soaked	dried								
Stipe		.....	53	40	19	35	15	16	6	23	6
Lam.	length	150	150	100	100	90	65	60	40	70	45
	greatest breadth	80	70[1])	62	42	35	17	14	15	35	9
Sorus	length	.....	40	80	40	Without Sorus					
	greatest breadth	.....	5	20	5						

[1]) In this case the breadth of the lamina was reduced 12,5 % by the drying process.

The species was gathered in May—August and October, with sorus in June and July, in a depth of 3—19 fathoms. At Ikerasak it grew in a luxuriant vegetation of *Laminaria*, on a steep rockside, in very rapid current, sheltered by a sea cliff, where no drift ice would normally appear. According to a statement from C. Kruuse the species is common in sheltered places in East Greenland.

Gr. or.: Tasiusak, Ikerasak, Tiningnekelak, Kangerdlugsuatsiak.

47. **L. saccharina** (L.) Lam. *δ.* **grandis** Kjellm. Handbok p. 25.

The size of the dried specimens that we have for examination is in centimeters as follows:

Stipe	80	123	80	80	80	130	67	66	96
Length of the young lamina	59	90	60	40	70	50	71	68	74
» » the old lamina	..	...	..	..	60	...	40	46	..
Greatest breadth of the young lamina	37	30	45	30	40	30	30	32	22
Sorus { length	..	...	..	..	37	...	..	30	..
Sorus { greatest breadth	..	...	..	..	4	...	..	7	..

The lamina of most of the specimens is broadest below the middle, oblong-ovate; but sometimes the greatest breadth of the lamina is in the middle, and its shape is narrowly elliptical, or the lamina is almost equally broad and linear-lanceolate. The base of the lamina is generally broadly cuneate, sometimes narrowly cuneate or rounded, and in some cases it shows a disposition to the cordate form. The sorus occupies the middle of the lamina in its whole length except the basal part, it is narrow, almost equally broad, or its greatest breadth is in the inferior part, or sometimes in the middle, and then its form is elliptical. The lamina is thin, and its transverse section agrees with Kjellman's description; the middle portion is destitute

of rugæ and a little thicker than the undulate marginal part. The stipe is relatively thin and 60—130 cm. long.

The narrower specimens with lanceolate lamina remind partly of *L. saccharina* var. *glacialis* Kr. Rosenv. (Deux. Mém. p. 53), partly of the main form of *δ. grandis* Kjellm., while the broader plants with ovate lamina of all described forms of *Laminaria saccharina* mostly resemble *δ. grandis* f. *latifolia* Kjellm. (Handb. p. 26, *Laminaria saccharina* f. *latissima* Kjellm. Arct. Alg. p. 230), and only seem to differ from the latter in this, that the lamina does not attain so large a breadth, and consequently also in this, that the base does not appear so markedly cordate.

The specimens were gathered changing the lamina and with sorus in July, in a depth of 3—8 fathoms, both in sheltered localities, in rapid current, and on open shore.

Gr. or.: Turner Sund, Kap Borlase Warren, Sabine Ö.

48. **L. solidungula** J. Ag., K. Rosenv. Grl. Havalg. p. 850, Deux. Mém. p. 57.

The species is considerably varying in size and in the form of the lamina. The shorter specimens are 6,5 cm. long and sterile; they are evidently very young plants, 1—2 years old. The larger specimens are 250 cm. long, evidently perennial plants. Many of the specimens have a lamina divided in four parts (one in 5), dating from different years. In the oldest, and often in two of the oldest portions an opening is found of the same shape as the sorus, and in its place in the lamina; in the one year old portion of the lamina, and often also in the oldest portion but one, the place where the sorus was found is clearly marked from the other portion by its whitish colour and its greater transparency. The sorus is generally ovate, or oblong-ovate, or oval-elliptical in the basal part of the lamina as described by J. Agardh (Spetsb. Alg. p. 3) and Kjellman (Spetsb. II, p. 16); but in two cases I have met with a different form of

sorus. In one case the sorus occupied the middle of the upper part of the young lamina, and only the lower third of the lamina was sterile; the sorus was however not continuous in its whole length; it was about 50 cm. long, its greater breadth 5 cm.; its smaller breadth 2 cm. In the other case the one year old lamina, 70 cm. long, had a linear sorus 65 cm. long and 6 cm. broad; it was almost equally broad in its whole length, only narrowing off a little upwards. A similar form of sorus seems to be mentioned by Kjellman (Spetsb. II, p. 17) and by Rosenvinge (Deux. Mém. l. c.). The form of the lamina[1]) varies as mentioned by Kjellman (Spetsb. II, p. 16) from the almost circular to the lanceolate form. In young specimens we frequently meet with a lingulate apex in the young lamina, some-

[1]) By lamina is meant here the portion of the lamina developed in a single year.

Fig. 2. *Laminaria solidungula* J. Ag. Two dried specimens photographed by E. Warming, showing the lamina divided in four parts, dating from different years. In the three years old portion an opening indicates the place of sorus.

times not at all separated from the latter by a constriction. J. Agardh calls this lingulate apex ligula, and he considers it a part of the young lamina. It is scarcely correct to explain «the ligula» in this way, as no ligula at all is found in very young specimens in their first year. I am of the opinion that the ligula always is the remainder of an older lamina, and the constriction occurs with age, as the breadth of the lamina increases.

Judging by what I have seen in young specimens from Greenland it seems justifiable to suppose that the plant does not produce any sorus for the first 2 (or 3) years of its life.

The length of its stipe naturally varies according to the age of the plant; the longest stipe was 80 cm. long. In order to show the size of some of the specimens of which the lamina dates from the fourth year (in a single case the lamina dates from the second year), the following measures are given in centimeters:

Total length	Stipe	The length and the breadth of the laminæ							
		a		b		c		d	
		length	breadth	length	breadth	length	breadth	length	breadth
219	50	44	23	46	30	49	30	30	..
209	34	60	29	50	25	40	24	25	15
245	60	46	20	62	25	47	20	30	15
190	80	60	23	50	21	..	..	..	..

In this table **a** indicates the young lamina; **b** is one year, **c** two, and **d** three years old.

The specimens were collected in a depth of 3—10 fathoms both on open shore and in sheltered locality in rapid current. Smaller specimens were found at Ikerasak in a rich vegetation of Laminaria sheltered by a sea cliff, where no drift ice would normally appear. The species was collected in June and July, with sorus in the young lamina in June. In many of the

specimens the young lamina has not yet reached its normal size. The specimens with old laminæ were found at Turner Sund and Kap Borlase Warren. The species is commonly distributed, according to Kruuse's statement.

Gr. or.: Tasiusak, Ikerasak, Turner Sund, Kap Borlase Warren, Sabine Ö.

Saccorhiza De la Pyl.

49. **S. dermatodea** (De la Pyl.) J. Ag., K. Rosenv. Grl. Havalg. p. 850, Deux. Mém. p. 57.

The specimens were gathered sterile in May—July; there are both large and small specimens; especially those gathered in Tiningnekelak in the current place (up to two fathoms of water, no drift ice) are of considerable size. The largest specimens measured in centimeters, in dried condition, give the following measures:

Total length	Stipe	The lamina	
		length	breadth
320	40	280	15
115 +	25	90 +	26

Gr. or.: Kap Dan, Tasiusak, Tiningnekelak.

Fam. *Chordaceæ.*

Chorda (Stackh.).

50. **Ch. Filum** (L.) Stackh., K. Rosenv. Grl. Havalg. p. 853, Deux. Mém. p. 57.

Several fragments of this species, the largest one 80 cm. long, were gathered sterile in Septemher.

Gr. or.: Tasiusak (Kilitilik).

Fam. *Chordariaceæ.*

Chordaria (Ag.).

51. **Ch. flagelliformis** (O. F. Müll.) Ag., K. Rosenv. Grl. Havalg. p. 854, Deux. Mém. p. 58.

Gathered with sporangia in September. The largest specimen 17 cm. long.

Gr. or.: Tasiusak, Ödesund.

Fam. *Desmarestiaceæ.*

Desmarestia Lam.

52. **D. aculeata** (L.) Lam., K. Rosenv. Grl. Havalg. p. 857, Deux. Mém. p. 59.

The species was gathered in May—July. The specimens gathered in May are richly supplied with hairs. On the contrary only a few plants of a gathering from June had a small number of hairs.

It was found in a depth of 3—20 (—30) fathoms, both in exposed and sheltered places.

Gr. or.: Kap Dan, the estuary of the Kalerajuek near Kap Dan, Tasiusak, Tiningnekelak, Turner Ö, Sabine Ö.

var. **media** (Ag.) J. Ag., K. Rosenv. Grl. Havalg. l. c.

Of this variety a few specimens were gathered in July; hairs abundant; they perfectly agree both with the specimens mentioned by Rosenvinge (l. c.) and with the Færöes specimens (Börgesen, Fær. Alg. p. 445). Gathered on open shore, in a depth of 11 fathoms.

Gr. or.: Kap Borlase Warren.

53. **D. viridis** (O. F. Müll.) Lam., K. Rosenv. Grl. Havalg. p. 859, Deux. Mém. p. 60.

The length of the specimens varies from 3—40 cm., they were all gathered in July, and in some of them hairs are abundant. The species was found both in exposed and sheltered places, in a depth of 3—11 fathoms.

Gr. or.: Turner Sund, Kap Borlase Warren, Sabine Ö.

Fam. *Dictyosiphonaceæ.*

Dictyosiphon Grev.

54. **D. foeniculaceus** (Huds.) Grev., K. Rosenv. Grl. Havalg. p. 859, Deux. Mém. p. 60.

The specimens are up to 50 cm. long; they were collected in July and August; with sporangia in August. In the upper sublittoral region.

Gr. or.: Tiningnekelak, Kangerdlugsuatsiak.

Coilodesme Strömf.

55. **C. bulligera** Strömf., K. Rosenv. Grl. Havalg. p. 862, Deux. Mém. p. 61.

Fam. *Punctariaceæ.*

Phyllitis Kütz.

56. **Ph. fascia** (O. F. Müll.) Kütz., K. Rosenv. Grl. Havalg. p. 862.

The species was gathered in a single place. The specimens are 15 cm. long and 2—3 cm. broad; one specimen even reaches a breadth of 7 cm. The margin is often slightly undulate.

Gathered sterile in May, in a depth of 5—19 fathoms.

Gr. or.: Tasiusak.

Delamarea Har.

57. **D. attenuata** (Kjellm.) K. Rosenv. Grl. Havalg. p. 865, Deux. Mém. p. 63.

Scytosiphon (Ag.).

58. **S. lomentarius** (Lyngb.) J. Ag., K. Rosenv. Grl. Havalg. p. 863, Deux. Mém. p. 62.

var. **typica** K. Rosenv. Grl. Havalg. l. c.

Some typical specimens 10 cm. long and 0,5—1 mm. broad were gathered with young sporangia in June. Some of the fructiferous plants were destitute of paraphyses (comp. K. Rosenv. Deux. Mém. l. c.).

var. **complanata** K. Rosenv. Grl. Havalg. l. c.

Some typical specimens up to 40 cm. long and 2—4 mm. broad were gathered with sporangia in June and July.

Gr. or.: Ikerasak, Tiningnekelak.

Symphyocarpus K. Rosenv.

59. **S. strangulans** K. Rosenv. Deux. Mém. p. 67.

Stictyosiphon Kütz.

60. **S. tortilis** (Rupr.) Reinke, K. Rosenv. Grl. Havalg. p. 868. Deux. Mém. p. 70.

The specimens I have had for examination are up to 17 cm. long; they were gathered in June—August; with unilocular sporangia in July—August. Specimens from August are richly supplied with hairs.

Gr. or.: Kap Dan, Tiningnekelak, Ödesund, Kangerdlugsuatsiak, Turner Sund, Kap Borlase Warren.

Isthmoplea Kjellm.

61. **I. sphærophora** (Harv.) Kjellm., K. Rosenv. Grl. Havalg. p. 881, Deux. Mém. p. 75.

Some sterile, loose specimens growing together with *Stictyosiphon tortilis* and *Pylaiella littoralis* were gathered by N. Hartz in a hole in the ice on the lagoon, north of Kap Dalton.

Gr. or.: Kap Dalton.

Punctaria Grev.

62. **P. plantaginea** (Roth) Grev., K. Rosenv. Deux. Mém. p. 71.

Omphalophyllum K. Rosenv.

63. **O. ulvaceum** K. Rosenv. Grl. Havalg. p. 872, Deux. Mém. p. 73.

A small fragment of this species was found among the haptera of *Polysiphonia arctica*.

Gr. or.: Kap Borlase Warren.

Geogr. distribution: Jan Mayen, Iceland, Miquelon near New Foundland.

Fam. *Elachistaceæ.*

Elachista Dub.

64. **E. fucicola** (Vell.) Aresch., emend. K. Rosenv. Grl. Havalg. p. 78, Deux. Mém. p. 74.

α. **typica.**

Gathered with unilocular sporangia in June and September.

Gr. or.: Smalsund.

β. **lubrica** (Rupr.) K. Rosenv.

Gathered with unilocular sporangia in May and June. In one specimen gathered in May plurilocular sporangia were found both in the lower part of the long assimilative shoots (comp. Rosenv. l. c.) and in the upper part of the short assimilative shoots. It has been gathered in a depth of up to 19 fathoms and grows on *Halosaccion ramentaceum*, *Saccorhiza dermatodea* and on the stipes of species of *Laminaria.*

Gr. or.: Tasiusak, Ikerasak.

Leptonema Rke.

65. **L. fasciculatum** Rke., Elachista fasciculata K. Rosenv. Deux. Mém. p. 75.

var. **subcylindrica** K. Rosenv. Grl. Havalg. p. 879.

Was found together with *Pylaiella* on a stipe of *Laminaria*, sterile filaments 7—12 μ thick, fructiferous filaments 11—15 μ. In almost all the filaments plurilocular sporangia were abundant; these sporangia are often more prominent than usual in this variety. Gathered in May.

Gr. or.: Tasiusak.

Fam. *Ectocarpaceæ.*

Ectocarpus Lyngb.

Subgen. Pylaiella (Bory).

66. **E. littoralis** (L.) Lyngb., K. Rosenv. Grl. Havalg. p. 881. Deux. Mém. p. 75.

var. **opposita** Kjellm.

This variety is the most frequent in the collection and according to a statement from Kruuse it is common in East Greenland. The largest specimens are 30 cm. long. It was gathered in May—September; in June, July and September with unilocular, in June and July with plurilocular sporangia; in a depth of 1—3 (—30) fathoms.

Gr. or.: Kap Dan, Tasiusak, Ikerasak, Kangarsik, Tiningnekelak, Angmagsivik, Smalsund, Kangerdlugsuatsiak, Nualik.

var. **divaricata** Kjellm. forma.

Grows on *Fucus inflatus*. The filaments are densely entangled, so as to produce a habitual resemblance with *Ectocarpus tomentosus*. The thickest main branches were 19—23 μ thick. The branches are frequently incurved and not rarely slightly hooked at the apex which often ends in a hairlike point. I have seen a single plurilocular sporangium terminal on a long branch, 196 μ long, 22 μ thick at the base and 17 μ at the top. Gathered in the littoral region in August.

It seems to me that this form is very much like f. *prætorta* Kjellm. (Handbok p. 85) which is only known from the Baltic; but whether they are identical I am not able to decide.

Gr. or.: Polhems Dal in Kong Oskars Fjord.

var. **varia** (Kjellm.) Kuck. f. **typica** Kuck., Pylaiella varia Kjellm.

Typical specimens have been gathered, some loose, and some others attached to stipes of Laminaria, in a depth of up to 5 fathoms. Gathered in June and July with unilocular sporangia.

Gr. or.: Ikerasak, Tiningnekelak.

Subgen. Euectocarpus Hauck.

67. **E. siliculosus** (Dillw.) Lyngb., K. Rosenv. Grl. Havalg. p. 882.

Some specimens of this species were gathered in September; they attain a thickness of 55 μ and have only plurilocular sporangia which are 188 μ long and 43 μ broad.

Gr. or.: Tasiusak.

68. **E. confervoides** (Roth) Le Jol., K. Rosenv. Grl. Havalg. p. 883, Deux. Mém. p. 76.

Gathered in June with plurilocular sporangia. The specimens reach a thickness of 33 μ. Was found together with *Acrosiphonia* and *Pylaiella*.

Gr. or.: Angmagsivik.

69. **E. pycnocarpus** K. Rosenv. Grl. Havalg. p. 886.

The plants I with some doubt refer to this species are up to 10 cm. long; in dried condition their colour is brownish green; they have a distinct main axis, and towards the apex the branches are somewhat bunched. The end of the younger branches is often hairlike. Young unilocular sporangia are found; they are mostly destitute of stalks, often unilateral, but also often scattered. The cells are much shorter than they are broad, and in this respect the plants are perfectly like *E. pycnocarpus*. Though the characteristic position of the sporangia of *E. pycnocarpus* (K. Rosenv. l. c. fig. 23 B, C) is not found in these plants, I still refer them to this species, as by examinating the original specimen I have met with branches with young unilocular sporangia of the same appearance and position as the above mentioned plants.

As my material is in dried condition like all the material of *E. pycnocarpus*, no definite statement can be given as to the form and number of the chromatophores.

Gathered in June with young unilocular sporangia.

Gr. or.: Ikerasak.

70. **E. ovatus** Kjellm. v. **tenuis** K. Rosenv. Deux. Mém. p. 77.

The specimens collected at Kap Borlase Warren perfectly agree with Rosenvinge's description; it only ought to be mentioned that specimens without branches or only furnished with a few branches, and with plurilocular sporangia mostly not opposite but unilateral, are frequent in the collection. Such specimens are identical with *E. Holmii* (K. Rosenv. Grl. Havalg.

p. 889) and might be called f. *Holmii*, as mentioned by Rosenvinge (Deux. Mém. l. c.), as they are connected with the typical var. *tenuis* by intermediate forms.

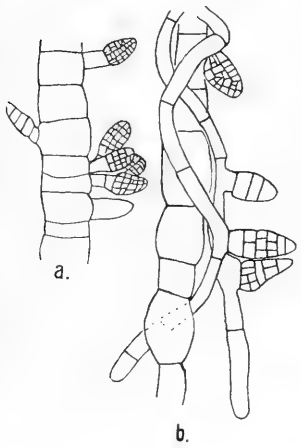

Fig. 3. *Ectocarpus ovatus* Kjellm. a a fragment of a filament with irregularly placed plurilocular sporangia showing to the right a group of sporangia. 168 : 1. b a fragment of a filament with rhizoids showing the plurilocular sporangia of the rhizoids (compare the text). 276 : 1.

The specimens gathered in Angmagsalik (in May?) were 43 μ thick in the lower part of the frond and thus remind of the typical form of *E. ovatus*. The plurilocular sporangia were frequently opposite, but scattered or terminal sporangia also occurred. Sometimes the plurilocular sporangia were found several together in a small group (compare Fig. 3 a). The rhizoids which were abundant at the base of the plants were frequently furnished with plurilocular sporangia in large number as shown in my figure (Fig. 3 b).

Gathered in (May? and) July with plurilocular sporangia.

Gr. or.: Angmagsalik, Kap Borlase Warren.

Subgen. Streblonema (Derb. et Sol.).

71. **E. æcidioides** K. Rosenv. Deux. Mém. p. 80.

72. **E. helophorus** K. Rosenv. Deux. Mém. p. 82, Fig. 17.

In the frond of *Petrocelis polygyna* I have met with sterile filaments of a brown alga, perfectly agreeing with the description and figures of this species. But my material did not give any further information as to this interesting alga.

Gathered sterile in July.

Gr. or.: Stenö.

Microsyphar Kuck.

M. Polysiphoniæ Kuck. Beiträge p. 29.

Was found in the outer walls of *Polysiphonia urceolata* which was mingled with *Sphacelaria radicans*, growing on the under side of beetling rocks.

Gr. occ.: Ivigtut (L. K. R.).

Geogr. distribution: Iceland, The Færöes, Scotland, Helgoland.

Fam. *Myrionemaceæ.*

Myrionema.

73. **M. globosum** (Rke.) Fosl. Phycocelis globosus K. Rosenv. Deux. Mém. p. 86.

Ralfsia Berk.

74. **R. deusta** (Ag.) J. Ag., K. Rosenv. Grl. Havalg. p. 899, Deux. Mém. p. 93.

75. **R. clavata** (Carm.) Farl., K. Rosenv. Deux. Mém. p. 94.

Sorapion Kuck.

76. **S. Kjellmani** (Wille) K. Rosenv. Deux. Mém. p. 95; Lithoderma Kjellmani Wille, K. Rosenv. Grl. Havalg. p. 902.

On *Chætomorpha Melagonium*. Gathered sterile in July.

Gr. or.: Tiningnekelak.

Lithoderma Aresch.

77. **L. fatiscens** (Aresch.) emend. Kuck., K. Rosenv. Deux. Mém. p. 97, Grl. Havalg. p. 901.

Abundant on stones having been fastened to the haptera of species of *Laminaria*. The specimens fully agree with K. Rosenvinge's description and figure (Deux. Mém. l. c. fig. 22). The filaments are 10—14 μ thick. Gathered in July; with young unilocular sporangia in July, in a depth of 3—8 fathoms.

Gr. or.: Kap Dalton, Turner Sund, Kap Borlase Warren, Sabine Ö.

Fam. *Sphacelariaceæ.*

Chætopteris Kütz.

78. **Ch. plumosa** (Lyngb.) Kütz., K. Rosenv. Grl. Havalg. p. 903, Deux. Mém. p. 99.

According to a statement from Kruuse this species is common in East Greenland; it grows gregariously, and from some of its habitats it has been gathered in great numbers. It was collected in a depth of up to 20 fathoms; the largest plants are 10 cm. long. All the specimens gathered in May—September are sterile, but the stalks of the sporangia from earlier years seem to be persistent, as they cover the older branches with a dense felt, as mentioned by Rosenvinge (l. c.).

Gr. or.: Kap Dan, Tasiusak, Ikerasak, Stenö, Ödesund, Kangerdlugsuatsiak, Nualik, Kap Borlase Warren, Sabine Ö.

Sphacelaria Lyngb.

79. **S. racemosa** Grev. var. **arctica** (Harv.) Rke., K. Rosenv. Grl. Havalg. p. 904, Deux. Mém. p. 100.

The species is surely common in East Greenland. It was gathered in the littoral region and in the sublittoral region in May—September, in a depth of up to 5 fathoms (in a single case a depth of 3—30 fathoms was stated). The specimens are up to 3 cm. long, and they are almost all sterile, only in a few specimens gathered in June, emptied unilocular sporangia were found; they were mostly terminal on monosiphone branches, but sometimes they were found several together on polysiphone branches, which is in perfect agreement with Rosenvinge's description in Deux. Mém. (l. c.).

Gr. or.: Kap Dan, Tasiusak, Smalsund, Moræneö, Stenö, Kap Dalton, Turner Sund.

S. radicans Harv., Sauvag. Sphacelaria p. 56; S. olivacea K. Rosenv. Grl. Havalg. p. 904 ex parte.

Only sterile specimens, destitute of hairs, growing on the

under side of beetling rocks and on the shell of a crab in a depth of 4—5 fathoms.

Gathered in June and July.

Gr. occ.: Christianshaab (N. H.), Ivigtut (L. K. R.).

Geogr. distribution: Iceland, Scotland, Ireland, Britain, Kattegat, Helgoland, Normandy, Bretagne.

80. **S. britannica** Sauvag. Sphacelaria p. 66; S. olivacea K. Rosenv. Grl. Havalg. p. 904 ex parte.

The Greenlandic specimens are perfectly typical and fully agreeing with Sauvageau's description (l. c.). Both the specimens from West Greenland and those from East Greenland were gathered in July, and are sterile. The plants from West Greenland grew in the littoral region in rock-clefts; the specimens from East Greenland were found on stones together with *Lithoderma*.

Sauvageau (l. c. p. 69) who founds his opinion on the informations given by Rosenvinge (l. c.) as well as on the examination of Giesecke's specimens in Thuret's herbarium, declares *S. olivacea* from Greenland to be identical with *S. britannica*. It has however been proved by an examination of the Greenlandic material that the specimens referred by Rosenvinge to *S. olivacea* really do belong to two species: *S. radicans* Harv. and *S. britannica* Sauv.

The specimens of Lyngbye's herbarium mentioned by Rosenvinge (l. c.) were gathered in Greenland by Giesecke but are without any statement as to their habitats; they mostly belong to *S. britannica*, but filaments of *S. radicans* are however frequently found mingled with *S. britannica*.

Gr. occ.: Sukkertoppen (L. K. R.).

Gr. or.: Kap Dalton.

Geogr. distribution: Iceland, The Færöes, Scotland.

C. Chlorophyceæ.

Fam. *Phyllosiphonaceæ.*

Ostreobium Born. et Flah.

81. **O. Queketti** Born. et Flah., K. Rosenv. Deux. Mém. p. 101.

Fam. *Gomontiaceæ.*

Gomontia Born. et Flah.

82. **G. polyrrhiza** (Lagerh.) Born. et Flah., K. Rosenv. Deux. Mém. p. 101.

Fam. *Cladophoraceæ.*

Acrosiphonia (J. Ag.).

The genus *Acrosiphonia* is here defined as proposed by Wille [1]) and includes only species with many nuclei in each cell. Thus defined the genus is identical with the subgenus *Melanarthrum* (Kjellman, Acrosiphonia p. 50). It has already been pointed out (Börgesen, Fær. Alg. p. 506, Jónsson Icel. Alg. p. 367), that Kjellman's division of the subgen. *Melanarthrum* into sections is untenable, at all events it may be regarded as fully demonstrated that the section I, *Speirogonicæ*, and section II, *Zoniogonicæ*, are to be considered as one. In the Greenlandic species of this genus the sporangia certainly mostly occur singly or two or three together, but 5—7 sporangia in a continuous row are not rare. Thus the Greenlandic material seems further to show that the above named sections are to be considered as one. Species with spinous branches did not occur in the Greenlandic collections.

The Greenlandic species are easily distinguishable by the following key:

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[1]) Botaniska Notiser 1899, p. 281.

A. Without terminal sporangia.
   a. with incurved branches ..... *A. incurva.*
   b. without incurved branches ..... *A. hystrix.*
B. With terminal sporangia ..... *A. penicilliformis.*

83. **A. incurva** Kjellm., Acrosiphonia p. 61, Cladophora (Spongomorpha) arcta *α.* typica and *β.* pulvinata K. Rosenv. Grl. Havalg. p. 907.

The Greenlandic specimens are 2—6 cm. high and 130—170 *μ* thick. The sporangia occur singly, two or three together, or up to 7 in a row. Incurved branches occur, but rather rarely. The lower part of the main axis of young plants terminates in an axile rhizoid, which dies off, as the plants grow older and the number of lateral rhizoids increases; in many cases it is replaced by a new axile rhizoid of intra-matrical origin, but usually the old specimens show the lower end of the main axis dying off. The lower end of the rhizoids is generally considerably enlarged, and often irregularly branched; sometimes these branches are well developed stolons, emitting erect filaments. The rhizoids are as a rule densely entangled below, as the branches or lobes of the basal cells work into each other. The apex of rhizoids not touching the substratum is not enlarged but incurved or hooked, and may be considered as a kind of prehensile organ.

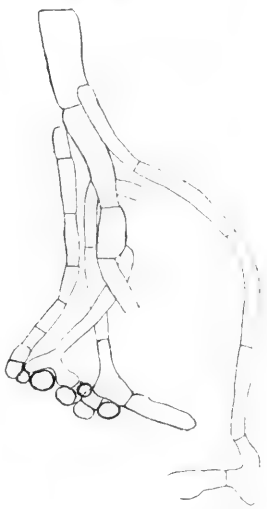

Fig. 4. *Acrosiphonia incurva* Kjellm.
A basal portion of a plant showing the lower end of the main axis dying off and lateral rhizoids with their widened and branched basal cells. To the left a stolon emitting an erect filament is to be seen. 25 : 1.

Injured rhizoids, the lower part of which is dying off or has been thrown away, are in many cases renewed by an

iterated division of the lowest living cell, and the new part of the rhizoid is distinctly marked from the old one by a sheath formed by the remaining walls of a dead cell. In the same way the uppermost branches, when injured, are renewed by an iterated division of the uppermost living cell, and the lower end of the young branch is enclosed in a sheath of a dead cell. Sometimes more than one sheath is to be seen in the young branch showing that the branch has been repeatedly renewed. The young branches produced in this manner are usually considerably narrower than the older part of the branch and often highly resemble flagelliform branches; consequently the occurrence of flagelliform branches is of a doubtful value as a specifically distinctive character. Such renewed growth of the branches is certainly sometimes produced in the manner, that the uppermost part of a branch above some emptied sporangia is thrown off, and the cell next to the emptied sporangia forms a new apex by iterated division, but in most cases it is produced in the way, that the uppermost part of the branches injured by the air during the ebb dies off and grows out again as milder environmental influences play upon it. This is concluded from the frequent occurrence of renewed growth in the branches of young, sterile specimens. Such renewed growth of branches and rhizoids is before described in *Acrosiphonia flabelliformis* (Jónsson Icel. Alg. p. 371, fig. 16 a, fig. 17 b-e).

Regarding the structure of the chromatophore the Greenlandic specimens fully agree with the Icelandic plants (Jónsson Icel. Alg. p. 368), and the largeness of the meshes of the chromatophore is, I think, not to be relied upon as a specifically distinctive character. As *A. incurva* Kjellm. differs from *A. centralis* (Lyngb.) Kjellm., only by the largeness of the meshes of the chromatophore, I think that on further investigation they will turn out to be identic, and in that case the older name, *A. centralis* (Lyngb.) Kjellm., should be used.

Some rather peculiar specimens have been collected by

Jessen at the northern side of Sermersok. They form tufts 1—2 cm. high, incurved branches are rather frequent, and the sporangia occur singly. On the whole the specimens mostly agree very well with *A. incurva*, but they differ from it by the occurrence of rhizoids in the uppermost part of the frond and by having the branches of last order sometimes given off at right angles. The rhizoids occur somewhat irregularly in the

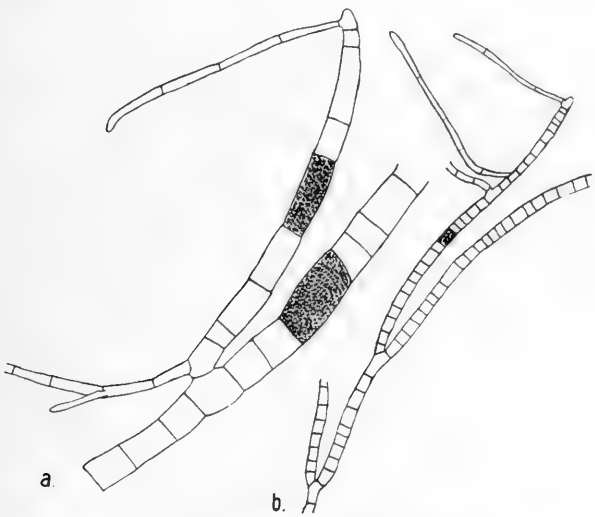

Fig. 5 *Acrosiphonia incurva* Kjellm.

Two fragments of the specimens from Sermersok. Compare the text.

a contains two singly occurring sporangia; the branch to the left shows at the base a normal rhizoid, at the apex an abnormally developed one. 47 : 1.

b shows a single sporangium and abnormally developed rhizoids becoming branches. 13 : 1.

uppermost part of the frond, and sometimes shoots from the upper ends of the cells, that is shoots which should have been branches, are developed as rhizoids, and vice versa, shoots from the lower ends of the cells, that is shoots which should have been rhizoids, are developed as branches. Fragments of main branches with young branches and young rhizoids occur loosely

entangled. These fragments doubtlessly give rise to new plants. On the whole the upper part of the frond of these specimens is frangible and consists of many loosely interwoven fragments between the main branches. On account of the loose condition of the frond the fragments probably have changed their position in proportion to the direction of the light, and thus branches have become rhizoids and rhizoids branches.

Specimens collected by Rosenvinge at Godthaab in a depth of 5 fathoms, entangled between Desmarestia aculeata are analogous to the f. *debilis* of *A. hystrix*. These specimens have certainly been removed from the coasts by the current, and afterwards thrown down to the bottom of the sea and entangled between the Desmarestia.

The specimens determined by Rosenvinge as *Cladophora arcta* f. *pulvinata* (l. c.) are rather young, gregariously growing plants of *A. incurva*.

The species is littoral, it has only seldom been collected at low-water mark and occasionally in the upper part of the sublittoral region. It was collected in February—March and May—August, with sporangia in June—August.

The species seems to be common in West Greenland.

Gr. occ.: Umanak (Sören Hansen); Atanikerdluk, Ujaragsugsak (N. H.); Godhavn (L. K. R.); Orpigsuit near Christianshaab (N. H.); Sukkertoppen, Ny Hernhut (L. K. R.); Godthaab (Vahl, L. K. R.); Island near Frederikshaabs Glacier, Frederikshaab, Smallesund (L. K. R.); Neriak (N. H.); Ivigtut (L. K. R.); Sermilik Fjord (A. Jessen); Ataneritsok (Igaliko) (L. K. R.); Kakortok (Vahl); Kagsimiut, Julianehaab (L. K. R.); Sardlok, Umanartut, the northern side of Sermersok (A. Jessen); Tasermiut prope Korsoak, Nanortalik (Vahl).

Gr. or.: Ikerasak, Angmagsivik, Smalsund, Nualik.

Geogr. distribution: Iceland, The Færöes, Norway.

84. **A. hystrix** (Strömf.), Jónsson Icel. Alg. p. 368; Spongomorpha hystrix Strömfelt, Om algvegetationen vid Islands kuster

p. 54; Cladophora (Spongomorpha) arcta γ. hystrix, K. Rosenv. Grl. Havalg. p. 907.

The Greenlandic specimens are 4—15 cm. high and the thickness of the upper branches is varying from 200—500 μ. The sporangia mostly occur singly or two or three together, but up to 6 sporangia in a continuous row are not rare. Neither spinous, nor hooked or incurved branches are met with. The tufts are loose and almost not entangled [in f. *typica*] or somewhat entangled at the base. As in other species of *Acrosiphonia* the main branches are much narrower below than above. As in *A. incurva* the main axis of young plants terminates in an axile rhizoid, which afterwards dies off; sometimes it is replaced by a new axile rhizoid, but in older plants the lower end of the main axis usually dies off. Lateral rhizoids are rare in the typical form, but rather frequent in the f. *littoralis*; they never occur in such quantities as in *A. incurva*. The lowest rhizoids are often unilaterally placed while the upper rhizoids are opposite, alternate or scattered. The basal cell of the rhizoids is usually considerably enlarged, it is lobed or irregularly branched and sometimes it emits stolons from which erect filaments arise. Renewed growth of injured rhizoids and branches as described in *A. incurva* (p. 43—44) also occurs in this species. The young apices of the branches produced in this manner sometimes resemble flagelliform

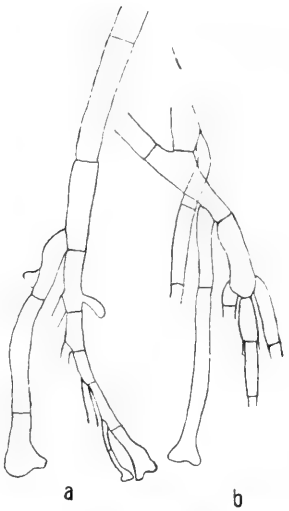

Fig. 6. *Acrosiphonia hystrix* (Strömf.).
a the basal portion of a young specimen showing an axile rhizoid and mostly secund lateral rhizoids. 47 : 1.
b the basal portion of an older plant showing an axile rhizoid produced by renewed growth dying off, besides both opposite and scattered lateral rhizoids. 47 : 1.

branches. The Greenlandic material of this species agrees well with the Icelandic plants (Jónsson l. c.) and three forms connected with numerous intermediate forms are distinguishable.

f. **typica** Jónss. l. c. p. 368.

Large specimens about 7—15 cm. high, and about 300—500 μ thick, only at the base loosely entangled. Occurs in the sublittoral region down to a depth of 7 fathoms.

f. **littoralis** Jónss. l. c. p. 370.

This form is lower than the typical form, 4—about 10 cm. high, and narrower, about 200—300 μ thick, and much more richly entangled in the lower part of the frond. Occurs at low-water mark and in the uppermost part of the sublittoral region.

f. **debilis** K. Rosenv. Grl. Havalg. p. 908.

This form has only been collected loose and entangled between other algæ as *Dictyosiphon foeniculaceus* f. *flaccida* and *Chætomorpha Melagonium*, in sheltered places in a depth of 3—7 fathoms. The specimens are low and 190—260 μ thick. It seems to be most closely related with the f. *littoralis* from which it differs especially by the peculiar, often unilateral branching (cfr. Rosenvinge's description l. c.).

The species was collected in May—August, with sporangia in June—August. It grows in the littoral region near low-water mark, and in the sublittoral region down to a depth of 7 fathoms. It mostly occurs on stones and rocks, but occasionally also on different algæ.

The species is presumably common in West Greenland.

Gr. occ.: Upernivik (L. K. R.); Sarkak in Vajgat, Unartok in Vajgat, Ujaragsugsak in Vajgat, Klokkerhuk (N. H.); Godhavn (L. K. R.); Agto (Sörensen); Tatsip-ata (N. H.); Holstensborg (Th. Holm, L. K. R., N. H.); Sukkertoppen (L. K. R.); Godthaab (L. K. R., C. Petersen); Merkuitsok, Fiskernæsset (L. K. R.); Frederikshaab, Nigamiut pr. Frederikshaab, Kvannefjord (N. H); Ivigtut (L. K. R.);

Narsak (L. K. R.); Kagsimiut (H. Lassen); Umanarsuk, Kimatulivigsalik, Kitsigsut Öer (A. Jessen).

Gr. or.: Ikerasak, Tiningnekelak, Angmagsivik, Smalsund, Ödesund, Nualik.

A. penicilliformis (Fosl.) Kjellm., Acrosiphonia p. 80; Cladophora (Spongomorpha) arcta δ. penicilliformis K. Rosenv. Grl. Havalg. p. 908.

I have with some doubt referred a single specimen to this species. Terminal sporangia did not occur, but as the upper part of many branches had died off, I think it probable that the rows of emptied terminal sporangia had been thrown off. Some intercalary sporangia occurring singly have been observed. In other respects the Greenlandic specimen agrees well with this species.

It was collected in July, on rocks in the littoral region.

Gr. occ.: Godthaab (L. K. R.).

Geogr. distribution: Iceland, Norway.

Spongomorpha (Kütz.).

The genus *Spongomorpha* is here defined as proposed by Wille [1]) and thus only includes species with a single nucleus in each cell. Thus defined the genus is identical with Kjellman's subgenus *Isochrous* (Acrosiphonia p. 82).

S. vernalis (Kjellm.), Acrosiphonia vernalis Kjellm., Acrosiphonia p. 82; Cladophora lanosa K. Rosenv. Deux. Mém. p. 103.

This species is known only from one place in Greenland, and the specimens in question have already been mentioned by Rosenvinge (l. c.). Rosenvinge remarks that, before Kjellman's work on *Acrosiphonia* was published, he would certainly have referred the specimens to *Cladophora lanosa*. In a footnote (l. c. p. 103) Rosenvinge points out that these specimens only contain one nucleus in each cell; this is a highly important

[1]) Botaniska Notiser 1899, p. 281.

statement, as all other *Cladophoraceæ* have many nuclei in each cell. Later on, Wille has shown, that some species belonging to the subgenus *Isochrous* Kjellm. only contain one nucleus in each cell, and I too only found one nucleus in each cell in *Spongomorpha vernalis* (Kjellm.) and *Spongomorpha* sp. from Iceland (Icel. Alg. p. 366).

The Greenlandic species are about 1,5—2 cm. high, about 30 μ thick below, and about 40—50 μ thick above. Hooked and incurved branches occur. The specimens fully agree with the description and figures (l. c. Tab. V) given by Kjellman, and the only difference is, that the Greenlandic plants are somewhat thicker than the plants described by Kjellman. The specimens are sterile, and were collected in July in a littoral pool, 15—20 feet above the level of the sea.

Gr. occ.: The rock Nunanguak west of Umanak 60° 34′ (A. Jessen).

Geogr. distribution: Iceland, Kattegat.

Cladophora (Kütz.).

85. **C. gracilis** (Griff.) Kütz., K. Rosenv. Grl. Havalg. p. 910.

The specimens from East Greenland entirely agree with the West Greenlandic plants referred by Rosenvinge to this species. The plants occurred in company with *Chætomorpha tortuosa*, *Stictysiphon tortilis* a. o. The species was collected in September and had some few sporangia.

Gr. or.: Tasiusak.

Rhizoclonium Kütz.

86. **Rh. riparium** (Roth) Harv., K. Rosenv. Grl. Havalg. p. 913, Deux. Mém. p. 103.

α. **polyrhizum** K. Rosenv. Grl. Havalg. l. c.

The filaments are 17—29 μ thick, in other respects the specimens entirely agree with the description. It was collected in September.

Gr. or.: Angmagsalik, Unartok (in thermal water in the littoral region).

Chætomorpha Kütz.

87. **Ch. tortuosa** (Dillw.) Kleen, K. Rosenv. Grl. Havalg. p. 917, Deux. Mém. p. 104.

It was collected sterile in September in company with *Cladophora gracilis* and *Chætomorpha Melagonium*.

Gr. or.: Tasiusak.

88. **Ch. Melagonium** (Web. et Mohr) Kütz., K. Rosenv. Grl. Havalg. p. 917, Deux. Mém. p. 104.

The species was gathered in May—September in a depth of 1—8 fathoms (f. *typica*) and in the littoral region (f. *rupincola*), both in sheltered and exposed places.

f. *typica*.

The typical form seems to be common.

Gr. or.: Tasiusak, Kangarsik, Ikerasak, Tiningnekelak, Smalsund, Stenö, Ödesund, Kangerdlugsuatsiak, Turner Sund, Sabine Ö.

f. *rupincola*.

The specimens are 9 cm. high and overgrown with Diatoms.

Gr. or.: Nualik.

Urospora Aresch.

89. **U. mirabilis** Aresch., K. Rosenv. Grl. Havalg. p. 918, Deux. Mém. p. 106.

The specimens belong to the typical form. The fructiferous filaments are up to 70 μ thick. The species was collected in June, July and September, with sporangia in June and September. Occurs in company with *Ulothrix flacca* and other species of *Ulothrix*.

Gr. or.: Smalsund, Nualik.

Fam. *Mycoideaceæ*.

Pringsheimia Rke.

90. **P. scutata** Rke., K. Rosenv. Grl. Havalg. p. 924.

It grows on *Chætopteris plumosa* and *Sphacelaria racemosa* and was collected, sterile in August and September.

Gr. occ.: Ivigtut (L. K. R.) on *Sphacelaria racemosa* and *Polysiphonia urceolata.*

Gr. or.: Smalsund, Kangerdlugsuatsiak.

Ulvella Crouan.

91. **U. confluens** K. Rosenv. Grl. Havalg. p. 924, Deux. Mém. p. 109.

This species occurs on the stipe of *Laminaria saccharina* and on the frond of *Rhodymenia palmata* amongst other epiphytes. The plants on the *Laminaria* stipe were sterile and fully resembled the description of the older plants (K. Rosenv. Grl. Havalg. l. c. fig. 39 B), while the plants on *Rhodymenia* were fructiferous and agreed with the description of the younger plants. It was collected in July with sporangia as far down as to 5 fathoms.

Gr. or.: Tiningnekelak, Turner Sund.

92. **U. fucicola** K. Rosenv. Grl. Havalg. p. 926, Deux. Mém. p. 109.

It was collected sterile in June growing on *Fucus inflatus* and *Fucus vesiculosus.*

Gr. or.: Kap Dan.

Chætobolus K. Rosenv.

93. **Ch. gibbus** K. Rosenv. Grl. Havalg. p. 928, Deux. Mém. p. 110.

Fully typical specimens (K. Rosenv. Grl. Havalg. l. c. fig. 41) were collected in July growing in *Sorapion Kjellmani* on *Chætomorpha Melagonium.*

Gr. or.: Tiningnekelak.

Fam. *Chætophoraceæ.*

Arthrochæte K. Rosenv.

94. **A. penetrans** K. Rosenv. Deux. Mém. p. 110.

Acrochæte Pringsh.

95. **A. parasitica** Oltm., K. Rosenv. Deux. Mém. p. 114.

Bolbocoleon Pringsh.

96. **B. piliferum** Pringsh., K. Rosenv. Grl. Havalg. p. 134, Deux. Mém. p. 115.

The species was abundant in old fragments of *Stictyosiphon tortilis*, which were found in company with *Pylaiella littoralis* and *Isthmoplea sphœrophora* floating in the water, in a hole in the ice of the lagoon, north of Kap Dalton. It was found sterile in July.

Gr. or.: Kap Dalton (N. H.).

Fam. *Ulothricaceæ.*

Ulothrix Kütz.

Key to the species:

I. Filaments 14—80 μ thick generally containing 2—3, rarely 1 or 4 pyrenoids in each cell ..... U. flacca

II. Filaments 7—23 μ thick containing only one pyrenoid in each cell.

A. Chromatophore thickened in one end.

a. Without rhizoids.

o. Basal cell tapering downwards.

1. Chromatophore generally almost fills the length of the cell ..... U. pseudoflacca f. typica

2. Chromatophore does not fill the length of the cell ..... U. pseudoflacca f. tenuior

oo. Basal cell discoidally widened at the base U. scutata

b. With rhizoids.

o. Basal cell discoidally widened at the base, no coalescent filaments ..... U. scutata

oo. Basal cell slightly narrowed at the base, coalescent filaments occur.

1. Filaments straight, the coalescent filaments

adhere in their whole length; no unbroken basal layer ..... U. consociata f. typica

2. Filaments often kneed at intervals, coalescent only at the base, forming an unbroken basal layer ..... U. consociata var. islandica

B. Chromatophore thickened in the middle.. U. subflaccida

97. **U. flacca** (Dillw.) Thur., K. Rosenv. Grl. Havalg. p. 935, Deux. Mém. p. 115; Wille, Studien p. 18.

This species has been so exhaustively described by Rosenvinge (Grl. Havalg. l. c.) and Wille (l. c.) that I have nothing to add.

The filaments usually contain 2—3 pyrenoids in each cell, but cells with one, or, in the thicker filaments with four pyrenoids are not rare. The number of pyrenoids seems to be dependent on the size of the cell, that is, larger cells contain more pyrenoids than smaller ones, as pointed out by Wille (l. c. p. 20).

The American *U. flacca*, as it is figured and described by Hazen (Am. Ulothricaceæ p. 155, pl. 20, fig. 7—9), cannot in my opinion be regarded as identic with the Greenlandic and North European species. *U. flacca* Hazen is 10—25 μ thick and contains only one pyrenoid in each cell, it is moreover most likely without rhizoids, as the rhizoids are neither figured nor mentioned in the description. The Greenlandic species is 14—80 μ thick, contains 1—4 pyrenoids in each cell, and has rhizoids. Hazens species seems to be nearly related to *U. pseudoflacca* Wille and the two species are thus most naturally regarded as identic by Hazen (Am. Ulothricaceæ p. 156); but *U. pseudoflacca* Wille is so different from the species named *U. flacca* from Greenland, Iceland, the Færöes and Norway, that any confounding of the two species seems to be excluded, while specimens of *U. pseudoflacca* from Greenland have been determined as *U. implexa* Kütz.

As to the distribution of the species in West Greenland

there is nothing to add except some few localities, which may be regarded as unimportant, the species certainly being common in West Greenland.

The plants from East Greenland fully agree with the West Greenlandic specimens. They were gathered in June and July. Specimens with typical gametangia (Rosenv. Grl. Havalg. fig. 44 C) were collected in June.

Gr. or.: Ikerasak, Angmagsivik, Kangerdlugsuatsiak, Nualik.

98. **U. pseudoflacca** Wille Studien p. 22, U. implexa K. Rosenv. Grl. Havalg. p. 936, Deux. Mém. p. 115, pro parte.

This species frequently occurs in the Greenlandic collections. The specimens are somewhat varying, especially regarding the length of the cell, and sometimes also as to the shape of the basal cell. As a rule the basal cell is somewhat narrowed towards the base, as described by Wille (l. c.), but in specimens growing on *Acrosiphonia* I have occasionally met with basal cells, the bases of which were somewhat expanded and marked from the upper part of the cell by a slight narrowing. As the specimens on *Acrosiphonia* in other respects agree with this species, and the different shape of the basal cells gradually runs into the normal shape, I have referred them to *U. pseudoflacca*.

The length of the cell is considerably varying; usually it varies from $^1/_4$ of the breadth to as much as the breadth, but sometimes the cells are $1\,^1/_2$ times longer than broad. The length of the gametangia and zoosporangia varies in the same way as in the vegetative cells. The sporangia are usually of the same shape as the sterile cells, but sometimes they are somewhat thicker and of a more round shape. The zoosporangia contain 4—8 zoospores of the typical shape. Most frequently both zoosporangia and gametangia occur in the same filament. The thickness of the filaments varies from 9—23 μ. In other respects the structure of the cell of the Greenlandic specimens agrees

with the original description. The cromatophore usually seems to fill the length of the cell, but cells containing an chromatophore shorter than the cell, are not rarely met with in the filaments. The thickness of the cell walls varies considerably, according to age and growing places. The thicker walls are about 3 μ. Specimens distinctly narrowed at intervals are occasionally met with (fig. 7).

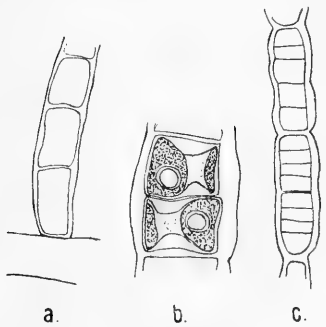

Fig. 7. *Ulothrix pseudoflacca* Wille.
a, a base of a filament. 667 : 1.
b, two cells showing the shape of the single chromatophore and the position of the single pyrenoid. 667 : 1.
c, a fragment of a filament showing the constriction, compare the text. 277 : 1.

f. **tenuior** nov. f.

Somewhat different specimens have been collected, growing on *Acrosiphonia*, or loose between *Pylaiella littoralis*. The filaments are 7—14 μ thick; they are frequently thickest in the middle and tapering towards the apex and towards the base (7 μ at the base, 14 μ in the middle and 9 μ in the upper part). The basal cell is somewhat longer than in the typical form, and tapering towards the base. The upper part of the filaments was fructiferous, while the lower part frequently was sterile. The cells are generally longer than in the typical form, and their length varies from $^1/_2$ of the breadth to twice as much as the breadth. Both gametangia and zoosporangia sometimes occur in the same filament. The zoosporangia contain up to 8 zoospores. The sporangia are frequently thicker and of a more rounded shape than the sterile cells. The cell walls are usually thin, especially in young filaments, and in fructiferous plants the thickness of the walls does not amount to more than 1,5 μ. Generally the chromatophore does not fill the length of the cell, it is usually distinctly belt-shaped and contains one lateral pyrenoid in the broader end. Sometimes the chromatophore seems to resemble

a curved plate with a somewhat lobed margin. In some respects these specimens resemble *U. subflaccida*, but they differ from it by the lateral position of the pyrenoid. As the specimens in some respects differ from the typical *U. pseudoflacca*, I have referred them to a new form, f. *tenuior*, which form, although not sharply defined, may, I think, be distinguished from the typical form by the following characters: The chromatophore usually does not fill the length of the cell, sometimes has a lobed margin, and the cells are longer. This form seems to me to be very much like *U. implexa* Hazen Am. Ulothricaceæ pl. 21, fig. 1, 2).

The species occurs on stones and rocks in the littoral region. Sometimes it has been collected in fresh water, beneath high-water mark. It is not rarely found in company with *U. flacca*, occasionally rather gregarious, forming green strata on the rocks. The species is also found growing on *Fucus* and *Acrosiphonia*, and sometimes entangled between other algæ. Specimens with gametangia were gathered in May—July, with zoosporangia in May and July. It occurs both on exposed and sheltered coast.

f. *typica* is certainly common in West Greenland.

Gr. occ.: Atanikerdluk, Sarkak in Vajgat (N.H.); Inilik in Atanek Fjord (P. H. Sörensen); Holstensborg (N.H.); Godthaab (L.K.R.); Frederikshaab (L.K.R., N.H.); Arsuk (H. Lassen); Issa west of Arsuk Fjord, Arsuk Storö (L.K.R.); Upernivik Island near Kagsimiut (H. Lassen); Sydpröven, Umanarsuk, the south end of Amitsok opposite Sermersok, Nanortalik, Kimatulivigsalik, Kitsigsut Öer (A. Jessen).

Gr. or.: Ikerasarsuk (Vahl); Smalsund.

f. *tenuior*.

Gr. or.: Nunatsuk (Sylow).

Geogr. distribution: Iceland, The Færöes, Norway.

U. scutata nov. sp.

The filaments are usually distinctly narrowed at intervals, 5—6 μ thick in the lowest part and 9—16 μ thick in the upper

part. The base of the basal cell is discshaped, with even or lobed margin, and marked from the upper part of the cell by a distinct constriction. The cells in the lowest part of the filament are as broad as long, or three times longer than broad, in the upper part their length is varying from $^1/_3$ of the breadth to about as much as the breadth. The chromatophore is belt-shaped and contains one lateral pyrenoid in its broader end; it does not fill the length of the cell. The single nucleus has a lateral position in the cell. The zoosporangia contain at least 8 spores.

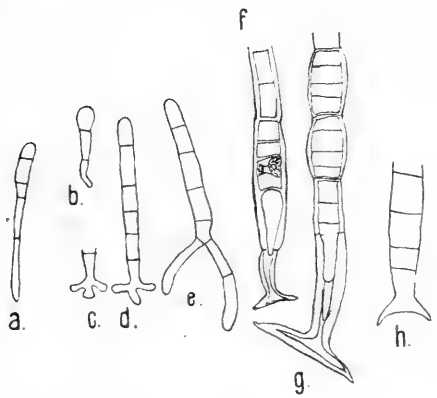

Fig. 8. *Ulothrix scutata* nov. sp.
a, **b**, two young plants with an elongated basal cell.
c, **d**, two young plants showing a lobed basal cell.
e, a young plant with an extramatrical rhizoid.
f, **g**, **h**, the basal portion of older filaments showing the discoidally widened lower end of the basal cell; in **f** and **g** the constrictions of the filaments and intramatrical rhizoids may moreover be seen.
a, **b**, **c**, **d**, **e** 168 : 1; **f**, **g**, **h** 422 : 1.

The specimens were found in the littoral region on species of *Acrosiphonia*. The filaments jut out freely from the substratum; they are usually distinctly constricted at intervals; every articulation (ɔ: the space between two constrictions) usually contains 4 cells and only sometimes more than 4 cells, that is, when some of the cells or all 4 have been divided without any distinct new constriction. The lower part of the filament is 5—6 μ thick, and much narrower than the remaining part of the filament, the thickness of which varies between 9 and 16 μ. The cells of the narrower, basal part of the filaments are as long as broad, or up to three times longer than broad, while the

length of the cells in the thicker part of the filament varies from about 1/3 of the breadth to as much as the breadth. The basal cell of young filaments is elongated, and either of the same thickness all over, or tapering towards the base. As the plants grow older the base of the basal cell is enlarged into a kind of basal disc, of the shape of a watch-glass, turning its concave side towards its substratum, the branches of *Acrosiphonia*; the margin of this basal disc is either entire or lobed or even palmate. The disc, or the discoidally enlarged base of the basal cell, is very distinctly marked from the upper part of the basal cell. The part of the basal cell which is next to the disc is often distinctly constricted, has thick walls and narrow lumen. Rhizoids are frequent, both extramatrical even in young plants, and intramatrical especially in older plants, but the filaments are not rarely destitute of rhizoids. The cell only contains a single, lateral nucleus. The chromatophore is belt-shaped and does not fill the length of the cell; it contains a single lateral pyrenoid in its broader and thicker end.

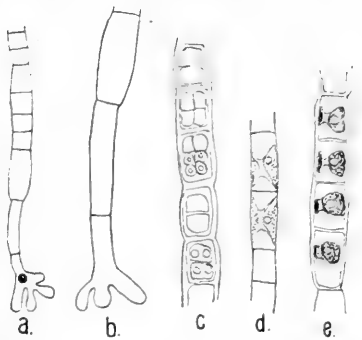

Fig. 9. *Ulothrix scutata* nov. spec.

a, b, The inferior part of two filaments showing the narrower basal portion and the lower portion of the thicker superior part, besides the lobed basal cell. In a the filament has been removed from the substratum, the discoidally widened lower end of the basal cell is unilaterally developed, and we look from below into the lumen of the cell. a 277 : 1; b 667 : 1.

c, a fragment of a filament showing the imperfectly divided zoosporangia. 422 : 1.

d, a fragment showing the shape of the chromatophore and the position of the single pyrenoid. 422 : 1.

e, a single articulation (compare the text) composed of 4 cells, showing the shape of the chromatophore and the position of the single pyrenoid. 667 : 1.

I have not met with specimens with fully ripe sporangia,

but judging by the stages of division of the sporangia shown in fig. 9 c, the number of the spores is at least 8.

The species is nearly related to *U. pseudoflacca* but differs from it essentially by the peculiar shape of the basal cell and the occurrence of rhizoids. The frequent constrictions of the filaments may be regarded as another difference, probably less important.

The species was collected in the littoral region in July —August, with unripe sporangia in July.

Gr. occ.: Umanalik east of Kangek Ö, 60° 36′, a rock near Kaersok, 60° 29′, the south side of Tusardluarnak, 60° 7′ (A. Jessen).

99. **U. consociata** Wille Studien p. 25.

To the typical form of this species I have referred some specimens collected by L. K. Rosenvinge at Godthaab, in rock-pools near high-water mark. The specimens occurred in company with blue-green algæ and some green algæ resembling stages of *Pleurococcus*. The filaments are 7—10 μ thick, and the length of the cell is varying from $^1/_4$ of the breadth to about as much as the breadth. Well developed rhizoids occur. The filaments are considerably narrower than in the Norwegian plants, and probably the specimens may be regarded as a f. *minor*.

Specimens collected by Jessen in the littoral region at Umanalik seem to be fully identic with Wille's species. The filaments are 14—22 μ thick, and the length of the cell varies from about $^1/_3$ to $^3/_4$ of the breadth. Rhizoids are abundant, and coalescent filaments have sometimes been met with. Filaments, that were indistinctly narrowed at intervals, occasionally occurred.

Gr. occ.: Godthaab (L. K. R.); Umanalik (A. Jessen).

var. **islandica** Jónss. Icel. Alg. p. 354, U. implexa K. Rosenv. Grl. Havalg. p. 936 ex parte.

Typical specimens of this variety have been collected by

Rosenvinge near the glacier of Kornok, growing on *Fucus inflatus*, in company with *Ulvella fucicola*. The plants occur gregariously, almost totally covering the substratum. The filaments are 14—16 μ thick and the length of the cell varies from $^1/_6$ to $^2/_3$ of the breadth. The filaments coalesce below as in the Icelandic plants. The rhizoids are well developed

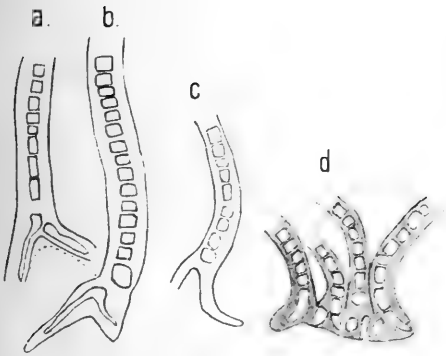

Fig. 10.

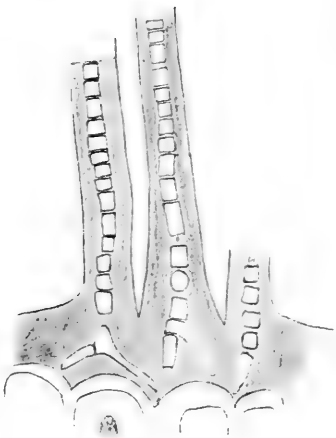

Fig. 11.

Ulothrix consociata Wille var. *islandica* Jónss.
Fragments of the specimens from Kornok.

Fig. 10. a, b, c, The basal portion of three filaments showing rhizoids. d, shows 4 filaments coalescent at the base. a, b, c, d 311 : 1.

Fig. 11. Transverse section of the frond of Fucus inflatus. The basal layer of the Ulothrix formed by the coalescent basal portions of the filaments covers the surface of the host with an unbroken growth. The rhizoids seem to penetrate the intercellular substance of the host. Beneath the basal layer of the Ulothrix the epidermal cells of the Fucus may be seen in the figure. 422 : 1.

and sometimes seem to penetrate the intercellular substance between the outmost cells of the host. The filaments are occasionally indistinctly kneed at intervals, and sometimes irregularly constricted. Sometimes the filaments are of an irregular appearance, caused by cells growing through emptied sporangia or dead cells. The chromatophore contains one lateral pyrenoid.

Regarding the structure of the chromatophore and the structure of the cell altogether, the Greenlandic specimens fully agree with the Icelandic plants. With gametes in July.

The specimens from East Greenland occurred on *Rhodymenia palmata*, they essentially resemble the above mentioned plants from West Greenland. The filaments are 14—16 μ thick, and the plants were less abundant.

Gr. occ.: Kornok (L. K. R.).

Gr. or.: Tiningnekelak.

Geogr. distribution: Iceland, The Færöes, Norway.

100. **U. subflaccida** Wille Studien p. 27.

To this species I have only referred some few, young, and sterile specimens. They fully agree with Wille's description and are easily recognizable by the position of the pyrenoid. The chromatophore does not fill the length of the cell and frequently occurs with a lobed margin. The filaments are 7—16 μ thick. The plants were found together with *Percursaria percursa*, *Acrosiphonia* sp. and *Urospora mirabilis*.

Hazen (Am. Ulothricaceæ p. 155) remarks, that *U. subflaccida* Wille apparently is identic with *U. implexa* Kütz. Whether *U. implexa* Kütz. is identic with any of the new species of *Ulothrix* described by Wille (l. c.) or not, must be left undecided until further examination of Kützing's original specimens has taken place, but judging from the description and figures (Hazen l. c. Pl. 21, fig. 1, 2) the American *U. implexa* does not seem to be identic with *U. subflaccida* (cfr. above p. 57).

Gr. occ.: Julianehaab (N. H.).

Gr. or.: Smalsund.

Geogr. distribution: Iceland, Norway.

Fam. *Ulvaceæ*.

Monostroma (Thur.).

101. **M. fuscum** (Post. et Rupr.) Wittr., emend. K. Rosenv. Grl. Havalg. p. 940, Deux. Mém. p. 116.

The specimens from East Greenland entirely agree with Rosenvinge's exhaustive description of the species (Grl. Havalg. l. c.). The size of the plants is somewhat varying. Young plants 2—5 cm. long and 0,5—2 cm. broad fully resemble the figures given by Rosenvinge (Grl. Havalg. fig. 48). The larger specimens are 10—30 cm. long and 5—20 cm. broad. The thickness of the frond varies between 39 and 44 μ. The species was gathered in May—July, and September, with zoospores in June, July, and September. In a single place it is said to have been dredged up from a depth of 5—19 fathoms.

As well known, Rosenvinge found (l. c.), that this species contains two chromatophores in each cell, one in each end of the cell, facing each of the two sides of the frond. In this respect *M. fuscum* differs from other species of *Monostroma* as, for example, *M. Grevillei*, which only contains one chromatophore in each cell facing the primary surface of the frond (Rosenv. l. c.). The occurrence of two chromatophores in each cell in *M. fuscum* is highly important and should be mentioned in the description of the species [1]).

Gr. or.: Tasiusak, Ikerasak, Tiningnekelak, Angmagsivik, Smalsund, Nualik.

102. **M. leptodermum** Kjellm., K. Rosenv. Grl. Havalg. p. 944, Deux. Mém. p. 117.

The largest specimen collected is 21 cm. long, and its largest breadth is 14 cm. Right above the tubular stipe the frond is 10 μ thick. The specimens are well agreeing with typical plants of this species, except in the largeness of the frond. The plants were collected in July.

Gr. or.: Tiningnekelak.

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[1]) F. S. Collins (The Ulvaceæ of North America, Rhodora, Journal of the New England Botanical Club, Vol. 5, No. 1, 1903) does not at all mention this important character neither in the description of the species nor in the description of the genus *Monostroma*.

103. **M. Grevillei** (Thur.) Wittr., emend. K. Rosenv. Grl. Havalg. p. 946, Deux. Mém. p. 117.

α. **typica** K. Rosenv. Grl. Havalg. p. 947.

Some few specimens of this variety have been collected. The frond is 17 μ thick, with somewhat thickened outer membrane.

β. **Vahlii** (J. Ag.) K. Rosenv. Grl. Havalg. p. 949.

Some small specimens of this variety have been collected; they agree well with the description, are up to 10 cm. long, with tubular frond.

γ. **arctica** (Wittr.) K. Rosenv. Grl. Havalg. p. 949.

Besides typical specimens the collection contains plants having an intermediate position between this and the following variety; they are up to 45 cm. long, with the uppermost part of the frond split into a few narrow segments, while the lower part, about $^2/_3$ of the frond, is tubular. The thickness of the frond is 43 μ at a distance of 1 cm. from the base, in the upper part the frond is somewhat thinner and thus measures only 39 μ in the lower part of the segments. Such specimens may as well be referred to one as to another of the named varieties.

δ. **intestiniformis** K. Rosenv. Grl. Havalg. p. 952.

Several typical specimens of this variety have been collected, some of which are much larger than reported by Rosenvinge (l. c.). The largest specimen of this collection is 130 cm. long, while the largest plant measured by Rosenvinge is 53 cm. long (l. c.). The thickness of the frond, measured at about the middle between the base and the apex of the frond, varies from 29—44 μ. A single fructiferous specimen was 44 μ thick at the apex of the frond. As pointed out by Rosenvinge the frond of this variety is not rarely split in its uppermost part.

The species was gathered in June, July, and September, with sporangia in June—July.

The varieties of this species are very varying and not sharply defined. While the frond of *M. fuscum* is cleft in an early stage of development, without regard to environmental influences, this species always remains tubular in sheltered situations (β and γ), and I think that the tubular frond must be regarded as normal in this species, as the split varieties (α and γ), which grow in the littoral region exposed to the dashing of the waves, in sheltered places occur with tubular frond; such specimens from Iceland have been shortly mentioned by me in Icel. alg. p. 350. The splitting of the frond is, I think, exclusively due to the surroundings, and the variability of the species seems to be caused by environmental influences. According to our present knowledge of these varieties I think it most natural to regard them as belonging to one and the same species, and I cannot admit Collins (l. c. cfr. my footnote p. 63) to be right in dividing *M. Grevillei* K. Rosenv. into two species: *M. Grevillei* Collins including var. *Vahlii* K. Rosenv., and *M. arcticum* Collins including var. *intestiniformis* K. Rosenv. The limit between the two species as understood by Collins, is as indistinct as the limit between the main form of the species and the included varieties. If closely related forms, which run into each other, are not to be regarded as belonging to one and the same species, we had better take as a species every form that can be described plainly enough to be recognizable, than form species of artificially grouped forms.

Gr. or.: Ikerasak (δ), Tiningnekelak (δ), Angmagsivik (α, γ), Smalsund (γ), Nualik (β, δ).

104. **M. groenlandicum** J. Ag., K. Rosenv. Grl. Havalg. p. 954, Deux. Mém. p. 117.

It has been collected in June—July together with *Ulothrix flacca*, *Monostroma Grevillei δ. intestiniformis* and *Rhodomela lycopodioides*. Fructiferous plants were gathered in July.

Gr. or.: Ikerasak, Nualik.

Enteromorpha (Link.).

105. **E. intestinalis** (L.) Link, emend. K. Rosenv. Grl. Havalg. p. 957, Deux. Mém. p. 117.

a. **genuina** K. Rosenv. Grl. Havalg. l. c.

Some fragments were collected in a single place in July.

Gr. or.: Tiningnekelak.

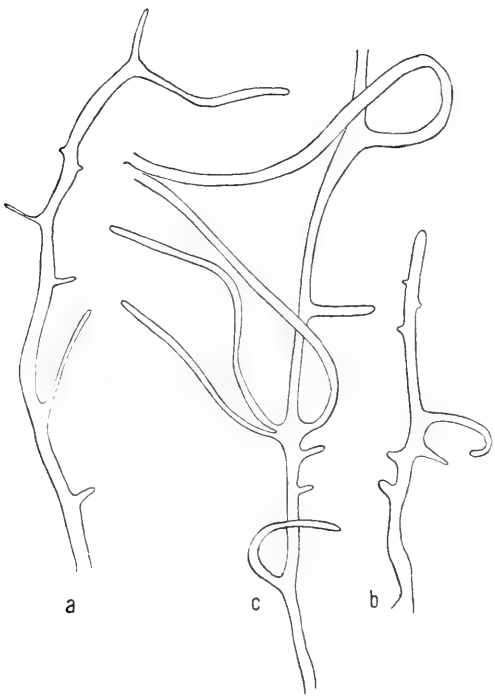


Fig. 12. *Enteromorpha prolifera* O. F. Müll.
a, b show the apex of the frond with young prolifications.
c, a fragment of a specimen at about the middle of the frond.
a, b, c 47 : 1.

106. **E. prolifera** O. F. Müll., K. Rosenv. Grl. Havalg. p. 960, . micrococca f. subsalsa Börgesen, Freshwater Algæ in the Botany of the Færöes Part I, p. 245, Pl. VIII, fig. 6.

The specimens collected are small and richly proliferous. They habitually resemble *Enteromorpha micrococca* f. *sub-*

salsa Kjellm. (The algæ of the arctic sea p. 292, pl. 31, fig. 1—3) but still they differ from it in many respects, while they seem to be identic with *E. micrococca* f. *subsalsa* Börgesen (Freshwater Algæ l. c.). The Greenlandic specimens differ from *E. *micrococca* on account of the anatomical characters in spite of their small cells. The cells are frequently arranged in longitudinal series; seen from above they are usually of angular shape and only rarely somewhat rounded, they are of different size, and sometimes about twice as broad as long. In transverse section the frond also differs from *E. *micrococca* as to the shape of the cells and the thickness of the walls, but agrees essentially with *E. prolifera*. Such specimens in many respects resemble *E. arctica* J. Ag. and probably might be regarded as a very proliferous form of that species; as *E. arctica* has before been included in *E. prolifera* (Rosenv. l. c.) such extreme forms of the latter with the small cells might be called f. *arctica* (J. Ag.) (cfr. Collins, Ulvaceæ l. c. p. 22).

The specimens occurred in company with *Percursaria percursa* on somewhat overflowed shore. Gathered in July.

Gr. or.: Dunholm.

Percursaria Bory.

107. **P. percursa** (Ag.) K. Rosenv. Gr. Havalg. p. 963.

It has been collected in a single place on the eastern coast of Greenland together with *Enteromorpha prolifera*. The filaments consist of two rows of cells. It was collected with zoospores in July.

Specimens collected by Rosenvinge June 5, 1888 at Igdlorsuit in West Greenland are furnished with rhizoids. The rhizoids often occur abundantly, they usually consist of a single cell, sometimes of more than one and occasionally they seem to be transformed into branches. The specimens essentially resemble the branched Icelandic plants (Jónsson Icel. Alg. p. 343,

fig. 4). They occurred in company with *Enteromorpha prolifera*, *Ulothrix* sp. and *Calothrix scopulorum*.

Gr. occ.: Igdlorsuit (L. K. R.).

Gr. or.. Dunholm.

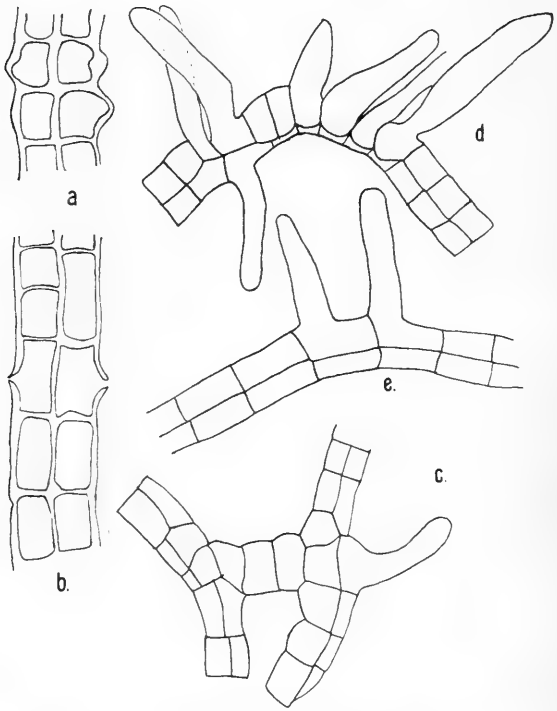


Fig. 13. *Percursaria percursa* (Ag.) K. Rosenv.

a, a fragment of a filament with ripe sporangia, in the prominent part of the walls of the sporangia, the opening is going to be. 527 : 1.

b, a fragment of a filament showing the opening of two emptied sporangia. 527 : 1.

c, a fragment of a branched specimen with a rhizoid to the right. 267 : 1.

d, e, fragments with rhizoids. 267 : 1.

Fam. *Protococcaceæ*.

Codiolum Al. Br.

C. gregarium Al. Br., Algarum unicellularum genera nova et minus cognita, Lipsiæ 1855, p. 19; Jónss. Icel. Alg. p. 338—340; C. Nordenskioeldianum K. Rosenv. Deux. Mém. p. 118.

This species was formerly known only from a single place in Greenland, Godthaab (Rosenv. Deux. Mém. l. c.). The specimens I have had for examination occurred in company with *Ulothrix consociata* Wille and were all young and small. The stipe was 102 μ long, the head 51 μ long and 6 μ broad. The head is distinctly marked from the stipe by a constriction. It was collected sterile in July in the littoral region.

Gr. occ.: Umanalik east of Kangek Ö, 60° 36′ (A. Jessen).

Chlorochytrium Cohn.

108. **Ch. Cohnii** Wright, K. Rosenv. Grl. Havalg. p. 963, Deux. Mém. p. 119.

Occurred in the gelatinous sheaths of *Diatoms.*

Gr. occ.: Igdlunguak south of Merkuitsok (N. H.).
Gr. or.: Tiningnekelak.

109. **Ch. inclusum** Kjellm., K. Rosenv. Grl. Havalg, p. 963, Deux. Mém. p. 119.

In the frond of *Turnerella Pennyi.* Gathered sterile in August.

Gr. or.: Tasiusak.

110. **Ch. dermatocolax** Rke., K. Rosenv. Grl. Havalg p. 964.

Grows in the outer membrane of *Chætopteris plumosa*, *Sphacelaria racemosa* and *Sphacelaria radicans.* It was collected sterile in June and August—September.

Gr. occ.: Ivigtut, in *Sphacelaria radicans* (L. K. R.).
Gr. or.: Kap Dan, Smalsund, Kangerdlugsuatsiak.

111. **Ch. Schmitzii** K. Rosenv. Grl. Havalg. p. 964, Deux. Mém. p. 119.

D. Myxophyceæ.

Fam. *Rivulariaceæ.*

Calothrix Ag.

112. **C. scopulorum** (W. et M.) Ag., K. Rosenv. Grl. Havalg. p. 966, Deux. Mém. p. 121.

It has been collected in the littoral region in August 1891 by N. Hartz. It seems to have been abundant.

Gr. or.: Heklahavn (N. H.).

Oscillatoria Vauch.

113. **O. amphibia** Ag., K. Rosenv. Grl. Havalg. p. 967.

It has been collected in July on stones in the littoral region.

Gr. or.: Stenö.

Pleurocapsa Thur.

114. **P. amethystea** K. Rosenv. Grl. Havalg. p. 967.

var. Johs. Schmidt in Jónsson Icel. Alg. p. 378.

The specimens were abundant on the filaments of *Rhodochorton Rothii* in the littoral region, and they agree entirely with the description of the Icelandic plants given by Johs. Schmidt (l. c.), they were collected in July.

Gr. or.: Stenö.

Principal abbreviations of titles of books.

J. Ag. Grl. Lam. = J. G. Agardh, Bidrag till kännedomen af Grönlands Laminarieer och Fucaceer. K. Svenska Vet.-Akad. Handlingar Bd. 10. No. 8. Stockholm 1872.

J. Ag. Spetsb. Alg. = J. G. Agardh, Bidrag till kännedomen af Spetsbergens Alger. Med Tilläg. K. Svenska Vet.-Akad. Handlingar Bd. 7, No. 8. Stockholm 1868.

Börgesen Fær. Alg. = F. Börgesen, Marine Algæ of the Færöes. Reprinted from the Botany of the Færöes. Part II, Copenhagen 1902.

Hazen Am. Ulothricaceæ = Tracy Elliot Hazen, The Ulothricaceæ and Chætophoraceæ of the United States. Memoirs of the Torrey Botanical Club. Vol. XI, No. 2, 1902.

Jónss. Icel. Alg. = Helgi Jónsson, The Marine Algæ of Iceland. Botanisk Tidsskrift Bind 24—25, Kjöbenhavn 1901 and 1903.

Kjellm. Spetsb. II = F. R. Kjellman, Om Spetsbergens marina, klorofyllförande Thallophyter. II. Bihang till K. Svenska Vet.-Akad. Handlingar Band 4, No. 6. Stockholm 1877.

Kjellm. Arct. Alg. = F. R. Kjellman, The Algæ of the Arctic Sea. Kongl. Sv. Vetensk. Akad. Handlingar Bd. 20, No. 5. Stockholm 1883.

Kjellm. Handbok = F. R. Kjellman, Handbok i Skandinaviens hafsalgflora. I. Fucoideæ. Stockholm 1890.

Kjellm. Acrosiphonia = F. R. Kjellman, Studier öfver Chlorophycéslägtet Acrosiphonia J. G. Ag. och dess skandinaviska arter. Bihang till K. svenska Vet. Akad. Handlingar Band 18, Afd. III, No. 5. Stockholm 1893.

Kuck. Beiträge = Paul Kuckuck, Beiträge zur Kenntnis der Meeresalgen, 1—4, in Wissenschaftliche Meeresuntersuchungen, herausgeg. von der Kommission zur Untersuch. d. deutschen Meere in Kiel. Neue Folge, II. Band, Heft 1. Kiel und Leipzig 1897.

K. Rosenv. Grl. Havalg. = L. Kolderup Rosenvinge, Grönlands Havalger. Særtryk af «Meddelelser om Grönland» III. Kjöbenhavn 1893.

K. Rosenv. Algues mar. d. Grl. = L. Kolderup Rosenvinge, Les Algues marines du Groenland. Annales des sciences naturelles, VII. serie, tome 19, 1894.

K. Rosenv. Deux. Mém. = L. Kolderup Rosenvinge, Deuxième Mémoire sur les Algues marines du Groenland. Extrait de «Meddelelser om Grönland» XX. Copenhague 1898.

Sauvag. Sphacelaria = C. Sauvageau, Remarques sur les Sphacélariacées. Journal de Botanique Tome XIV, 1900 and Tome XV, 1901.

Wille, Studien = N. Wille, Studien über Chlorophyceen I—VII, Videnskabs Selskabets Skrifter I, Math.-naturv. Klasse, 1900, Nr. 6, Christiania 1901.

Index of species

(Synonyms are printed in Italics).

1—9—1904.

Arbejder fra den Botaniske Have i København. Nr. 19.

The Freshwater Algæ of East Greenland

by

E. Larsen.

Reprinted from „MEDDELELSER OM GRÖNLAND" Vol. XXX.

Copenhagen.
Printed by Bianco Luno
1904.

The material treated in this paper falls in two parts. One part containing about 60 glasses with Chlorophyceae was gathered by C. Kruuse and N. Hartz who were members of the expedition to East Greenland, set on foot by the Carlsberg Fund in 1898—1900.

The other part containing about 25 glasses with Chlorophyceae was gathered in 1899 and 1902 by C. Kruuse in the district of Angmagsalik. They were all preserved in alcohol.

Of former works treating the Chlorophyceae of East Greenland three are known to me: Boldt II, Boldt III and Börgesen I (see List of writings).

In Boldt II 44 Desmidiaceae are stated, besides 4 Chlorophyceae in the little note of Boldt III. In Börgesen I a little more than 100 Chlorophyceae are stated.

In the above mentioned material I have found 125 Chlorophyceae of which 47 hitherto unknown from East Greenland.

The following genera are not before mentioned from East Greenland: *Crucigenia, Polyedrium, Coelastrum, Hormospora, Aphanochæte, Ophiocytium.*

The complete number of Chlorophyceae presently known from East Greenland is 188, of which 150 Desmidiaceae.

The following list includes the species found by me, all species formerly known and with certainty determined, besides all their respective habitats.

As to the species found by Boldt and Börgesen no account is given of varieties nor forms, but only of the species.

With regard to the limit between the Arctic and more southern flora of Desmidiaceae I only have to confirm what is stated by Börgesen (l. c. p. 4), still I have found *Euastrum oblongum* as far north as in Jameson Land.

I have not met with *Cladophora*, but with *Pediastrum* right up to Sabine Ö.

The dimensions are always in μ, where no other statement is given.

Li = Lat. Isthm.

The figures have all been drawn by means of a drawing prism (Seibert's microscope Objectiv V, Ocular I).

I am indebted to Dr. Börgesen for his valuable help; I also have to thank Miss E. Hallas for having determined the species of *Oedogonium* and *Bulbochæte*.

Copenhagen, Botanical Museum, July 1904.

List of habitats.

Kap Dan	65° 31′	Liverpool Kyst in Hurry Inlet	70° 50′
Tasiusak	65° 37′	Jameson Land Nordostbugt	71° 10′
Kordlortok	65° 40′	Fleming Inlet	71° 38′
Amaka	65° 40′	Canning Land about	71° 40′
Tunok	65° 52′	Kap Seaforth	71° 49′
Stenö	66° 2′	Forsblads Fjord	72° 30′
Falkefjæld	66° 4′	Kap Borlase Warren	74° 1′
Kingorsuak	66° 5′	Sabine Ö	74° 30′
Kap Warming about	67° 1′		
Kap Dalton	69° 25′		
Dunholm	69° 55′		

List of writings.

Boldt I = Boldt, R.: Bidrag til kännedomen om Sibiriens Chlorophyllacéer. (Öfvers. af K. Svenska Vet. Akad. Handl. Stockh. 1885.)

Boldt II = Boldt, R.: Desmidiéer från Grönland. (Bih. till K. Sv. Vet. Akad. Handl. 1888.)

Boldt III = Boldt, R.: Några Söttvattensalger från Grönland. (Botaniska Notiser 1893.)

Borge I = Borge, O.: Bidrag till Sibiriens Chlorophycéflora. (Bih. till K. Sv. Vet. Akad. Handl. 1891.)

Borge II = Borge, O.: Chlorophycéer från norska Finnmarken. (Bih. till K. Sv. Vet. Akad. Handl. 1892.)

Borge III = Borge O.: Süsswasser Chlorophycéen gesammelt von Dr. A. O. Kihlmann im nördlichen Russland Gouvernement Archangel. (Bih. till K. Sv. Vet. Akad. Handl. 1894.)

Börgesen I = Börgesen, F.: Ferskvandsalger fra Öst Grönland. (Meddelelser om Grönland XVIII, Köbenhavn 1894.)

Chodat I = Chodat R.: Algues vertes de la Suisse. Beiträge zur Kryptogamenflora der Schweiz Bd. I, Heft 3. Bern 1902.

Delponte I = Delponte, J. B.: Specimen Desmidiarum Subalpinarum. Augustæ Taurinorum 1873.

Hazen I = Hazen, T. E.: The Ulothricaceae and Chætophoraceae of the United States. (Mem. of the Torrey bot. Club. Vol. XI, 1902.)

Hirn I = Hirn, K.: Zur Kenntnis der Desmidiaceen Finnlands. (Acta Soc. pro Fauna et Flora Fennica 25, Helsingfors 1903.)

Imhäuser I = Imhäuser, L.: Entwickelungsgeschichte und Formenkreis von Prasiola. (Flora 1889.)

Jessen I = Jessen C.: Prasiolæ generis Algarum Monographia. Kiliæ 1848.

Lagerheim I = Lagerheim, G. v.: Studien über die Gattungen Conferva und Microspora. (Flora 1889.)

Lundell I = Lundell, P. M.: De Desmidiaceis quæ in Suecia inventæ sunt. Observationes criticæ. Upsaliæ 1871.

Nordstedt I = Nordstedt, O.: Desmidiaceae ex Insulis Spetsbergensibus et Beeren Eiland in Expeditionibus annorum 1868 et 1870 Suecanis collectæ. (Öfvers. af K. Sv. Vet. Acad. Handl. 1872.)

Nordstedt II = Nordstedt, O.: Bidrag till kännedomen om sydligare Norges Desmidieer. Lund 1873.

Nordstedt III = Nordstedt, O.: Desmidieae arctoæ. (Öfvers. af K. Sv. Vet. Akad. Handl. 1875.)

Nordstedt IV = Nordstedt, O.: Desmidieer samlade af Sv. Berggren under Nordenskiöldska expeditionen till Grönland 1870. (Öfvers. af K. Sv. Vet. Akad. Handl. 1885.)

Raciborski I = Raciborski: Monogr. Pediastr. (Mem. ac. imp. des sciences de Cracovie. 1889.)

Ralfs I = Ralfs, J.: The British Desmidieae. London 1848.

Senn I = Senn, G.: Ueber einige koloniebildende einzellige Algen. (Bot. Zeit. 1899.)

Toni de I = Toni, J. B. de: Sylloge Algarum Vol. I. Patavii 1889.

Wille I = Wille, N.: Ferskvandsalger fra Novaja Semlja. (Öfvers. af K. Sv. Vet. Akad. Handl. 1879.)

Wille II = Wille, N.: Algologische Mittheilungen. (Pringsh. Jahrb. XVIII.)

A. Chlorophyceae.

I. Conjugatae.

Desmidiaceae.

Arthrodesmus Ehrb.

1. **A. convergens** Ehrb.

Sim. Fig. Borge III, Tab. III, fig. 35. Lo 41, La sine acul. 46, Li 10.

Falkefjæld.

2. **A. incus** Hass.

Ralfs I, Tab. XX, fig. 4 f. Lo 17—19,5, La 14,3—15,6, Li 6,5—7,8.

Amaka, Liverpool Kyst in Hurry Inlet.
Börgesen I: Hekla Havn. Boldt II: Tasiusak.

3. **A. octocornis** Ehrb.

Börgesen I: Hekla Havn.

Closterium Nitzsch.

1. **C. acutum** Bréb.

Ralfs I: Tab. XXX, fig. 5 c. Lo 136—140, La 10.

Kordlortok, Liverpool Kyst in Hurry Inlet.
Börgesen I: Hekla Havn.

2. **C. cornu** Ehrb.

Ralfs I: Tab. XXX, fig. 6. Lo 84,5—106, La 10—11,7.

Jameson Land, Forblads Fjord.

3. **C. Dianæ** Ehrb.

Ralfs I: Tab. XXVIII, fig. 5. Lo 107,9—125, La 10,4—15,6.

Amaka, Liverpool Kyst, Jameson Land, Kap Seaforth.
Börgesen I: Hekla Havn.

4. **C. intermedium** Ralfs.

Ralfs I: Tab. XXIX, fig. 3. Lo 220, La 32.

Kordlortok, Amaka, Jameson Land.
Börgesen I: Hekla Havn.

5. **C. Jenneri** Ralfs.

Wille I: pag. 60, Tab. XIV, fig. 83. Lo 66,3—100, La 10—12,2.

Amaka, Kap Dalton, Jameson Land.
Börgesen I: Hekla Havn.

6. **C. juncidum** Ralfs.

Börgesen I: Hekla Havn.

7. **C. Kützingii** Bréb.

Börgesen I: Röde Ö.

8. **C. parvulum** Näg.

Wille I: pag. 60, Tab. XIV. fig. 84. Lo 88,4, La 12.

Fleming Inlet.
Boldt II: Tasiusak.

9. **C. rostratum** Ehrb.

Ralfs I: Tab. XXX, fig. 3. Lo 342, La 22,3.

Amaka. Boldt II: Tasiusak.

10. **C. striolatum** Ehrb.

Ralfs I: Tab. XXIX, fig. 2. Lo 262—300, La 23,4—26,6.

Amaka, Liverpool Kyst in Hurry Inlet.
Börgesen I: Hekla Havn. Boldt II: Tasiusak.

Cosmarium Ralfs.

1. **C. anceps** Lund.

Lundell I: pag. 48, Tab. III, fig. 4. Lo 28, La 15, Li 10,5

Jameson Land.
Börgesen I: Röde Ö.

2. **C. annulatum** De. By.

Börgesen I: Hekla Havn. Boldt II, Tasiusak.

3. **C. arctoum** Nordst.

Börgesen I: Hekla Havn.

4. **C. bioculatum** Bréb.

Ralfs I: Tab. XV, fig. 5. Lo 19,5, La 16,9, Li 5.

Kap Borlase Warren, Sabine Ö.

Börgesen I: Röde Ö, Hekla Havn. Boldt II: Tasiusak.

5. **C. biretum** Bréb.

Ralfs I: Tab. XVI, fig. 5. Lo 47, La 42, Li 17.

Kordlortok, Amaka, Sabine Ö.

6. **C. Blyttii** Wille.

Börgesen I: Hekla Havn.

7. **C. Botrytis** Menegh.

Delponte I: Tab. VIII, fig. 31—32. Lo 50—65, La 42—51, Li 14—18.

Kordlortok, Amaka, Tunok, Falkefjæld, Kap Dalton, Liverpool Kyst, Jameson Land, Fleming Inlet, Kap Seaforth, Kap Borlase Warren.

Börgesen I: Hekla Havn, Danmarks Ö. Boldt II: Tasiusak.

forma: **Boldtii.**

Boldt II: pag. 29, forma d. Lo 45,5, La 41, Li 13.

Falkefjæld.

8. **C. caelatum** Ralfs.

Ralf I: Tab. XVII, fig. 1 c. Lo 46, La 36, Li 14,3.

Kap Dalton.

9. **C. capitulum** Roy & Biss.

Börgesen I: Hekla Havn.

10. **C. connatum** Bréb.

Ralfs I: Tab. XVII, fig. 10. Lo 85, La 55,9.

Jameson Land.

Börgesen I: Hekla Havn.

11. **C. conspersum** Ralfs.

Ralfs I: Tab. XVI, fig. 4. Lo 84,5—110, La 65—80, Li 19,5—26,6.

Jameson Land, Kap Borlase Warren.
Börgesen I: Hekla Havn, Röde Ö.

12. **C. costatum** Nordst.

Nordstedt III: pag. 25, Tab. VII, fig. 17. Lo 39, La 34, Li 15.

Kap Dalton.
Börgesen I: Hekla Havn. Boldt II: Tasiusak.

13. **C. crenatum** Ralfs.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

14. **C. cucumis** Ralfs.

Nordstedt III: Tab. VII, fig. 28. Lo 104, La 65, Li 39.

Amaka. Börgesen I: Hekla Havn.

15. **C. cucurbita** Bréb.

Sim. Fig. Klebs Desm. Ostpreuss. Tab. III, fig. 8. Lo 50, La 24,7.

Kap Warming.

16. **C. cyclicum** Lund. var. **arcticum** Nordst.

Nordstedt I: pag. 31, Tab. VI, fig. 13. Lo 45,5—65, La 42—65, Li 12—19,5.

Amaka, Falkefjæld, Kingorsuak, Kap Dalton, Liverpool Kyst in Hurry Inlet, Sabine Ö.
Börgesen I: Hekla Havn.

17. **C. Debaryi** Archer.

Börgesen I: Hekla Havn.

18. **C. excavatum** Nordst.

Börgesen I: Hekla Havn.

19. **C. globosum** Bulnh.

Börgesen I: p. 21, Tab. I, fig. 15. Lo 13—16, La 9—12, Li 8—9.

Jameson Land, Sabine Ö.
Börgesen I: Hekla Havn.

forma: **major** Wille.

Wille I: pag. 45, Tab. XIII, fig. 42. Lo 26—28, La 19,5—21, Li 17—19.

Jameson Land.

20. **C. granatum** Bréb.

Ralfs I: Tab. XXXII, fig. 6. Lo 30, La 22, Li 6,5.

Kordlortok, Amaka.

Börgesen I: Hekla Havn, Danmarks Ö. Boldt II: Tasiusak.

21. **C. hexalobum** Nordst.

Nordstedt I: pag. 33, Tab. VII, fig. 16. Lo 52, La 37,7, Li 20.

Kap Dalton, Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn.

22. **C. hexastichum** Lund.

Lundell I: pag. 33, Tab. III, fig. 13 a. Lo 51, La 39, Li 17—18.

Amaka.

Boldt II: Tasiusak.

As to the granulation it agrees with the form mentioned by Nordstedt IV, p. 9.

23. **C. Holmiense** Lund.

Nordstedt I: pag. 28, Tab. VI, fig. 5. Lo 66, La 32,5, Li 18.

Kingorsuak, Kap Dalton, Liverpool Kyst in Hurry Inlet, Jameson Land, Kap Borlase Warren, Sabine Ö.

Börgesen I: Hekla Havn, Röde Ö, Hold with Hope.

24. **C. homalodermum** Nordst.

Nordstedt III, pag. 18, Tab. VI, fig. 4. Lo 53,3—57, La 43—44, Li 16—18.

Kap Dalton, Liverpool Kyst in Hurry Inlet, Jameson Land Nordostbugt.

25. **C. Kirchneri** Börgs.

Börgesen I: Hekla Havn, Danmarks Ö.

26. **C. læve** Rab.

Nordstedt: Desm. ital. (Öfvers. K. Vet. Akad. Förh. 1876), pag. 29, Tab. 12, fig. 4. Lo 26, La 15,6, Li 4.

Falkefjæld.

The specimens found by me fully agree with Nordstedt's figure (l. c.). The species has been found by Borge in North Russia (Borge III, p. 26).

27. **C. margaritiferum** Menegh.

Ralfs I: Tab. XVI, fig. 2. Lo 35—57,2, La 28—52, Li 14—15,6.

Kordlortok, Amaka, Falkefjæld, Jameson Land, Sabine Ö.

Börgesen I: Hekla Havn.

28. **C. Meneghinii** Bréb.

Ralfs I: Tab. XV, fig. 6. Lo 19,5—26, La 17, Li 7—9.

Kordlortok, Amaka, Tunok, Kap Dalton, Jameson Land, Kap Borlase Warren, Sabine Ö.

Börgesen I: Hekla Havn, Röde Ö.

29. **C. microsphinctum** Nordst.

Börgesen I: pag. 16, Tab. I, fig. 6. Lo 40—44, La 29—31, Li 15—18.

Kap Dalton, Sabine Ö.

Börgesen I: Hekla Havn.

forma: **parvulum** Wille.

Wille I: pag. 38, Tab. XII, fig. 22. Lo 32,5, La 19,5, Li 6.

Jameson Land.

30. **C. nasutum** Nordst.

Nordstedt I: pag. 34, Tab. VII, fig. 17. Lo 37, La 30, Li 12.

Kap Dalton, Jameson Land.

forma: **granulata** Nordst.

Wille I: pag. 42, Tab. XII, fig. 30. Lo 41—48, La 31—36,4, Li 11,7—17.

Kordlortok, Kap Dalton, Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn.

31. **C. Nathorstii** Boldt.

Boldt II: Tasiusak.

32. **C. ochthodes** Nordst.

Nordstedt III: pag. 17, Tab. VI, fig. 3. Lo 78, La 57, Li 37.

Kordlortok, Falkefjæld, Kap Dalton, Fleming Inlet, Jameson Land, Kap Borlase Warren, Sabine Ö.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

33. **C. orbiculatum** Ralfs.

Klebs: Desm. Ostpreuss. 1879, Tab. III, fig. 78—79. Lo 29—31, La 20—24, Li 9.

Falkefjæld, Kap Borlase Warren.

34. **C. perforatum** Lund.

Boldt II: Tasiusak.

35. **C. Phaseolus** Bréb.

forma: **minor.**

Boldt II: pag. 15. Lo 21,5, La 19, Li 7.

Amaka.

var. **elevata** Nordst.

Nordstedt II: pag. 17, fig. 5. Lo 28,6, La 27,3, Li 10.

Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

36. **C. Portianum** Archer.

Fig. nob. 1. Lo 36—39, La 26—27, Li 11.

Kordlortok, Amaka, Falkefjæld, Jameson Land.

Börgesen I: Hekla Havn.

Fig. 1. *Cosmarium Portianum* Cellula a fronte.

37. **C. profractum** Archer.

Hirn I: pag. 11, Tab. I, fig. 10. Lo 40, La 38, Li 8.

Amaka.

38. **C. protumidum** Nordst. *β.* **triquetrum** Nordst.

Nordstedt I: pag. 35, Tab. VII, fig. 19. Lo 38—40, La 30.

Kap Dalton, Jameson Land, Kap Borlase Warren, Sabine Ö.

39. **C. pseudoprotuberans** Kirchner.

Börgesen I: pag. 18, Tab. I, fig. 12. Lo 37, La 29, Li 10.

Amaka.

Börgesen I: Hekla Havn.

40. **C. pulcherrimum** Nordst.

Börgesen I: Hekla Havn.

41. **C. punctulatum** Bréb.

Klebs: Desm. Ostpreuss. pag. 37, Tab. III, fig. 50—51, Lo 27—31, La 21—29, Li 8—10.

Amaka, Stenö, Falkefjæld, Kap Dalton, Jameson Land, Fleming Inlet, Kap Borlase Warren, Sabine Ö.

Börgesen I: Hekla Havn.

42. **C. pusillum** Bréb.

Boldt II: Tasiusak.

43. **C. quadratum** Ralfs.

Wille I: pag. 37, Tab. XII, fig. 20. Lo 49—57, La 27—33, Li 15—22.

Kordlortok, Amaka, Falkefjæld, Kap Dalton, Liverpool Kyst, Jameson Land, Kap Borlase Warren, Sabine Ö.

forma: **major** Wille.

Wille l. c., Tab. XII, fig. 21. Lo 65, La 33,8, Li 20,8.

Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn, Röde Ö.

Boldt II: Tasiusak.

44. **C. reniforme** Archer.

Börgesen I: Hekla Havn.

45. **C. scenedesmus** Delp.

Börgesen I: Hekla Havn, Danmarks Ö.

46. **C. speciosum** Lund.

var. **biforme** Nordst.

Nordstedt I: pag. 30, Tab. VI, fig. 11. Lo 62, La 50.

Sabine Ö.

Börgesen I: Röde Ö. Boldt II: Tasiusak.

var. **simplex** Nordst.

Nordstedt l. c., Tab. VI, fig. 12. Lo 45, La 30, Li 19.

Kingorsuak, Kap Warming, Kap Dalton, Liverpool Kyst in Hurry Inlet, Jameson Land, Kap Borlase Warren, Sabine Ö.

Börgesen I: Hekla Havn.

47. **C. spetsbergense** Nordst.

Nordstedt I: pag. 27, Tab. VI, fig. 3. Lo 61, La 32,5, Li 19,5.

Liverpool Kyst in Hurry Inlet.

48. **C. striatum** Boldt.

Boldt I: pag. 104, Tab. V, fig. 9. Lo 15, La 14, Li 5.

Kordlortok, Amaka, Jameson Land.

Boldt II: Tasiusak.

49. **C. subcostatum** Nordst.

Börgesen I: Hekla Havn.

50. **C. subcrenatum** Hantzsch.

Nordstedt III, pag. 21, Tab. VI, fig. 10—11. Lo 23—33, La 20,8—27, Li 8—12.

Kordlortok, Amaka, Kap Dalton, Jameson Land, Sabine Ö.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

51. **C. sublobatum** Archer.

Börgesen I: Hekla Havn.

52. **C. subspeciosum** Nordst.

Börgesen I: Hekla Havn.

53. **C. subtumidum** Nordst.

Wittr. et Nordst.: Alg. exsic. Nr. 172. Lo = La = 27—28, Li 7,5.

Kordlortok, Amaka.

54. **C. tetraopthalmum** Kütz.

Delponte I: Tab. IX, fig. 1—4. Lo 98—110, La 72—83, Li 20—27.

Kordlortok, Amaka, Falkefjæld.

55. **C. tinctum** Ralfs.

Börgesen I: Hekla Havn.

56. **C. Turpinii** Bréb.

Börgesen I, pag. 13, Tab. I, fig. 7. Lo 65, La 59, Li 16.

Kordlortok, Amaka, Falkefjæld, Kap Dalton, Kap Seaforth, Sabine Ö.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

57. **C. undulatum** Corda.

Ralfs I: Tab. XV, fig. 8. Lo 50—52, La 35—37,7, Li 14—16.

Kordlortok, Amaka.

Börgesen I: Hekla Havn.

58. **C. venustum** Archer.

Börgesen I: pag. 17, Tab. I, fig. 10. Lo 42, La 31,5, Li 9.

Kordlortok, Amaka.

Börgesen I: Hekla Havn, Darmarks Ö. Boldt II: Tasiusak.

Cylindrocystis De By.

C. Brebissonii Menegh.

Lo 26, La 13.

Kingorsuak, Kap Dalton.

Börgesen I: Gaasefjord.

Desmidium Ralfs.

D. Swartzii Ag.

Ralfs I: Tab. IV. Lo 19,5, La 44, Li 35.

Kordlortok, Amaka.

Börgesen I: Hekla Havn.

Euastrum Ralfs.

1. **E. ansatum** Ralfs.

Ralfs I: Tab. XIV, fig. 2. Lo 62, La 36, Li 9.

Kordlortok, Amaka.

Börgesen I: Hekla Havn.

2. **E. binale** Ralfs.

Ralfs I: Tab. XIV, fig. 8. Lo 20—22, La 13—16.

Kordlortok, Amaka, Kap Dalton, Liverpool Kyst in Hurry Inlet, Jameson Land, Sabine Ö.

Börgesen I: Danmarks Ö, Gaasefjord, Hekla Havn. Boldt II: Tasiusak.

3. **E. crassicolle** Lund.

Lundell I: pag. 23, Tab. II, fig. 8. Lo 27, La 14, Li 7.

Kap Dalton, Jameson Land, Kap Borlase Warren.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

4. **E. cuneatum** Jenner.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

5. **E. denticulatum** Gay.

Börgesen I: Hekla Havn.

6. **E. didelta** Ralfs.

Ralfs I: Tab. XIV, fig. 1. Lo 102, La 53, Li 14.

Kordlortok, Amaka.

7. **E. elegans** Kütz.

Ralfs I: Tab. XIV, fig. 7. Lo 45,5, La 28,6, Li 9.

Kordlortok, Amaka, Falkefjæld, Liverpool Kyst in Hurry Inlet, Jameson Land, Fleming Inlet, Kap Borlase Warren, Sabine Ö.

Börgesen I: Hekla Havn.

var. **bidentata** Näg.

fere sim. Boldt II: Tab. I, fig. 10 (var. *speciosum*). Lo 49,4, La 32,5, Li 7.

Kordlortok, Amaka, Falkefjæld, Jameson Land.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

8. **E. gemmatum** Bréb.

Boldt II: pag. 6, Tab. I, fig. 5. Lo 46,8, La 35, Li 9.

Amaka.

Boldt II: Tasiusak.

9. **E. oblongum** Ralfs.

Ralfs I: Tab. XII a, b. Lo 136,8—152, La 68,4—72, Li 19—22,8.

Kordlortok, Amaka, Falkefjæld, Jameson Land.
Boldt II: Tasiusak.

10. **E. pectinatum** Bréb.

Ralfs I: Tab. XIV, fig. 5. Lo 64, La 44, Li 10.
Kordlortok, Amaka.

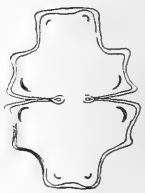


Fig. 2. *Euastrum pectinatum* Bréb. forma. Cellula a fronte.

forma: The terminal lobe not dilated as in Ralf's figure (Ralfs I: Tab. XIV, fig. 5) cfr. fig. nob. 2.

Lo 63,7, La 46,2, Li 9,8.
Kordlortok, Amaka.

11. **E. verrucosum** Ehrb.

Boldt II: Tasiusak.

β. **rhomboideum** Lundell. forma: **groenlandica** nob. cfr. Fig. nob. 3.

Seen from above the cell is relatively much broader than the cell observed by Lundell. Cfr. Lundell I, Tab. I, fig. 8. Lo 120, La 104.

Kordlortok, Amaka, Falkefjæld.

a *b*

Fig. 3. *Euastrum verrucosum* Ehrb. *β. rhomboideum* Lund. forma *groenlandica* nob. *a*; Cellula a vertice: *b*: Semicellula a fronte.

Gonatozygon De By.

G. asperum Bréb.

Ralfs I: Tab. XXVI, fig. 6. Lo 260, La 12.
Jameson Land, Fleming Inlet.

G. Ralfsii De By.
Börgesen I: Hekla Havn, Röde Ö, Gaasefjord.

Gymnozyga Ehrb.

G. moniliformis Ehrb.
La 16.
Sabine Ö.
Börgesen I: Hekla Havn.

Hyalotheca Kütz.

H. dissiliens Bréb.
Ralfs I: Tab. I, fig 1. La 26.
Falkefjæld, Liverpool Kyst in Hurry Inlet, Sabine Ö.
Börgesen I: Hekla Havn. Boldt II: Tasiusak.

var **bidentatula** Nordst.
Nordstedt II, pag. 48, Tab. I, fig. 22. La 20.
Jameson Land.
Börgesen I: Hekla Havn.

Mesotænium Näg.

M. Braunii De By.
Börgesen I: Gaasefjord.

Micrasterias Ag.

M. americana Ralfs.
Boldt II: pag 5, Tab. I, fig. 1. Lo 140, La 110. Li 30.
Kordlortok, Amaka.
Boldt II: Tasiusak.

M. denticulata Bréb.
Boldt II: Tasiusak.

Penium De By.

1. **P. closterioides** Ralfs.
Börgesen I: Hekla Havn. Boldt II; Tasiusak.

2. **P. curtum** Bréb.

forma: **major** Wille.

Wille I: pag. 56, Tab. XIV, fig. 73. Lo 40—42, La 20,8—22.

Kap Dalton, Jameson Land, Kap Borlase Warren, Sabine Ö.

forma: **minor** Wille.

Wille l. c., Tab. XIV, fig. 74. Lo 30, La 14.

Kap Dalton, Jameson Land, Kap Borlase Warren, Sabine Ö.
Börgesen I: Hekla Havn.

3. **P. cylindrus** Bréb.

Delponte I: Tab. XV, fig. 30. Lo 50, La 14.

Jameson Land.

4. **P. lamellosum** Bréb.

Delponte I: Tab. XV, fig. 13. Lo 117—170, La 36,4—39.

Kordlortok, Amaka, Falkefjæld.

5. **P. margaritaceum** Bréb.

Ralfs I: Tab. XXV, fig. 1. Lo 83—120, La 21—22.

Kordlortok, Amaka, Kap Dalton, Jameson Land, Sabine Ö.

6. **P. polymorphum** Perty.

Lundell I: pag. 86, Tab. V, fig. 10. Lo 58,5, La 27,3.

Kap Dalton.

7. **P. Regelianum** Wille.

Börgesen I: Hold with Hope.

Pleurotænium Lund.

P. trabecula Näg.

Börgesen I: Danmarks Ö. Boldt II: Tasiusak.

β. **crassum** Wittrock.

Wittrock: Gotl. och Ölands Sötvatnsalg. 1872. pag. 62, Tab. IV, fig. 17. Lo 494—532, La 38—41,8.

Kordlortok, Amaka. Tunok, Falkefjæld.
Börgesen I: Hekla Havn, Röde Ö.

Sphærozosma Arch.

S. excavatum Ralfs.

Ralfs I: Tab. VI, fig. 2. La 11,7, Li 5.

Falkefjæld.

Börgesen I: Hekla Havn.

forma: Boldt II: pag. 42, Tab. II, fig. 52. Lo 9, La 10, Li 5.

Liverpool Kyst, Jameson Land.

Boldt II: Tasiusak.

Staurastrum Ralfs.

1. **S. aculeatum** Menegh.

β. **ornatum** Nordst.

Nordstedt I: pag. 40, Tab. VII, fig. 27. Lo 45, La 34, Li 15.

Kap Dalton.

Börgesen I: Hekla Havn.

forma: **spinosissima tetragona** Wille.

Wille I: pag. 54, Tab. XIII, fig. 67. Lo 39—40, Li 14.

Kap Dalton, Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn.

forma: **simplex** Boldt II, pag. 38, Tab. II, fig. 49. Lo 37, La 39, Li 15.

Kap Dalton.

Börgesen I: Hekla Havn.

forma: **torta** Börgesen I: pag. 28, Tab. II, fig. 26. Lo 32, Li 11.

Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn.

2. **S. alternans** Bréb.

Ralfs I: Tab. XXI, fig. 7. Lo 31,3, La 29.

Kap Dalton, Sabine Ö.

3. **S. Bieneanum** Rab.

forma: **Spetsbergensis** Nordst.

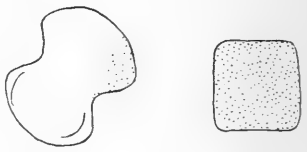
Nordstedt III: pag. 33, Tab. VIII, fig. 35. Lo 36—37, La 36, Li 10—11.

Kap Borlase Warren.

Börgesen I: Hekla Havn.

forma: **groenlandica** nob. is possibly a form of S. Kjellmani Wille (Wille I, p. 50) but it is not granulated, only slightly pored; it is moreover somewhat smaller. Lo 35,5, La 23,4, Li 15,6. Fig. 4.

Kordlortok, Amaka.



a *b*

Fig. 4.

Staurastrum Bieneanum Rab. forma *groenlandica* nob.

a: Cellula a fronte.
b: Cellula a vertice.

4. **S. Brebissoni** Arch.

Cfr. Boldt II: pag. 33, Tab. II, fig. 45. Lo 57—71,5, La 33—54,6, Li 19,5—22.

Kordlortok, Amaka, Kap Dalton, Liverpool Kyst in Hurry Inlet, Jameson Land.

5. **S. brevispinum** Bréb.

Ralfs I: Tab. XXXIV, fig. 7.

forma: **minor** Rab. Lo 34, La 33, Li 10.

Liverpool Kyst in Hurry Inlet.

Börgesen I: Hekla Havn, Röde Ö.

6. **S. capitulum** Bréb.

β. **amoenum** Rab. forma: **Spetsbergense** Nordst.

Nordstedt I: pag. 39, Tab. VII, fig. 25. Lo 41,6, La 29,9, Li 15,6.

Kap Dalton.

7. **S. cuneatum** Boldt.

Boldt I: pag. 114, Tab. V, fig. 24. Lo 21,3, La 20, Li 7,8.

ordlortok.

8. **S. cuspidatum** Bréb.

Ralfs I: Tab. XXI, fig. 1. Lo 40. La 26,6, Li 10,4.

Jameson Land.

Börgesen I: Hekla Havn, Danmarks Ö, Röde Ö.

9. **S. dejectum** Bréb.

Ralfs I: Tab XX, fig. 5. Lo 32, La 30.

Kordlortok, Amaka, Falkefjæld.

Börgesen I: Hekla Havn.

10. **S. Dickiei** Ralfs.

Börgesen I: Hekla Havn.

11. **S. furcigerum** Bréb.

Ralfs I: Tab. XXXIII, fig. 12. Lo sine procul. 38,4, Lo cum procul. 66,3, La cum procul. 58,5.

Amaka. Börgesen I: Hekla Havn, Röde Ö.

12. **S. hexacerum** Wittr.

forma: **4-gona** Boldt.

Boldt I: pag. 115, Tab. V, fig. 25. Lo 26, La 30, Li 8.

Kap Dalton.

forma: **alternans** Wille. Wille I: p. 53.

Jameson Land.

Börgesen I: Hekla Havn.

13. **S. insigne** Lund.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

14. **S. Kjellmani** Wille.

formæ: **tetragona** et **pentagona** Wille.

Wille I: pag. 50, Tab. XIII, fig. 52. Lo 45—48, La 34—37,7, Li 18—20.

Kap Dalton, Liverpool Kyst in Hurry Inlet, Sabine Ö.

forma: **trigona minor** Wille l. c. Tab. XIII, fig. 51. Lo 37, La 32,5, Li 14.

Kap Dalton.

Börgesen: Hekla Havn. Boldt II: Tasiusak.

15. **S. lunatum** Ralfs.

forma: **groenlandica** Börges. Börgesen I: pag. 29, Tab. II, fig. 27. Lo 34, La 32, Li 12.

Liverpool Kyst in Hurry Inlet.
Börgesen I: Hekla Havn.

var. **triangularis** Börges. Börgesen l. c. Tab. II, fig. 28. Lo = La sine acul. = 32, Li 12.

Amaka, Kap Dalton.
Börgesen I: Hekla Havn.

16. **S. margaritiferum** Menegh.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

17. **S. meganolotum** Nordst.

Börgesen I: Hekla Havn. Boldt II: Tasiusak.

18. **S. Meriani** Reinsch.

Reinsch: Algenflora v. Franken pag. 160, Tab. 12, fig. 1. Lo 39, La 26, Li 15,6.

Jameson Land.

19. **S. minutissimum** Reinsch.

forma: **trigona minor** Wille. Wille I: pag. 52, Tab. XIII, fig. 60. Lo 18—20, La 17—19, Li 9—10.

Kap Dalton. Börgesen I: Hekla Havn.

20. **S. monticulosum** Bréb.

β. **bifarium** Nordst. Börgesen I: pag. 29, Tab. II, fig. 25. Lo 39, La 37.

Jameson Land. Börgesen I: Hekla Havn.

21. **S. muricatum** Bréb.

Cfr. *S. trapezicum* Boldt II: pag. 35, Tab. II, fig. 46. Lo 44—46,8, La 42—43, Li 19—19,5. 4-gona.

Kap Dalton.

22. **S. muticum** Bréb.

Börgesen I: Hekla Havn.

23. **S. orbiculare** Ralfs.

Börgesen I: Hekla Havn.

24. **S. pachyrhynchum** Nordst.

forma: **3-** et **4-gona**. Nordstedt III: pag. 32, Tab. VIII, fig. 34. Lo 28—34, La 22—26, Li 11—12.

Amaka, Kap Dalton, Jameson Land, Sabine Ö.
Börgesen I: Hekla Havn, Röde Ö.

25. **S. papillosum** Kirchn.

Börgesen I: Röde Ö.

26. **S. pilosum** Archer.

Börgesen I: Hekla Havn, Danmarks Ö.

27. **S. polymorphum** Bréb.

Ralfs I: Tab. XXII, fig. 9. 6-gona. Lo 38, La 39, Li 15.
Kordlortok.
Börgesen I: Hekla Havn. Boldt II: Tasiusak.

28. **S. proboscideum** Archer.

var. **altum** Boldt. Boldt I, pag. 117, Tab VI, fig. 34. Lo = La = 70, Li 16.
Liverpool Kyst.

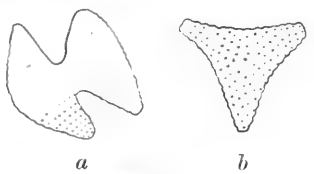
29. **S. punctulatum** Bréb.

Ralfs I: Tab. XXII, fig. 1. Lo 28—29, La 29—29,9, Li 9.
Jameson Land, Fleming Inlet.

30. **S. pygmæum** Bréb.

var. **obtusum** Wille. Wille I: pag. 51, Tab. XIII, fig. 56.

forma: It resembles Wille's figure; but the corners are not denticulated. Lo 30,5—32,5, La 31,8—33,8, Li 8—10 (Fig. 5).



a *b*

Fig. 5.
Staurastrum pygmæum Bréb. var *obtusum* Wille. forma.
a: Cellula a fronte.
b: Cellula a vertice.

Amaka, Tunok, Kap Borlase Warren.
Börgesen I: Hekla Havn. Boldt II: Tasiusak.

31. **S. saxonicum** Bulnh.

Börgesen I: Hekla Havn.

32. **S. scabrum** Bréb.

Boldt II: Tasiusak.

33. **S. Sebaldi** Reinsch.

forma: **groenlandica** Börgesen I: pag. 30, Tab. II, fig. 31. Lo 65, La 72, Li 16.

Falkefjæld.

Börgesen I: Hekla Havn, Danmarks Ö.

34. **S. sibiricum** Borge.

Börgesen I: Hekla Havn.

35. **S. sp.** Nordst.

Nordstedt III: pag. 33, Tab. VIII, fig. 37. Lo = La = 10, Li 5.

Kap Dalton.

36. **S. spongiosum** Bréb.

Boldt I: pag. 118, Tab. VI, fig. 31, forma 3-gona. La 40, Lo 45.

Kap Dalton.

Börgesen I: Hekla Havn.

37. **S. subsphæricum** Nordst.

Nordstedt III: pag. 31, Tab. VIII, fig. 33. Lo 48, La 34, Li 20. forma 4-gona.

Kap Dalton.

38. **S. teliferum** Ralfs.

Delponte I: Tab. XI, fig. 1—4. Lo 36,4—39, La 31—32, Li 9—12.

Kordlortok, Amaka, Falkefjæld, Jameson Land.

Börgesen I: Hekla Havn, Danmarks Ö.

39. **S. tetracerum** Ralfs.

Börgesen I: Hekla Havn.

40. **S. vestitum** Ralfs.

Börgesen I: Danmarks Ö.

Tetmemorus Ralfs.

T. lævis Ralfs.

β. **attenuatus** Wille. Wille I: pag. 58, Tab. XIV, fig. 77.

Lo 78—87,7, La 24—26, Li ?—24.

Amaka, Kap Dalton.

Boldt II: Tasiusak.

Xanthidium Ehrb.

1. **X. antilopæum** Kütz.

γ. **dimazum** Nordst. Nordstedt II: pag. 38, Tab. I, fig. 19.

Lo 50, La 47, Li 13. Lo spin. c. 13.

Falkefjæld.

Börgesen I: Hekla Havn.

2. **X. cristatum** Bréb.

Boldt II: Tasiusak.

3. **X. fasciculatum** Ehrb.

Delponte I: Tab. XIII, fig. 20. Lo 57, La sine acul. 60,8, Li 13, Lo acul. 16,9.

Falkefjæld.

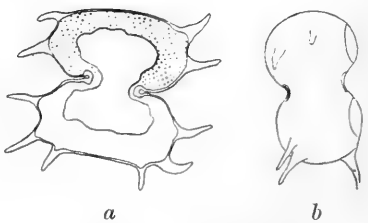


Fig. 6.
Xanthidium antilopsum Kütz.
a: Cellula a fronte. *b*: Cellula a latere.

With regard to the distinction between the species *antilopæum* and *fasciculatum* I shall refer to Börgesen's report (Börgesen I, p. 23); not even the number of spines is always constant; I have seen specimens with four pair of spines on one semicell, and with six on the other (Fig. 6).

Zygnemaceae.

Zygnema De By.

Z. Cyanosporum Cleve.

De Toni I: pag. 729. La veg. cell. 22 *μ*. Diam. Spor. 33,8.

The spores were spherical or almost spherical, glabrous, and of a deep bluish black colour, or almost quite black. The spore is formed in the channel of conjugation.

Amaka.

Z. lejospermum De By.

Börgesen I: Hekla Havn.

Z. stellinum Ag.

Börgesen I: Hekla Havn.

Z. sp. Sterile Zygnemæ were found from almost all localities as far north as to Sabine Ö.

Spirogyra Link.

S. sp. Fructiferous Spirogyra were not at all found; Börgesen with some doubt mentions *S. insignis* Kg. (Börgesen I, p. 34) from Gaasefjord.

Mesocarpaceae.

Mougeotia Wittr.

Börgesen l. c. p. 35 with some doubt mentions *M. ovalis* Nordst. or *M. gelatinosa* Wittr. et Nordst., besides several sterile specimens. I did not find any fructiferous, but many sterile specimens from almost all localities.

II. Euchlorophyceae.

Palmellaceae.

Palmella Lyngb.

P. mucosa Kütz.

Börgesen I: Hekla Havn.

Tetraspora Link.

T. lubrica Ag.

Boldt III: Tasiusak.

Gloeocystis Näg.

G. rupestris Rab.

Börgesen I: Danmarks Ö.

Volvocaceae.

Pandorina Pringsh.

P. morum Müll.

Falkefjæld, Jameson Land, Kap Borlase Warren.
Börgesen I: Hekla Havn.

Eudorina Ehrb.

E. elegans Ehrb.

Börgesen I: Hekla Havn.

Sphærella Sommerf.

S. nivalis Sommerf.

Börgesen I: Hekla Havn, Danmarks Ö, Hold with Hope.

Protococcaceae.

Oocystis Näg.

O. solitaria Wittr.

Chodat I, pag. 191. Lo 16,9, La 10, Lo Col. 32,5.
Jameson Land.
Börgesen I: Hekla Havn, Röde Ö. Boldt II: Tasiusak.

Raphidium Kütz.

R. fasciculatum Kütz. + *γ.* **radiatum.**

Cfr. Chodat I: pag. 197—98. Lo 40, La 1,5
Kordlortok, Amaka, Jameson Land, Kap Borlase Warren.
Börgesen I: Hekla Havn.

Crucigenia Morren.

C. rectangularis (A. Br.) Chodat.

Chodat I: p. 206. Lo 7,8, La 5,2.
Kordlortok.

Scenedesmus Meyen.

1. **S. quadricauda** Bréb.

Chodat I: pag. 213. Lo cell. 18, La 6,5.

Tunok.
Börgesen I: Röde Ö.

2. **S. bijugatus** Kütz.

Chodat I: pag. 212 «**seriatus**». La 4—6.

Kordlortok, Amaka, Tunok, Jameson Land.
Börgesen I: Hekla Havn.

3. **S. denticulatus** Lagerh.

Börgesen I: Danmarks Ö.

Polyëdrium Näg.

1. **P. minutum** nov sp.

The cell has four arms narrowing off towards their apices. No spines. Lat. Cell. 19,5 μ. Lat. Brach. ad Bas. 4 μ. Fig. 7.

Kap Borlase Warren.

2. **P. angulosum** nov. sp.

The cell polygonous with roundish corners; in every corner two short spines. Diam. Cell. 18,5 μ. Fig. 8.

Kordlortok Amaka.

Fig. 7.

Fig. 8.

Fig. 7.
Polyëdrium minutum sp. nov.
Fig. 8.
Polyëdrium angulosum sp. nov.

Pediastrum Meyen

1. **P. Boryanum** Menegh.

var. **granulatum** Kirchn.
Tunok, Falkefjæld.
Boldt III: Tasiusak.

var. **granulatum** forma **forcipatum.** Raciborski I: fig. 16.
Falkefjæld.

var. **longicorne** forma **granulata.** Raciborski I: fig. 13. La cell. 14,3, Lo cell. cum spin. 22, Lo spin. 10,4 Diam. Coenob. 117.

Kordlortok, Amaka, Falkefjæld, Kap Borlase Warren.

var. **longicorne** ? forma **ordinata** nob.

The granulations occuring in regular rows along the dissepiments. La cell. 26—30 μ, Long. spin. 10—11 μ. Fig. 9.

Jameson Land.

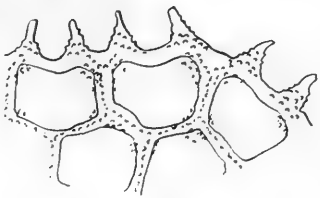


Fig. 9.
Pediastrum Boryanum Menegh. var. *longicorne* Rac. forma *ordinata* nob.
Fragment of Coenobium showing the granulation of the cell.

2. **P. rotula** A. Br.

Boldt III: Tasiusak.

3. **P. tricornutum** Borge.

Chodat I: pag. 230. Diam. cell. c. 8 μ.

Amaka, Sabine Ö.

Coelastrum Näg.

C. proboscideum Bohlin.

Senn I: Diam. Cell. 10—11 μ, Diam. Coenob. c. 35 μ.

Kordlortok, Amaka.

Ulothricaceae.

Ulothrix Kütz.

1. **U. subtilis** Kütz.

Chodat I: pag. 268. Hazen I: pag. 162, Tab. 21, fig. 11. La cell. 5,2.

Kap Dalton, Dunholm, Hurry Inlet, Sabine Ö.

Börgesen I: Hekla Havn.

2. **U. zonata** Kütz.

Börgesen I: Gaasefjord, Kap Stewart.

3. **U. variabilis** Kütz.

Hazen I: pag. 152, Tab. 21, fig. 5—7. La cell. 6—7 μ.
Dunholm.

Hormospora Bréb.

H. minor Näg.

Chodat I: pag. 270. Lat. fil. 15 μ. Diam. cell. 6,5 μ.
Kap Borlase Warren.

Pleurococcaceae.

Pleurococcus Menegh.

P. vulgaris Menegh.

Börgesen I: Danmarks Ö, Röde Ö, Gaaseland, Hekla Havn.

Acanthococcus Lagerh.

A. hirtus Lagerh.

Börgesen I: Hekla Havn.

Chlorococcus Fries.

C. humicola Rab.?

Börgesen I: Kobberpynt, Danmarks Ö, Kap Stewart.

Chætophoraceae.

Aphanochæte A. Br.

A. repens A. Br.

Chodat I: pag. 329. Diam. cell. veg. 8 μ.
On *Oedogonium*, Amaka.

Schizogoniaceae.

Prasiola Ag.

P. Sauteri Menegh.

Imhäuser I: pag. 276.

The exterior agrees with the narrow specimens of Jessen's figure (Jessen I, Tab. I, fig. 4—5). The thallus attains a length

of up to 32 mm. and a breadth of up to 2 mm. The diameter of the cell is 5—6,5 μ. Rhizoids from the basal part of the plant were found beautifully developed. Specimens in different

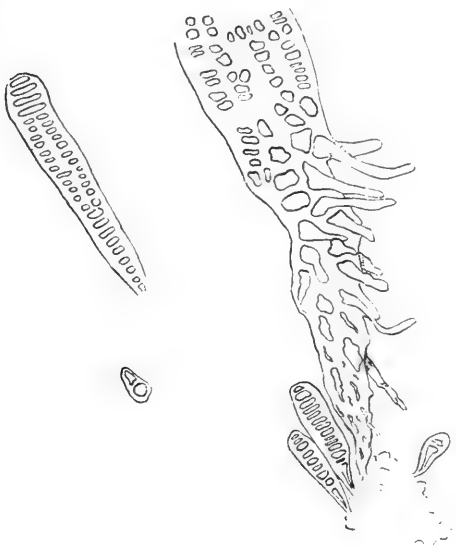


Fig. 10.

Prasiola Sauteri Menegh.

To the right: the basal part of a fully developed plant with rhizoids; at its base and to the left: young plants in different stages of development.

stages of development were belonging to the material (comp. Fig. 10) showing that the development is analogous to that of *P. stipitata*, as presumed by Imhäuser l. c.

Canning Land.

Schizogonium Kütz.

S. crispum Gay.

Stages of *Schizogonium* as well as of *Hormidium* were found in gatherings from Fleming Inlet and Kap Warming.

Börgesen I found the stage of *Schizogonium* at Röde Ö and Danmarks Ö.

Confervaceae.

Tribonema.

T. bombycinum Derb. et Sol.

La cell. 6,5—8,5 μ.

Kap Dan, Stenö, Kap Warming, Kap Dalton, Jameson Land, Kap Seaforth, Sabine Ö.

forma: **tenue** Hazen. Hazen I: pag. 185. La cell. 4,5 μ.
Jameson Land.
Börgesen I: Hekla Havn, Gaaseland.

Ophiocytium Näg.

O. parvulum A. Br.

Lat. fil. 6,5 μ.

Falkefjæld.

Microsporaceae.

Microspora Lagerh.

1. **M. pachyderma** Wille.

Lagerheim I: pag. 208. Lat. cell. 13—14 μ.

Sabine Ö.
Börgesen I: Hekla Havn, Kap Stewart.

2. **M. stagnorum** Lagerh.

Lagerheim I: pag. 208. Wille II. Lat cell. 7—9.

Falkefjæld, Jameson Land, Sabine Ö.

3. **M. tumidula** Hazen.

Hazen I: p. 177, Tab. 24, fig. 8—11. La 7,8.

Kap Dan.

Oedogoniaceae.

Oedogonium Link.

1. **O. crispum** Wittr.

Kordlortok, Amaka.

2. **O. capilleforme** forma: **De Baryanum** (Chmielevsky) Hirn.
Kordlortok, Amaka.

3. **O. grande** forma: **hortense** Wittr.
Kordlortok, Amaka.
Several sterile Oedogonia were moreover found from different localities. Cfr. Börgesen 1: pag. 39.

Bulbochæte Ag.

1. **B. dispar** Wittr.
Kordlortok, Amaka.

2. **B. intermedia** De By.
Börgesen I: Hekla Havn.

3. **B. mirabilis** Wittr.
Kordlortok, Amaka.
With some doubt stated from Hekla Havn (Börgesen I).

4. **B. crassiuscula** Nordst.
Kordlortok, Amaka.

III. Siphoneae.

Vaucheriaceae.

Vaucheria De Cand.

1. **V. terrestris** Lyngb.
Börgesen I: Gaaseland.

2. **V. geminata** Walz.
With some doubt stated from Hekla Havn (Börgesen I).

B. Phæophyceae.

Hydrureae.

Hydrurus Ag.

H. foetidus Kirch.

Hurry Inlet, Jameson Land.
Börgesen I: Hekla Havn, Kap Stewart.

30—10—1904.

Arbejder fra den Botaniske Have i København. Nr. 20.

Fungi Groenlandiæ orientalis

in expeditionibus G. Amdrup 1898—1902

a **G. Amdrup** (G. A.), **N. Hartz** (N. H.) et **C. Kruuse** (C. K.) collecti.

Determ. **E. Rostrup.**

Reprinted from „MEDDELELSER OM GRÖNLAND" Vol. XXX.

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Printed by Bianco Luno.
1904.

Peronosporaceae.

1. **Peronospora Alsinearum** Casp.

Cerastium trigynum: Tasiusak (C. K.).

2. **Peronospora grisea** (Ung.) de Bary.

Veronica saxatilis: Tasiusak (C. K.).

Ustilaginaceae.

3. **Sphacelotheca Hydropiperis** (Schum.) de Bary.

Polygonum viviparum: Kap Borlase Warren, Hurry Inlet, Fame Ö, Kap Wandel, ad rivulum prope Angmagsalik, Kingorsuak (C. K.).

4. **Ustilago Caricis** (Pers.) Fuck.

Carex sp.: Kingua Hurry Inlet, Ikatek (C. K.). — *Carex rigida*: Amaga, Tasiusak (C. K.). — *Carex nardina*: Kordlortok, Tasiusak (C. K.). — *Elyna Bellardi*: Sarfakajik (C. K.).

5. **Ustilago vinosa** (Berk.) Tul.

Oxyria digyna: Eskimo Ö, Hurry Inlet, Kingak, Angmagsalik (C. K.).

6. **Tilletia arctica** Rostr.

Carex sp. Folia: Hurry Inlet (C. K.).

7. **Urocystis sorosporoides** Kke.

Thalictrum alpinum: Fleming Inlet (N. H.), Kap Dalton (C. K.).

Uredinaceae.

8. **Puccinia septentrionalis** Juel.

Polygonum viviparum: Kap Brown, Hurry Inlet, Turner Sund, Tasiusak, Kingorsuak (C. K.).

Thalictrum alpinum (Aecidium Sommerfeltii Joh.): Kakarsuak, Kingorsuak, Sarfakajik, Tasiusak (C. K.).

9. **Puccinia variabilis** (Grev.) Plowr.

Taraxacum phymatocarpon: Hurry Inlet (C. K.). — *Taraxacum croceum*: Tunok, Tasiusak (C. K.).

10. **Micropuccinia Saxifragae** (Schlect.).

Saxifraga cernua: Kap Stewart (C. K.). — *Saxifraga rivularis*: Kap Brewster (C. K.).

11. **Micropuccinia Epilobii** (DC.).

Epilobium alsinefolium: Surok, Tunok (C. K.). — *Epilobium anagallidifolium*: Tasiusak (C. K.). — *Chamaenerium angustifolium*: Tasiusak (C. K.).

12. **Micropuccinia Blyttii** (de Toni).

Sedum Rhodiola: Kumarmiut (C. K.).

13. **Micropuccinia Cruciferarum** (Rud.).

Vesicaria arctica: Jamesons Land (C. K.). — *Cardamine bellidifolia*: Kap Greg (N. H.).

14. **Leptopuccinia Veronicarum** (DC.).

Veronica alpina: Hurry Inlet, Kap Warming, Tasiusak (C. K.).

15. **Trachyspora Alchimillae** (Pers.) Schroet.

Alchimilla vulgaris: Tunok, Kakasuak, Tasiusarsik (C. K.).

16. **Melampsora arctica** Rostr.

Salix arctica: Kap Borlase Warren, Hurry Inlet, Fame Ö, Kap Brown, Kap Dalton (C. K.).

Auriculariaceae.

17. **Pilacre bubonis** n. sp. Stromatibus gregariis, stipitato-capitatis, albidis, 5—6 mm. altis, 1—2 mm. crassis; capitulo disciformi-depresso, levi, fusco; sporis ellipsoideis, 1-guttulatis, hyalinis, longit. 5—6 μ, crassit. 4 μ. In pilulae rejectae strigum. Kap Dalton (N. H.).

Clavariaceae.

Sclerotia globoidea fusca, ad Typhulæ speciem ut videtur pertinentia, in caulibus Arabidis alpinæ, foliis Caricis rigidæ et foliis Poæ alpinæ lecta, ad Turner Sund (C. K.).

Thelephoraceae.

18. **Exobasidium Warmingii** Rostr.

Saxifraga oppositifolia: Kap Dalton (N. H.).

19. **Exobasidium Vaccinii** Wor.

Vaccinium uliginosum: Kangerdluarsikajik, Hurry Inlet, Kingorsuak, Sarfakajik (C. K.). Sporæ quam vulgo majores, nempe 16—18 μ l., 8—9 μ t. — *Cassiope tetragona*: Hurry Inlet, Turner Sund, Kingorsuak (C. K.).

Polyporaceae.

20. **Boletus scaber** Fr.

Hurry Inlet Kingua, Liverpool Kyst (C. K.).

Agaricaceae.

21. **Russuliopsis laccata** (Scop.) Schroet.

Tasiusak (C. K.).

Obs. In collectionibus expeditionis **Agaricaceæ** variæ exsiccatæ, indeterminabiles e generibus *Russulæ*, *Pholiotæ*, *Inocybes*, *Clitocybes* et *Cortinarii* inventæ sunt.

Gasteromycetes.

22. **Lycoperdon gemmatum** Batsch.

Kap Seaforth, Tasiusak. Var. *minuta*: Kap Brown, Lilleö, Ikatek (C. K.).

23. **Lycoperdon favosum** (Rostkov.) Bonord.

Hurry Inlet, Kingua, Liverpool Kyst, Kap Dalton (C. K.).

24. **Lycoperdon uteriforme** Bull.

Angmagsalik (C. K.).

25. **Globaria Bovista** (L.) Schroet.

Tasiusak (C. K.).

26. **Globaria furfuracea** (Schaeff.) Schroet.

Ikerasausak (C. K.).

Taphrinaceae.

27. **Taphrina carnea** Joh.

Betula nana: Huspynt (C. K.).

Erysiphaceae.

28. **Erysiphe graminis** DC.

Poa pratensis: Danmarks Ö (N. H.).

Sphaeriaceae.

29. **Asterella Chamaenerii** Rostr.

Chamaenerium latifolium: Hurry Inlet (C. K.).

30. **Laestadia rhytismoides** (Berk.) Sacc.

Dryas octopetala: Kap Dalton (N. H.).

31. **Coleroa Alchimillae** (Grev.) Wint.

Alchimilla vulgaris: Tasiusak (C. K.).

32. **Coleroa Oxyriae** Rostr.

Oxyria digyna: Adloe Kap Dan Öer $^{18}/_{1}$ 99.

33. **Sphaerella Tassiana** de Not.

Trisetum subspicatum: N. Aputitek (G. A.). — *Poa alpina*: Hurry Inlet, Kingorsuak (C. K.). — *Carex rigida*: Turner Sund (C. K.). — *Carex rariflora*: N. O. Bugt (N. H.).

34. **Sphaerella pusilla** Awd.

Carex rupestris: Turner Sund (C. K.).

35. **Sphaerella minor** Karst.

Chamaenerium latifolium: Hurry Inlet (C. K.).

36. **Sphaerella arthopyrenoides** Awd.

Papaver nudicaule: Kap Borlase Warren (C. K.), Forsbladfjord (N. H.).

37. **Sphaerella ootheca** Sacc.

Dryas integrifolia: Turner Sund (C. K.).

38. **Sphaerella Polygonorum** (Crié) Sacc.

Polygonum viviparum: Kingorsuak (C. K.).

39. **Sphaerella Stellarianearum** (Rbh.) Karst.

Cerastium alpinum: Kap Dalton (C. K.). — *Cerastium trigynum*: Kap Irminger (G. A.).

40. **Sphaerella inconspicua** Schroet.

In pedunculis et foliis *Cassiopis tetragonæ*: Turner Snnd, Kingorsuak (C. K.).

41. **Sphaerella Cruciferarum** (Fr.) Sacc.

Draba nivalis: Sabine Ö (N. H.).

42. **Sphaerella pachyasca** Rostr.

Draba hirta: Hurry Inlet, Kap Dalton. *Draba incana*: Hurry Inlet. *Draba fladnizensis*: Turner Sund. *Ranunculus affinis*: Sabine Ö. *Ranunculus nivalis*: Sabine Ö. *Chamaenerium latifolium*: Hurry Inlet (C. K.).

43. **Venturia ditricha** (Fr.) Karst.

Betula nana: Kap Irminger (G. A.).

44. **Leptosphaeria epicarecta** (Cooke) Sacc.

Carex saxatilis: Hurry Inlet (C. K.), Scoresby Sund (N. H.).

45. **Leptosphaeria Fuckelii** Niessl.

Calamagrostis neglecta: Kap Seaforth (N. H.).

46. **Leptosphaeria Silenes** de Not.

Silene acaulis: Tunok (C. K.).

47. **Pleospora herbarum** (Pers.) Rbh.

Calamagrostis neglecta: Hurry Inlet (N. H.). — *Draba nivalis*: Hurry Inlet (C. K.). — *Cardamine bellidifolia*: Kap Greg (N. H.). — *Ranunculus nivalis*: Sabine Ö (C. K.). — *Saxifraga hieraciifolia*: Scoresby Sund (C. K.). — *Polemonium humile*: Sabine Ö, Kap Borlase Warren (C. K.). — *Pedicularis hirsuta*: Turner Sund (C. K.). — *Campanula uniflora*: Kap Dalton, Turner Sund (C. K.). — *Erigeron neglectum*: Kap Borlase Warren (C. K.).

48. **Pleospora pentamera** Karst.

Elyna Bellardi: Sabine Ö (C. K.). — *Festuca ovina*: Kap Borlase Warren (C. K.). — *Luzula multiflora*: Sabine Ö (N. H.).

49. **Pleospora discors** (Mont.) Ces. et Not.
Carex rigida: Turner Sund (C. K.).

50. **Pleospora deflectens** Karst.
Poa abbreviata: Kap Borlase Warren (N. H.).

51. **Pleospora vagans** Niessl.
Phippsia algida: Turner Sund (C. K.).

52. **Pleospora Elynae** (Rbh.) Ces. et Not.
Juncus arcticus: Hurry Inlet (C. K.).

53. **Pleospora platyspora** Sacc.
Armeria sibirica: Hurry Inlet (C. K.).

54. **Pleospora Drabae** Schroet.
Draba alpina: Kap Borlase Warren. *Draba fladnizensis*: Kap Brewster (C. K.).

55. **Pyrenophora comata** (Niessl.) Sacc.
Alsine biflora: Turner Sund (C. K.).

56. **Ophiobolus brachystomum** Sacc.
Oxyria digyna: Turner Sund (C. K.).

57. **Didymosphaeria Cassiopes** Rostr.
Cassiope tetragona: Sabine Ö (C. K.).

Sordariaceae.

58. **Sordaria aviaria** (Karst.).
In fimo anserino: Turner Sund (N. H.).

59. **Sporormia heptamera** Awd.
In fimo anserino: Kap Seaforth (N. H.).

60. **Sporormia intermedia** Awd.
In fimo lupino: Kap Dalton (N. H.).

61. **Sporormia octomera** Awd.
In fimo anserino: Sabine Ö (N. H.).

Dothideaceae.

62. **Dothidella thoracella** (Rutstr.) Sacc.

Sedum Rhodiola: Tasiusak (C. K.).

63. **Dothidella Vaccinii** Rostr.

Vaccinium uliginosum: Sarfakajik (C. K.).

Hysteriaceae.

64. **Lophodermium juniperinum** (Fr.) de Not.

Juniperus alpina: Grus Ö, Kap Dan (C. K.).

65. **Lophodermium maculare** (Fr.) de Not.

Vaccinium uliginosum: Hurry Inlet (C. K.), Fleming Inlet, Kap Brown (N. H.), Kap Vedel (G. A.).

66. **Lophodermium arundinaceum** (Schrad.) Lév.

Poa sp., *Calamagrostis neglecta*: Kingorsuak (C. K.).

Phacidiaceae.

67. **Trochila Epilobii** Karst.

Chamaenerium angustifolium: Tasiusak (C. K.).

68. **Trochila ignobilis** Karst.

Carex sp.: Stenö, Ikatek (C. K.). — *Carex glareosa*: Kap Irminger (G. A.).

69. **Rhytisma salicinum** (Pers.) Fr.

Salix arctica: Forsblads Fjord (N. H.), Kap Brown (C. K.). — *Salix glauca*: Kardlortok Sö, Tasiusak (C. K.). — *Salix herbacea*: Kap Wandel (C. K.).

70. **Rhytisma Bistortae** (DC.) Rostr.

Polygonum viviparum: Ikatek (C. K.).

Bulgariaceae.

71. **Ombrophila Archangelicae** n. sp. Cupulis gregariis, carnosis, siccis corneis, sessilibus, concavis, rufo-violaceis, extus subtiliter furfuraceis, margine paululum crenulato, 2—4 mm. lat. Ascis cylindraceis, longit. 110—120 μ, crassit. 8—9 μ, pars

sporifer. 90—100 μ. Sporidiis monostichis, elllpsoideis, longit. 13 μ, crassit. 7 μ. Paraphysibus filiformibus.

Ad caules emortuos *Archangelicae officinalis*: Kingorsuak (C. K.).

Ascobolaceae.

72. **Ascobolus furfuraceus** Pers.

In fimo lupino: Kap Dalton (N. H.).

73. **Lasiobolus equinus** (Müll.) Karst.

In fimo lupino: Kap Dalton (N. H.).

74. **Ryparobius hyalinellus** (Karst.) Sacc.

In stercore: Kap Dalton (N. H.).

Pezizaceae.

75. **Lachnea scutellata** (L.).

Hurry Inlet (C. K.).

76. **Phialea virgultorum** (Vahl) Sacc.

In ramis ligneis: Tasiusak (C. K.).

77. **Mollisia graminis** (Desm.) Karst.

Poa glauca: Turner Sund (C. K.).

Sphaeropsideae.

78. **Phoma herbarum** West.

Cerastium sp.: Stenö (C. K.). — *Cerastium trigynum*: N. Aputitek (G. A.). — *Pedicularis hirsuta*: Turner Sund (C. K.).

79. **Asteroma alpinum** Sacc.

Arctostaphylos alpina: Kap Dalton (C. K.).

80. **Placosphaeria Bartsiae** Mass.

In foliis vivis *Bartsiae alpinae*: Tunok, Tasiusak (C. K.).

81. **Hendersonia Poae** n. sp. Peritheciis innatis, gregariis; conidiis compactis, cylindraceis, curvulis, fuscis, 3-septatis, obtusis, longit. 25—27 μ, crassit. 9—10 μ.

In foliis *Poae alpinae*: Fleming Inlet (C. K.).

82. **Septoria cercosperma** Rostr.

Ranunculus nivalis: Sabine Ö (N. H.). — *Ranunculus pygmaeus*: N. Aputitek (G. A.). — *Cerastium trigynum*: N. Aputitek (G. A.). — *Archangelica officinalis*: Angmagsalik. — *Taraxacum*: Angmagsalik. — In capsulis *Veronicae saxatilis*: Tasiusak (C. K.).

83. **Septoria semilunaris** Joh.

Poa glauca: Skærgaardshalvöen (G. A.).

84. **Rhabdospora longissima** Sacc.

Arabis alpina: Turner Sund (C. K.).

Melanconiaceae.

85. **Marssonia Chamaenerii** Rostr.

Chamaenerium angustifolium: Angmagsalik (C. K.).

Hyphomycetes.

86. **Oospora nivea** (Fr.) Sacc.

In fimo anserino: Kap Dalton (C. K.), Sabine Ö (N. H.).

87. **Aspergillus clavatus** Desm.

In fimo tetraonis: Grus Ö (C. K.).

88. **Torula herbarum** Link.

Chamaenerium latifolium: Turner Sund (C. K.).

89. **Cladosporium herbarum** (Pers.).

Rhodiola: Jærnö. — *Oxyria digyna*: Jamesons Land. — *Salix groenlandica*: Kap Dalton (C. K.).

90. **Cladosporium graminum** Cda.

Poa pratensis: Hurry Inlet (C. K.).

11—7—1904.

Arbejder fra den Botaniske Have i København. Nr. 21.

Lichenes

expeditionis G. Amdrup (1898—1902).

Enumeravit **Edv. A. Wainio.**

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I. Discolichenes.

A. Cyclocarpeae.

Trib. 1. *Gyrophoreae.*

1. Umbilicaria.

1. **U. rugifera** Nyl., Lich. Scand. p. 117. *Gyrophora* Th. Fr., Lich. Scand. p. 156, pr. p. (excl. *U. stipitata* Nyl., quae speciem autonomam constituit secundum specimina orig. in herb. Nyl.).

In rupe prope Turner Sund (12 m.). N. 14. Fert.

2. **U. cylindrica** (L.) Dub.

Var. **Delisei** (Despr.) Nyl., Lich. Scand. p. 117. *Gyrophora* Th. Fr., Lich. Scand. p. 158.

In rupibus ad Kap Dalton, ad Turner Sund, n. 4, 6 (7 m.), 7 (8 m.), 13, et ad Lagunas meridionales in insula Jan Mayen. Fert.

3. **U. hyperborea** Hoffm. *Gyrophora hyperborea α. primaria* Th. Fr., Lich. Scand. p. 160.

In rupibus ad Turner Sund, n. 4, et in insula Jan Mayen. Fert.

4. **U. arctica** (Ach.) Nyl., Lich. Lapp. Or. p. 123. *Gyrophora hyperborea β. arctica* Th. Fr., Lich. Scand. p. 161.

In rupe granitica ad Fleming Inlet et ad Lagunas meridionales in insula Jan Mayen. Fert.

5. **U. proboscidea** (L.) D. C.

F. **subnuda** Wain.

Thallus subtus rhizinis fere destitutus. In rupibus in insula Jan Mayen. Fert.

Trib. 2. *Parmelieae.*

1. Usnea.

1. **U. sulphurea** (Koenig) Th. Fr., Lich. Spitsb. p. 9. *Neuropogon melaxanthus* Nyl., Syn. Lich. p. 272.

Var. **granulifera** Wain. in Exped. Antarct. Belge Lich. (1903) p. 11.

Thallus soraliis tuberculiformibus aut primum applanatis instructus. Stratum myelohyphicum crebrum, KHO non reagens.

In rupibus ad Kap Dalton (n. V, VI etc.) et prope Lagunas meridionales in insula Jan Mayen. Ster.

2. Alectoria.

1. **A. chalybeiformis** (L.) Nyl.

F. **intricans** Wain., Lich. Caucas. (1899) p. 276. *A. chalybeiformis* Nyl., Fl. 1869 p. 444.

Supra *Cetrariam aculeatam* et alios lichenes prope Lagunas meridionales in insula Jan Mayen. Ster.

2. **A. nigricans** (Ach.) Nyl.

Supra muscos et lichenes in rupibus in insula Jan Mayen et ad Kap Greg. Ster.

3. **A. ochroleuca** (Ehrh.) Nyl. *A. ochroleuca α. rigida* (Vill.) Th. Fr., Lich. Scand. p. 19.

Supra muscos in rupibus prope Lagunas meridionales in insula Jan Mayen. Ster.

4. **A. sarmentosa** Ach.

Var. **cincinnata** (Fr.) Nyl.

Supra muscos et lichenes in rupibus prope Lagunas meridionales in insula Jan Mayen. Ster.

3. Cetraria.

1. **C. hiascens** (Fr.) Th. Fr., Lich. Scand. p. 98. *C. Delisei* (Bory) Nyl., Lich. Lapp. Or. p. 79.

Var. **Delisei** (Bory) Wain. Laciniae thalli apicibus laceratis. Est forma typica hujus speciei.

Supra muscos et alias plantas destructas in insula Jan Mayen, in Henry Land (840 m.), in Skærgaards Halvöen (n. 35), prope Turner Sund et pluribus locis ad Kap Dalton (n. II, V, VI, etc.). Specimina lecta sterilia sunt.

Var. **fastigiata** (Del.) Nyl. in Norrl. Lich. Lapp. p. 323.

In rupe (12 m. s. m.) ad Turner Sund (n. 14). Ster.

2. **C. crispa** (Ach.) Nyl. Wain., Adj. Lich. Lapp. I p. 119.

Supra muscos prope Lagunas meridionales in insula Jan Mayen. Ster.

3. **C. aculeata** (Schreb.) Fr.

Prope Lagunas meridionales in insula Jan Mayen. Ster.

4. **C. hepatizon** (Ach.) Wain., Lich. Caucas. (1899) p. 278. *Cetraria Fahlunensis* Th. Fr., Lich. Scand. p. 108.

In rupe ad Turner Sund (n. 4). Ster. Medulla thalli KHO lutescens.

5. **C. Fahlunensis** (L.) Wain., Lich. Caucas. p. 278. *Platysma commixtum* Nyl.

Var. **Groenlandica** Wain.

Thallus dichotome repetito-laciniatus, laciniis elongatis, linearibus, circ. 0,5 mm. latis, leviter concavis aut partim planis, nitidis, fusco-fuligineis, esorediatis, increbre imbribatis, subtus et margine ciliis paucis increbris instructus. Medulla thalli KHO non reagens. Conceptacula pycnoconidiorum verruculas parum elevatas marginales formantia, ostiolo haud impresso, qua nota haec variatio a *Parmelia stygia* differt, cui cæterum habitu simillima est. Revera valde affinis est *Cetrariae Fahlunensi* (L.) Wain. (= *Plat. commixto* Nyl.), et ab ejus var. *tenuisecta* Th. Fr. laciniis longioribus latioribusque linearibus differt.

In rupe ad Kap Dalton. Ster.

6. **C. nivalis** (L.) Ach.

Ad plantas destructas in insula Jan Mayen, in Henry Land (840 m.), ad Kap Greg et Kap Dalton (n. VI). Ster.

7. **C. cucullata** (Bell.) Ach.

Ad Kap Greg. Ster.

4. Parmelia.

1. **P. saxatilis** (L.) Ach.

Ad rupem in insula Jan Mayen. Ster.

2. **P. omphalodes** (L.) Ach.

Var. **panniformis** Ach.

In rupe et supra alios lichenes rupium et ad lignum in insula Jan Mayen. Ster.

3. **P. pubescens** (L.) Wain., Lich. Caucas. p. 281. *P. lanata* Wallr., Nyl., Lich. Scand. p. 103.

Ad rupem in insula Jan Mayen, supra muscos in rupe ad Kap Dalton, ad alios lichenes et supra rupem prope Fleming Inlet. Ster.

Trib. 3. *Thamnolieae.*

1. Thamnolia.

1. **Th. vermicularis** (Sw.) Schaer., Enum. Lich. Eur. p. 243; Nyl., Syn. Lich. p. 264; Minks, Fl. 1874 p. 337; Cromb., Brit. Lich. p. 185. *Cladonia* (?) Th. Fr., Lich. Arct. p. 161.

Supra terram arenosam ad Hurry Inlet et supra muscos in rupe ad Lagunas meridionales in insula Jan Mayen. Ster.

Trib. 4. *Stereocauleae.*

1. Stereocaulon.

1. **St. alpinum** Laur.

Supra muscos rupium et in ipsa rupe locis numerosis in insula Jan Mayen, in Henry Land (840 m. s. m.) et in Kap Greg. Ster.

2. **St. evolutum** Graewe in Bot. Not. 1865 p. 181; Th. Fr., Lich. Scand. p. 45.

In rupe ad Kap Dalton. Ster. Thallo glabro a *St. alpino* differt.

Trib. 5. *Lecanoreae.*

1. Lecanora.

1. **L. (Candelariella) vitellina** (Ehrh.) Ach.

Supra terram arenosam et in rupe ad Fleming Inlet et ad

Turner Sund (n. 4 et 16). Fert. — Asci polyspori. Thallus KHO non reagens. Apothecia margine crenulato, esorediato.

2. **L. (Fulgensia) bracteata** (Hoffm.) Ach.

Var. **alpina** Th. Fr., Lich. Scand. p. 223 (Lich. Arct. 1860 p. 81).

Ad terram arenosam prope Hurry Inlet (n. 1). Ster.

3. **L. (Squamaria) alphoplaca** (Wahlenb.) Ach., Nyl., Fl. 1873 p. 18; Wain., Lich. Caucas. p. 286.

Thallus KHO superne lutescens et demum rubescens, intus non reagens.

In rupe ad Forsblads Fjord. Fert.

4. **L. (Eulecanora) atrosulphurea** (Wahlenb.) Ach.

Var. **normalis** Th. Fr., Lich. Scand. p. 257.

Ad lignum vetustum in insula Jan Mayen. Fert.

5. **L. polytropa** (Ehrh.) Th. Fr.

Var. **vulgaris** Flot.

In rupe ad Turner Sund (4 m.) et ad Fleming Inlet. Fert.

6. **L. (Aspicilia) calcarea** (L.) Sommerf.

Var. **contorta** (Hoffm.) Hepp.

In rupe ad Turner Sund (n. 10), 2000 p. s. m. Thallus KHO non reagens. Fert.

7. **L. gibbosa** (Ach.) Nyl.

Var. **subdepressa** Nyl.

In rupe in insula Jan Mayen. Fert. Thallus KHO non reagens.

8. **L. verrucosa** (Ach.) Laur., Th. Fr., Lich. Scand. p. 273.

Supra plantas destructas ad Kap Dalton (L. V) et ad terram arenosam loco haud indicato (in insula Jan Mayen) n. 318 A. Fert. Thallus KHO non reagens.

2. Placopsis.

1. **Pl. gelida** (L.) Nyl., Lich. Lapp. Or. p. 126 (conf. Wain., Lich. Nov. Bar. II, 1899, p. 186). *Lecanora* Th. Fr., Lich. Scand. p. 228.

Ad lapides vulcanicos in insula Jan Mayen.

3. Ochrolechia.

1. **O. tartarea** (L.) Mass.

Var. **saxorum** (Retz.) Wain. *Lichen saxorum* Retz., Fl. Scand. Prodr. ed. II (1795) p. 276.

Thallus crassus, subcontinuus, demum vulgo sorediosus, KHO passim leviter lutescens, $CaCl_2O_2$ intus parum aut leviter rubescens, at his reagentiis unitis intus bene rubescens. Medulla jodo passim leviter caerulescens, partim non reagens. Est forma typica hujus speciei.

Supra muscos in rupe in insula Jan Mayen et ad Fleming Inlet.

Var. **inspersa** Wain.

Thallus verruculas dispersas, subglobosas, circ. 0,2—0,4 mm. latas formans, neque KHO, nec $CaCl_2O_2$, nec his reagentiis unitis reagens, esorediatus. Apothecia circ. 2,5—1,2 mm. lata, disco nudo, pallido, KHO lutescente, $CaCl_2O_2$ non reagente aut levissime rubente, at his reagentiis unitis bene rubente, margine his reagentiis non reagente.

Supra *Racomitrium lanuginosum* ad rupem in monte Hoyberg in insula Jan Mayen. Fert.

Var. **frigida** (Sw.) Ach.

Medulla thalli jodo leviter caerulescens. Hypothallus in spinulas erectas continuatus.

Supra lichenes et muscos in monte Hoyberg in insula Jan Mayen. Ster.

Trib. 6. *Pertusarieae.*

1. Pertusaria.

1. **P. oculata** (Dicks.) Th. Fr., Lich. Scand. p. 307.

Supra muscos destructos in rupe montis Hoyberg in insula Jan Mayen. Ster.

Trib. 7. *Theloschisteae.*

1. Xanthoria.

1. **X. polycarpa** (Ehrh.) Wain. ***X. lychnea** (Ach.) Wain.

Ad lapides in Kap Dalton (n. l). Ster.

2. Placodium.

1. **Pl. elegans** (Link) D. C. ***Pl. granulosum** (Schaer.) Wain., Lich. Sibir. Merid. (1896) p. 12.

In rupe ad Fleming Inlet et Turner Sund, 2000 ped. s. m. (n. 12 et 13). Ster.

2. **Pl. verruculiferum** Wain.

Thallus arcte adnatus, radiato-laciniatus, laciniis circ. 0,8—0,3 mm. latis, superne convexis, circ. 0,4—0,6 mm. crassis, superne fulvescens, neque pruinosus, nec lacunosus, centrum versus isidiis brevibus globosis verruculaeformibus minutis instructus. Habitu simile est *Pl. Heppiano* (Müll. Arg.) Wain., Lich. Cauc. p. 295, at isidiis ab eo differens et forsan ejus subspecies.

Ad lapidem vulcanicum in insula Jan Mayen. Ster.

3. **Pl. cerinum** (Ehrh.) Wain., Lich. Caucas. p. 296. *Lecanora pyracea* Nyl., Lich. Lapp. Or. p. 129.

***Pl. vitellinulum** (Nyl.) Wain.

Ad lapidem vulcanicum in insula Jan Mayen. Fert.

4. **Pl. jungermanniae** (Vahl) Wain., Lich. Caucas. p. 298.

Var. **genuina** Th. Fr., Lich. Scand. p. 179.

Supra muscos destructos in rupe ad Turner Sund (n. 13). Fert.

Var. **subolivacea** Th. Fr., Lich. Scand. p. 180.

Ad plantas destructas in Kap Dalton (n. V). Fert.

5. **Pl. ferrugineum** (Huds.) Hepp.

Var. **bryacea** Wain., Adj. Lich. Lapp. I p. 144.

A *Pl. jungermanniae* colore apotheciorum differt et simile est *Pl. ferrugineo.*

Supra muscos destructos in rupe ad Kap Dalton. Fert.

6. **Pl. tetraspora** (Nyl.) Wain. Lecanora Nyl., Lich. Lapp. Or. p. 397.

Supra muscos destructos in rupe ad Lagunas meridionales in insula Jan Mayen et in Canning Land. Fert.

Trib. 8. *Buellieae.*

1. Physcia.

1. **Ph. stellaris** (L.) Nyl. ***Ph. tribacia** (Ach.) Wain., Adj. Lich. Lapp. I p. 135.

Ad lapides in Kap Dalton (n. V) et ad Turner Sund (n. 11). Ster.

2. **Ph. pulverulenta** (Schreb.) Wain. ***Ph. muscigena** (Ach.) Wain., Adj. Lich. Lapp. I p. 131.

In rupe ad Kap Dalton. Ster.

2. Rinodina.

1. **R. mniaraea** (Ach.) Th. Fr., Lich. Scand. p. 194.

Var. **normalis** Th. Fr., l. c.

Supra plantas destructas ad Turner Sund, 2 m. s. m. (n. 1). — Apothecia nuda. Epithecium rubescens. Hypothecium albidum, inferne fuscescens. Sporae long. circ. 0,032, crass. 0,014 mm., endosporio inaequaliter incrassato, ad apicem et septum crassiore.

2. **R. archaea** (Ach.) Wain. *Parmelia sophodes γ. archaea* Ach., Meth. Lich. (1803) p. 156. *Lichen turfaceus* Wahlenb., Lich. Lapp. (1812) p. 408. *Lecanora turfacea* Wain., Adj. Lich. Lapp. I p. 153.

Var. **orbata** (Ach.) Wain. (l. c.).

Supra muscos destructos in insula Jan Mayen et ad Kap Dalton (n. V) et ad Turner Sund (n. 9). Fert.

3. Buellia.

1. **B. disciformis** (Fr.) Br. et Rostr.

Var. **insignis** (Naeg.) Wain., Adj. Lich. Lapp. II p. 112.

F. **muscorum** (Schaer.) Wain., l. c. p. 113.

Supra muscos destructos in monte Hoyberg in insula Jan Mayen. Sporae 8:nae, fuligineae, 1-septatae, long. 0,024—0,030, crass. 0,11—0,12 mm.

F. **albocincta** Th. Fr., Lich. Scand. p. 591. Wain., Adj. Lich. Lapp. II p. 113.

Supra plantas destructas ad Turner Sund, 8 m. s. m. (n. 7). Fert. Sporae long. circ. 0,028, crass. 0,012 mm.

2. ***B. lauricassiae** (Fée) Wain., Lich. Welw. p. 413. *Lecidea triphragmia* Nyl., Prodr. Lich. Gall. p. 141.

Sporae hujus speciminis long. 0,016—0,022, crass. 0,007—0,006 mm., 3-septatae, fuscofuligineae.

Supra muscos destructos in Canning Land. Fert.

3. **B. punctiformis** (Hoffm.) Mass. Wain., Lich. Caucas. p. 305. *B. myriocarpa* Th. Fr., Lich. Scand. p. 595.

F. **stigmatea** (Koerb.) Wain., Adj. Lich. Lapp. II p. 114.

Supra plantas destructas (excrementa) ad Kap Dalton (n. V) et ad lapides vulcanicos in insula Jan Mayen. — Sporae membrana aequaliter incrassata.

F. **punctata** (Koerb.) Wain., l. c.

In rupe ad Fleming Inlet.

4. **B. Groenlandica** Wain. (n. sp.).

Thallus tenuis, verrucoso-areolatus, dispersus, areolis sordide cinerascentibus, KHO non reagentibus, hypothallo nigricante tenui distincto. Medulla jodo non reagens. Apothecia minuta, 0,2—0,15 mm. lata, demum adnata, nigra, nuda, disco plano aut vulgo demum umbonato, margine tenui, persistente aut demum excluso. Hypothecium fusco-nigrum. Excipulum fuscofuligineum. Sporae 8:nae, distichae, pulchre polari-dyblastae, ellipsoideae, septo crasso (poro instructo), membrana ceterum aequaliter incrassata, long. 0,012—0,014, crass. 0,007—0,008 mm. Hymenium jodo persistenter caerulescens. — Habitu similis est *B. punctiformi* f. *punctatae* (Koerb.), at disco saepe umbonato et sporis polaridyblastis ab ea differens.

Supra lapidem ad Turner Sund, 7 m. s. m. (n. 6).

Trib. 9. *Peltigereae.*

1. Peltigera.

1. **P. aphthosa** (L.) Hoffm.

Supra muscos et alias plantas destructas ad Kap Dalton (n. III, V) et Hurry Inlet in Kingua (n. II, IV). Fert.

2. **P. canina** (L.) Hoffm.

Supra muscos rupium prope Lagunas meridionales in insula Jan Mayen. Supra muscos vigentes et destructos in Sabine Ö (n. 193, 232 b), ad Hurry Inlet (n. 1), Kap Borlase Warren (n. 274 b), Fleming Inlet, Turner Sund (n. 2, 9), Kap Dalton (n. III, 380). Fert.

2. Nephroma.

1. **N. arcticum** (L.) Fr.

Supra muscos et lichenes vigentes et destructos rupium in monte Hoyberg in insula Jan Mayen. Ster.

3. Solorina.

1. **S. crocea** (L.) Ach.

Supra muscos destructos rupium in monte Hoyberg in insula Jan Mayen et ad terram arenosam ad Hurry Inlet in Liverpool Kyst (n. III). Fert.

2. **S. octospora** Arn.

Supra muscos destructos rupium ad Fleming Inlet. Fert.

3. **S. bispora** Nyl., Syn. Lich. p. 334; Wain., Lich. Caucas. p. 307.

Sporae binae, long. 0,070—0,106, crass. 0,030—0,046 millim., 1-septatae, fusco-rufescentes, medio constrictae. Gonidia leptogonidia, vulgo ellipsoidea, simplicia, guttulas oleosas continentia, membrana tenuissima, long. circ. 0,007—0,005, crass. 0,004—0,003 mm.

Ad muscos destructos et terram arenosam prope Lagunas meridionales in insula Jan Mayen et Sabine Ö (n. 211 a) et ad Forsblads Fjord. Fert.

Trib. 10. *Pannarieae.*

1. Parmeliella.

1. **P. lepidiota** (Sommerf.) Wain., Lich. Caucas. p. 309.

F. **tristis** Th. Fr., Lich. Arct. p. 74.

In hoc specimine apothecia (microscopio visa) lecideina, margine proprio tenui, excipulo proprio thallo immerso, in parte exteriore e stratis pluribus sat grosse cellulosis parenchymaticis formato, at

demum habitu lecanorina aut zeorina, thallo marginem thallodem crenulatam, discum superantem formante cincta. Sporae simplices.

Supra muscos destructos ad rupem in monte Hoyberg in insula Jan Mayen. Fert. — Parce haec species (f. *primaria* Wain.) etiam ad Turner Sund lecta est (n. 9 pr. p.).

2. Psoroma.

1. **Ps. hypnorum** (Hoffm.) Fr.

Supra plantas destructas et terram arenosam in rupibus ad Kap Dalton (n. V) et Turner Sund (n. 6, 7) et in monte Hoyberg in insula Jan Mayen. Fert.

Trib. 11. *Collemeae.*

1. Leptogium.

1. **L. lacerum** (Sw.) Koerb.

F. majus Koerb.

Supra plantas destructas in rupe ad Kap Dalton (n. V). Ster.

Trib. 12. *Lecideae.*

1. Cladonia.

1. **Cl. rangiferina** (L.) Web.

Supra et inter muscos in monte Hoyberg in insula Jan Mayen. Ster.

2. **Cl. sylvatica** (L.) Rabenh.

Var. **sylvestris** Oed. Wain., Mon. Clad. I p. 20, III p. 222.

Supra et inter muscos in monte Hoyberg in insula Jan Mayen. Ster.

Modif. **spumosa** Floerk. Wain., Mon. Clad. I p. 27.

In hoc specimine ramuli apicales parcissime nutantes. Gelatina pycnoconidiorum materiam coccineam haud continens, qua nota certe a *Cl. alpestri* differt.

Ad Kap Dalton. Ster.

3. **Cl. coccifera** (L.) Willd.

Var. **stemmatina** Ach.

Supra muscos destructos ad Kap Dalton (n. VI), Turner Sund (n. 6) et Hurry Inlet in Liverpool Kyst (n. IV). Cum apotheciis male evolutis.

Var. **pleurota** (Floerk.) Schaer.

Supra muscos destructos ad Turner Sund, 8 m. s. m. (n. 7). Ster.

4. **Cl. amaurocraea** (Floerk.) Schaer.

F. **oxyceras** Ach. Wain., Mon. Clad. Univ. I p. 249, 254, III p. 232.

Supra et inter muscos ad Lagunas meridionales et in monte Hoyberg in insula Jan Mayen. Ster.

5. **Cl. cariosa** (Ach.) Spreng.

Modif. **pruniformis** Norm. Wain., Mon. Clad. Univ. II p. 52, III p. 248.

Supra terram humosam ad Turner Sund (n. 9). Parce etiam fertilis.

6. **Cl. gracilis** (L.) Willd.

Var. **chordalis** (Floerk.) Schaer.

Ad plantas destructas in monte Hoyberg in insula Jan Mayen. Fert.

7. **Cl. cerasphora** Wain., Mon. Clad. Univ. II p. 167, III p. 257.

F. **stricta** Wain., l. c. II p. 169, III p. 257.

Inter Racomitrium lanuginosum in rupe ad Lagunas meridionales in insula Jan Mayen. Ster. — Podetia KHO lutescentia.

8. **Cl. pyxidata** (L.) Fr.

Var. **neglecta** (Floerk.) Mass.

Supra muscos destructos ad Kap Borlase Warren (n. 274 b). Ster.

Var. **chlorophaea** Floerk.

Supra plantas destructas ad Fleming Inlet et ad Lagunas meridionales in insula Jan Mayen. Ster.

9. **Cl. fimbriata** (L.) Fr.

Modif. **minor** (Hag.) Wain., Mon. Clad. Univ. II p. 258, III p. 253.

Supra plantas destructas ad Turner Sund (n. 1, 5). Ster.

2. Lecidea.

1. **L. (Lopadium) pezizoidea** Ach.

Var. **muscicola** (Sommerf.) Th. Fr., Lich. Scand. p. 389; Wain., Adj. Lich. Lapp. II p. 123.

Supra plantas destructas in rupe ad Turner Sund, 2 m. s. m. (n. 7). Fert.

2. **L. (Rhizocarpon) geographica** (L.) Fr.

In saxis et rupibus ad Fleming Inlet et in insula Jan Mayen. Fert.

3. **L. concreta** (Ach.) Wain., Lich. Caucas. p. 319.

F. **geminata** (Flot.) Wain., l. c.

In saxis et rupibus ad Fleming Inlet, Turner Sund, 2000 ped. s. m. (n. 10 et 12), Kap Dalton (n. III) et in Insula Jan Mayen. Fert.

4. **L. (Psora) rubiformis** Wahlenb.

Ad terram arenosam in fissuris rupium ad Turner Sund (n. 13). Fert.

5. **L. (Biatora) cuprea** Sommerf.

In hoc specimine excipulum in margine incoloratum, ex hyphis radiantibus pachydermaticis conglutinatis, lumine angusto instructis formatum. Hypothecium dilute fuscescens, passim pallide fuscescens. Hymenium decoloratum, granulis nullis, jodo caerulescens, dein vinose rubens. Paraphyses arcte cohaerentes. Sporae parcissime visae, simplices, decolores, long. 0,010, crass. 0,0035 mm. Apothecia disco fusco vel fusco-nigricante convexo, margine vulgo pallidiore. Thallus albidus, sat continuus, sat tenuis, verruculoso-inaequalis.

Supra muscos destructos in rupe in Canning Land.

6. **L. (Eulecidea) goniophila** Floerk.

***L. latypiza** Nyl.

Thallus in hoc specimine dispersus, tenuis, KHO lutescens. Excipulum extus caeruleo-smaragdulo-fuligineum, intus subalbidum. Hypothecium obscure fulvescens aut fulvo-fuscescens. Epithecium caeruleo-smaragdulo-fuligineum. Paraphyses sat arcte cohaerentes. Sporae ellipsoideae, simplices, decolores.

Ad lapidem in Kap Dalton (n. VI).

7. **L. glomerulosa** D. C.

F. **Laureri** (Hepp) Wain., Adj. Lich. Lapp. II p. 93.

Ad lignum vetustum in insula Jan Mayen.

F. **euphorea** (Floerk.) Wain., l. c. p. 94.

Ad lignum vetustum in insula Jan Mayen.

8. **L. subcongrua** Nyl., Fl. 1874 p. 11; Wain., Adj. Lich. Lapp. II p. 97.

Excipulum extus in margine smaragdulo-caerulescens, basi superne smaragdulo-caerulescens, inferne violaceo-fuligineum. Hypothecium albidum. Epithecium caeruleo-smaragdulum. Paraphyses arcte cohaerentes.

Ad lapides prope Turner Sund usque ad 2000 ped. s. m. (n. 12 et 4).

9. **L. assimilata** Nyl., Lich. Scand. p. 221.

F. **irrubata** Th. Fr., Lich. Scand. p. 522; Wain., Adj. Lich. Lapp. II p. 85.

Ad terram arenosam et muscos destructos in Kap Dalton.

10. **L. limosa** Ach. Th. Fr., Lich. Scand. p. 538.

Ad terram arenosam et muscos destructos in Kap Dalton (n. V).

11. **L. paupercula** Th. Fr., Lich. Scand. p. 482; Wain., Adj. Lich. Lapp. II p. 51.

In rupe ad Fleming Inlet et in insula Jan Mayen.

12. **L. Dicksonii** Ach. Th. Fr., Lich. Scand. p. 516. *L. atroferrata* Deichm. Br., Enum. Lich. Groenl. p. 503.

In rupibus et lapidibus ad Turner Sund, 7 m. s. m. (n. 6) et in insula Jan Mayen.

13. **L. lapicida** (Ach.) Wain., Adj. Lich. Lapp. II p. 55.

Var. **declinans** Nyl., Lich. Scand. p. 226.

Thallus cinerascens, KHO non reagens, medulla jodo caerulescens. Excipulum extus fuscescens, intus pallidum. Hypothecium dilute fuscescens. Epithecium smaragdulo-caerulescens.

Ad rupem in insula Jan Mayen.

Trib. 13. *Acarosporeae.*

1. Acarospora.

1. **A. glaucocarpa** (Wahlenb.) Koerb.

Ad lapidem vulcanicum in Kap Dalton (n. II). Fert.

2. **A. fuscata** (Schrad.) Arn.

Var. **smaragdula** (Wahlenb.) Wain.

Ad lapidem vulcanicum in insula Jan Mayen. Fert.

3. ***A. discreta** (Ach.) Th. Fr.

In rupe ad Fleming Inlet. Fert.

2. Thelocarpon.

1. **Th. epibolum** Nyl., Fl. 1866 p. 420; Wain., Lich. Caucas. p. 331.

Supra partes mortuas *Solorinae octosporae* Arn. ad Fleming Inlet.

B. Hysterieae.

Trib. 1. *Graphideae.*

1. Xylographa.

1. **X. parallela** (Ach.) Fr. Wain., Lich. Caucas. p. 334.

Var. **difformis** Wain., Adj. Lich. Lapp. II p. 148.

Gonidia thalli cystococcoidea, globosa, simplicia, membrana crassitudine mediocri. Perithecium sordide pallidum. Hypothecium albidum. Hymenium jodo caerulescens, dein sordide vinose rubens. Paraphyses apice ramosae, haud connexae. Asci clavati. Sporae 8 : nae, distichae, simplices, decolores, oblongae, long. 0,010—0,012, crass. 0,004—0,005 mm.

Ad lignum vetustum in insula Jan Mayen.

C. Coniocarpeae.

Trib. 1. *Sphaerophoreae.*

1. Sphaerophorus.

1. **Sph. fragilis** (L.) Koerb.

Ad rupem in monte Hoyberg in insula Jan Mayen. Ster.

II. Pyrenolichenes.

1. Dermatocarpon.

1. **D. (Endopyrenium) cinereum** (Pers.) Th. Fr. *Verrucaria tephroides* (Ach.) Nyl., Lich. Scand. p. 267.

Supra terram arenosam ad Turner Sund (n. 13). Fert.

2. Verrucaria.

1. **V. aethiobola** Ach. Wain., Adj. Lich. Lapp. II p. 173.

Ad lapidem vulcanicum in insula Jan Mayen.

Ad formam atypicam pertinet thallo sordide albicante disperso sat tenui instructam. Sporae long. 0,026, crass. 0,013 mm.

3. Endocarpon.

1. **E. pulvinatum** Th. Fr., Lich. Arct. p. 257. *Dermatocarpon* Koerb., Parerg. Lich. Germ. p. 308; Wain., Adj. Lich. Lapp. II p. 166.

Gonidia thalli pleurococcacea. Gonidia hymenialia stichococcacea, long. 0,012—0,004, crass. 0,0045—0,0025 mm. Amphithecium extus fuscescens, gonidia pleurococcacea continens. Perithecium decoloratum vel pallidum. Periphyses bene evolutae.

In rupe ad Turner Sund, 2000 ped. s. m. (n. 12 et 13). Fert.

4. Staurothele.

1. **St. clopima** (Ach.) Th. Fr., Lich. Arct. p. 263; Wain., Lich. Caucas. p. 339.

In rupe ad Fleming Inlet et ad Turner Sund, 2000 ped. s. m. (n. 10 et 12).

5. Polyblastia.

1. **P. terrestris** Th. Fr., Polybl. Scand. p. 15.

Thallus bene evolutus, sat crassus, verrucoso-inaequalis, cinerascens. Apothecia amphithecio thallino obducta, vertice denudato nigro vulgo leviter impresso. Perithecium fuligineum, integrum, globosum. Sporae 8:nae, murales, decolores, demum pallidae, long. 0,040—0,052, crass. 0,022—0,024 mm.

Ad saxa friabilia laxe affixa in Kap Dalton (n. V).

2. **P. pseudomyces** (Norm.) Th. Fr., Polybl. Scand. p. 26. *Staurothele* Norm., Vet. Akad. Förh. 1870 p. 805.

Thallus tenuis, nigricans. Apothecia hemisphaerica. Perithecium globosum, fusco-fuligineum, integrum. Nucleus jodo vinose rubens. Sporae 8:nae, fuscescentes, ellipsoideae aut oblongae, murales, cellulis paucis, long. 0,014—0,015, crass. 0,007—0,008 mm. Thallus algas varias, praesertimque micaroideas continens.

Supra terram humosam ad Turner Sund, 12 m. s. m. (n. 14).

Pharcidia.

1. **Ph. lichenum** Arn., Lich. Tirol VIII p. 302, XXI p. 153; Wain., Lich. Caucas. p. 342.

Supra thallum *Lecideae rubiformis* Wahlenb. ad Turner Sund (n. 13). — Ad fungos pertinet. Sporae long. 0,014, crass. 0,006 mm., 1-septatae, ovoideae, decolores, 8:nae, distichae, septo in medio. Paraphyses haud evolutae.

11—7—1904.

(Særtryk af Vidensk. Meddel. fra den naturh. Foren. i Kbhvn. 1905.)

Arbejder fra den Botaniske Have i København. Nr. 22.

Støtterødderne hos *Rhizophora*.

Af

V. A. Poulsen.

[Hertil Tab. V.]

(Meddelt i Mødet d. 11. Nov. 1904 samt i Botanisk Forening d. 27. Febr. 1904.)

De ejendommelige Støtterødder, som udmærke Arterne af den til visse tropiske Kysters halofile Vegetation knyttede Planteslægt *Rhizophora*, have altid vakt de rejsendes Opmærksomhed og hyppig været Genstand for Studium. Mangrovens egenartede Udseende [smlg. Fig. 1] er allerede tydelig beskrevet i Oldtiden. Alexander den stores Admiral Nearchos havde undersøgt den i den persiske Havbugt, og omend hans derom handlende Stentavler, som have været opbevarede i Babylon, ere gaaede tabt, har Theophrast dog forinden faaet dem afskrevne, og vi ere i Stand til at konstatere, hvilke Mangrovetræer Nearchos har set, og at netop *Rhizophora*'en med sine mærkelige Rødder allerede for saa lang Tid siden har tildraget sig hans Opmærksomhed [1]). Men det er naturligvis først i vore Dage, at et nöjere Kendskab til dette interessante Plantesamfund har kunnet vindes og da atter særlig, efterat den moderne biologiske Forskning har kastet sin Interesse paa de Maader og Veje, ad hvilke Planterne have tilpasset sig til Klimater og Voxesteder. Især ved Warmings [2]), Schimpers [3]), Karstens [4]) og Goebels [5])

[1]) Bretzl: Botan. Forschungen des Alexanderzuges. 1903.

[2]) Tropische Fragmente, II; (i Englers Jahrb., Bd. IV, 1883; p. 519).

[3]) Indomalayische Strandflora, Jena 1891.

[4]) Mangrove-Vegetation im Malayischen Archipel [Bibliotheca botanica, Heft 22; 1891].

[5]) Pflanzenbiologische Schilderungen, I, 1889; pag. 113.

Studier, hvortil flere andre Forskeres, ogsaa danskes, Arbejder slutte sig, have vi lært Mangrovens Sammensætning, dens Træers Skudfølge og anatomiske Struktur, Blomster, Kimdannelse, Spiring m. m. ret nöje at kende. Hvad *Rhizophoras* Støtterødders anatomiske Forhold angaar, kan det bemærkes, at den store, polyarke Centralcylinder, allerede förend Tykkelsevæxten begynder, altsaa i sit primære Stadium, opnaar en betydelig Styrke ved Uddannelsen af mægtige Sejbastbelægninger paa Hadrompartiernes Inderside; saavel

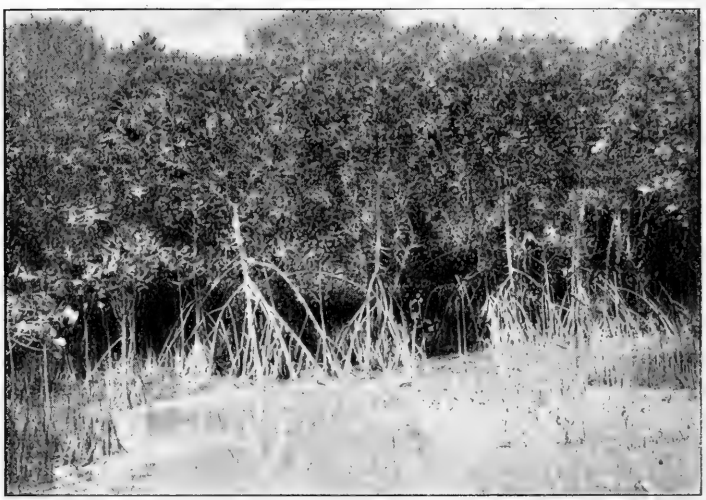

Fig. 1. *Rhizophora mucronata* Lam.
Mangrove ved Pasoeroean paa Java. Efter Fotografi af Hj. Jensen.

i Barken, der ved en tydelig Endodermis, en Caspary'sk Skede, er adskilt fra den ikke meget udprægede Pericykel, som i det indenfor Hadrom- og Sejbastmasserne liggende, marvlignende Parenkym findes, som bekendt, talrige, ejendommelige, forvedede Trichoblaster, der vel ogsaa forøge Vævets Styrke, og endelig kan det fremhæves, at alt Grundvævet er sammensat af paafaldende smaa Celler, der næsten alle indeholde store Masser af Phlobaphener og Garvesyre, og mange ere udstyrede med Krystalstjærner. Det er i Særdeleshed Rodbarken, som hyppig har været Genstand for

anatomisk Undersøgelse, saa vel hos *R. Mangle* L. som hos *R. mucronata* [1]) Lam.; Centralcylinderens Bygning har interesseret Anatomerne mindre; den er bleven studeret af Warming; senere Mangroveforskere, saasom Schimper, Karsten, Goebel have holdt sig hertil, skönt Warming kun har undersøgt *R. Mangle*; de tvende indiske Arter synes egentlig slet ikke at være undersøgte i denne Retning, eller man har fundet dem saa overénsstemmende med den amerikanske, at man ikke har offentliggjort noget derom.

Ifølge Warming er Støtterodens primære Bygning, hvad Centralcylinderen angaar, i Hovedsagen normal, dog med enkelte Varianter; saaledes forekommer der oftest flere [ɔ: 2 à 3] indenfor Endodermen liggende Hadrom- (el. Xylem-) strænge; leptomlignende, af langstrakte Elementer uden Siplader dannede Vævstrænge iagttages udenfor dem, og endelig kunne „Xylemstrængene" være dobbelte i radial Retning, hvorhos ogsaa det indre Xylem har sit udadtil lejrede „weichbastähnliche" Væv. Om Hadromkarrenes eller, som de kaldes, Tracheïdernes Anlægsfølge anføres intet særligt; de betegnes alle som „Spiraltracheïder".

Da Studier over Røddernes Anatomi i lange Tider have beskæftiget mig, ønskede jeg ved Selvsyn at lære *Rhizophoraens* at kende; jeg havde under mit Ophold i Indien for ti Aar siden imidlertid ikke selv indsamlet Materiale, væsenligst fordi jeg ved en flygtig Undersøgelse i Buitenzorg af Materiale fra Tandjong Priok ikke havde set rettere, end at Bygningen var som af Warming elleve Aar tidligere beskrevet. Men ved Studiet af *Rhiz. Mangle*-Rødder, som jeg med stor Velvillighed fik overladt af Dr. F. Børgesen, der selv havde indsamlet dem i Vestindien, har jeg, idet jeg ogsaa har fulgt Centralcylinderens Udviklingshistorie, senere faaet en anden Opfattelse af disse mærkelige Organers Bygning, og har man hidtil maattet anse dem for noget afvigende i Struktur, forekommer det mig nu, efter at jeg nöje har studeret

[1]) Cfr. Karsten, l. c., pag. 46. — Solereder: Systematische Anatomie der Dicotyledonen; 1899, p. 387.

deres Histologi, at de ere langt interessantere og ganske anderledes afvigende fra sædvanlig Rodbygning, saa at efterfølgende Skildring kan søge sin Berettigelse heri.

Mit Materiale har bestaaet af den ovennævnte *Rhiz. Mangle*, *Rh. mucronata* Lam., som Cand. mag. Hjalmar Jensen har haft den store Godhed at indsamle og spritlægge til mig paa Java, samt *Rh. conjugata* L., som jeg skylder Museet i Lund, til hvilket Hr. cand. Hjalmar Møller havde samlet under sit Ophold i Singapore. Samtlige Herrer beder jeg herved modtage min Tak.

De spritlagte Støtterødder blive som saa meget andet tropisk Materiale mørkebrune; da de, som allerede ovenfor nævnt, ere meget smaacellede, kræves der temmelig tynde Snit, og selv paa saadanne er det ofte vanskeligt at skelne Vævelementerne tydelig fra hverandre. Jeg har derfor altid til Kontrol og ved Udførelsen af Tegningerne først ved Hjælp af Klornatron fjernet alle de forstyrrende Phlobaphener; de omhyggelig i Vand udvaskede Snit behandledes derefter videre, dels med Safranin (og Indlægning i Kanadabalsam), dels med Methylgrönt (og Indlægning i Glycerin); herved opnaas temmelig holdbare, farvede Snit, i hvilke de forvedede Elementer fremtræde med stor Tydelighed; for øvrigt foretoges til Kontrol de sædvanlige, saakaldte Ligninprøver [Saltsyre-Floroglucinprøven, Mäules Reaktion o. a.], ligesom disse ogsaa bragtes i Anvendelse overfor ikke i Klornatron blegede Snit.

Allerede i en Afstand af et Par Millimetre fra Rodspidsen anlægges Ledningsstrængene hos *Rh. mucronata* og *Mangle*; saa ungt Materiale har ikke foreligget af *Rh. conjugata*, og den efterfølgende Skildring gælder derfor foreløbig kun hine to Arter. Tværsnit gennem denne meget unge Del af Roden viser, at Endodermen endnu ikke er anlagt, [det sker først adskillig senere,] men at der er dannet en Kreds af 30—40 Prokambium- eller Desmogenstrænge af kredsrundt Tværsnit og bestaaende af meget langstrakte, men meget snævre Elementer, der slutte tæt sammen uden Intercellularum. De ere adskilte ved Grundvæv af adskillig större Parenkymceller, hvis Indhold paa dette Stadium allerede har

antaget den brunlige Farve i Spiritussen, hvorved Prokambiumstrængene, der ikke indeholde Phlobaphener, paa Tværsnittet træde tydelig frem som klare, meget smaamaskede, kredsrunde Pletter; i Vævet udenfor dem (i Barken) saa vel som indenfor (i „Marven") er der dels allerede udviklet talrige Idioblaster, dels ere saadanne i Færd med at danne sig.

I disse Prokambiumstrænge uddannes nu fem forskellige Slags Elementer: Yderst Sirør, inderst Kar og Hadromparenkym, desuden Kambium og Sejbast; [se Tab. V, Fig. 1, som skematisk viser den udvoxne Rod i primært Stadium]. Heraf anlægges de tvende førstnævnte først; Sejbasten træder først op paa et senere Stadium, ved den primære Udviklings Afslutning; hos *Rh. Mangle* har jeg fundet dette at være Tilfældet i en Afstand fra Rodspidsen af ca. 14 Ctm. Samtidig hermed bliver Endodermen, der, som Warming har vist, udgör en tyndvægget, Caspary'sk Skede med Forkorkning af et bredt, med Sudanopløsning eller Methylgrönt let paaviseligt Bælte paa Radialvæggen, synlig. Leptomet, hvis Siplader paa Længdesnit ere meget tydelige, medens de paa Tværsnittene ere saare vanskelige at iagttage, danner [cfr. Tab. V, figg. 2 (af *Rh. mucronata*) og 5 (af *R. Mangle*), *l*] paa Tværsnit afrundede, ofte noget tangentialstrakte Vævgrupper af snævre Elementer; Protoleptomets Sirør viser tydelig den af franske Histologer saakaldte „différenciation nacrée" [1]). Ikke sjældent findes to Leptomgrupper udviklede [Fig. 3 (af *Rh. Mangle*)]. Hadromet udvikles paa samme Tid indenfor Leptomet i den ydre Halvdel af Prokambiumstrængen. De først dannede Kar, Vasalprimanerne, som Strasburger kalder dem, eller Protohadromet, for at bruge en Haberlandtsk Betegnelse, ere meget snævre Skruekar [Figg. 2, 3, 4 og 5, *x*]; de senere dannede, Metahadromet [samme Figg., *m*], udpræges imidlertid ikke i centripetal Retning, saaledes som ellers i Rødder, men som

[1]) *Lesage*: Sur la différenciation du liber dans la racine; [Compt. rend., CXII, 1891, p. 144.] — *Léger*: Origines et transformations des éléments libériens [Mém. de la soc. Linn. de Normandie, t. 19, 1896]. — *Perrot*: Le tissu criblé. Diss., Paris, Lechevallier, 1899, p. 17 ff.

oftest i alle Retninger, ikke sjældent (se hosstaaende Fotografi) i tydelige Radialrækker, ofte noget uordentlig, sjældnere (og især hos *Rh. Mangle*) væsenlig i centrifugal Retning, altsaa ligesom i en Stængels Karstræng; man finder Repræsentanter for alle tre Udviklingsmaader paa et og samme Tværsnit, og følger man paa Snitserier een og samme Karstræng, ses Forholdet ofte at være forskelligt i forskellig Afstand fra Rodspidsen. Samtidig med, at Metahadromet uddannes i Skikkelse af Skruekar med tætliggende, lave Vindinger af Fortykningstraaden, og Rodens primære Struktur fæstnes, udvikles der ved enkelte Tangentialdelinger et lille, men tydeligt Kambium lige indenfor hver af Leptomstrængene [Figg. 2-5, *k*]; det træder dog foreløbig ikke i Virksomhed, og navnlig udvikler det ikke noget af de ydre Metahadromkar. Af leptomagtige Elementer i Hadromet har jeg intet kunnet finde.

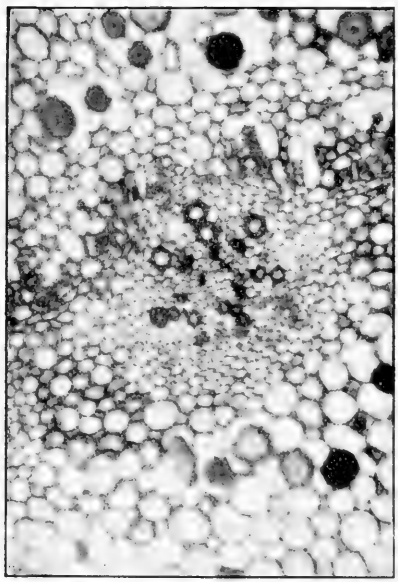

Fig. 2. Parti af et Fotografi af et Tværsnit af *Rhizophoras Mangles* Støtterod visende en kollateral Karstræng; det primære Hadrom er helt udviklet, men Endodermen og Sejbasten er ikke udpræget endnu. Man ser Protohadromelementerne i Midten, Metahadromet danner ret tydelige Straaler ud derfra. Den øverste Del af Figuren vender udad imod Korken. [$^1\frac{6}{1}^0$]

Medens Rodens Ledningsvæv saaledes udpræges i Prokambiumstrængens ydre Halvdel, har den indre Del af den stadig holdt sig i tyndvægget og plasmafyldt Tilstand; men den omdannes nu til den fra tidligere Undersøgere bekendte, overordenlig stærkt fortykkede og forvedede Sejbast, der som en i Tværsnit kredsrund eller noget halvmaaneformet Streng udgör et overmaade kraftigt Styrkevæv [cfr. Fig. 1, *s*].

Det ovenfor omtalte Leptom er ikke det eneste, som udvikles i Roden; karakteristiske for Rødder ere jo netop de imellem det primære Hadroms Kargrupper liggende Sivævsstrænge; saadanne forekommer ogsaa her [Fig. 1, *p*]. De ligge, som Warming rigtig bemærker, temmelig langt fra Endodermen; han angiver, at der ofte er flere af dem imellem Hadromstrængene; det har ikke været Tilfældet hos mit Materiale, hverken hos *Rh. Mangle* eller *mucronata*. Iøvrigt har jeg intet at bemærke om dem.

Ville vi nu kaste et Blik paa den nys skildrede Rodstruktur, kunne vi ikke undgaa at bemærke flere fra det sædvanlige meget afvigende Ejendommeligheder. For det første finde vi, hvad der saa vidt mig bekendt ikke er kendt hos nogen anden Rod, aabne, kollaterale Karstrænge i Stedet for de ellers almindelige Hadromstraaler, og dersom de interfasciculære Leptomstrænge ikke forekom, vilde vi have en Stængels Struktur for os. For det andet er Hadromet i disse Karstrænge ordnet og udviklet paa en Maade, der hidtil ikke er funden hos nogen angiosperm Plante, hverken i Rod eller i Stængel, og som leder Tanken hen paa Planterigets fjærne Fortid eller paa Nutidens faa Descendenter fra hine Perioders Vækster, fra hvilke Rhizophoraceerne dog ere systematisk vidt adskilte. I vore nulevende Blomsterplanters Stængler og Rødder finde vi, som det er bekendt fra enhver Lærebog, at Hadromet [naturligvis se vi bort fra koncentriske Strænges] enten er endarch [ɔ: Protohadromet inderst, Metahadromets Udvikling centrifugal], som almindeligt i Stængelen, eller exarch [ɔ: Protohadromet yderst, Metahadromets Udvikling centripetal], som det ses i Roden; [ganske vist have italienske Forskere i den nyere Tid[1]) for Monocotyledonernes Vedkommende paavist Rodens Kars centrifugale Anlæg, men deres egenlige Uddannelse, Forvedning og Skulpturudvikling, altsaa det, der gör dem til tracheale Elementer, foregaar dog centripetalt.] Kun i Karstrængene i

[1]) Cfr. Pirotta: Ricerche ed osservazioni intorno alla origine ed alla differenziazione degli elementi vascolari primarî nelle radice delle Monocotyledonî [i Annali di Botanica, vol. I, 1903–04, p. 8].

Cycadeernes Blade samt i Ginkgo's Kimblade har man fundet en anden Udvikling af Hadromet, nemlig den mesarche, karakteriseret ved Protohadromkarrenes centrale Stilling og Metahadromets Udvikling saavel i centrifugal som centripetal Retning. For Cykadekarstrængenes Vedkommende er dette velbekendt og omtalt i enhver anatomisk Lærebog (meget godt afbildet f. Ex. hos de Bary[1]), og Fænomenet er af Interesse, fordi det utvivlsomt er nedarvet fra Fortidsvæxter. Betegnelsen mesarch er ikke benyttet af de nyere Lære- og Haandbogsforfattere, saasom van Tieghem, Haberlandt, Eichler (i Engler & Prantls Haandbog), men desto mere af engelske og amerikanske Anatomer og Palæontologer i nyere Tid.

Selve Fænomenet er opdaget 1861 af Mettenius[2]), men han har ikke givet noget terminologisk Udtryk derfor; Russow omtaler Forholdet igen i 1872[3]) (eller egl. 1871) samt i sit fortrinlige Skrift[4]) fra 1875; en udmærket Fremstilling haves, som ovenfor nævnt, hos de Bary i 1877, og hans Afbildning er senere ofte reproduceret; mere uklar forekommer Bertrand[5]) (1880) mig at være [hans Skrift er for øvrigt ikke let forstaaeligt], men man sammenligne dog hans Fig. 59, Tab. V. Allerede i 1879[6]) ser Renault den Art Karstrænge hos Planter fra Kultiden, men opfatter det ikke som senere i 1881, hvor han[7]) betegner Cycadékarstrængen som „diploxyl"; dette Udtryk gaar nu senere igen især i den franske, palæontologiske Litteratur, i hvilken Renault jo indtager en meget fremskudt Plads[8]); hos Bertrand &

[1]) Vergl. Anatomie, pag. 349, Fig. 158; cfr. Engler & Prantl: Natürl. Pflanzenfam., II, 1, pag. 13, Fig. 4.

[2]) Abhandl. d. kgl. Sächs. Ges. d. Wiss., Bd. VII (math.-naturw. Cl. Vol. 5).

[3]) Vergl. Untersuchungen der Leitbündel-Kryptogamen (i Mém. de l'Acad. imp. des sciences de St. Pétersb., VII^e sér., tome XIX, No. 1).

[4]) Betrachtungen über das Leitbündel- und Grundgewebe, pag. 37.

[5]) Théorie du faisceau (Bulletin scientif. du département du Nord, 2^e sér. 3^ième année, No. 2, 3 og 4).

[6]) Structure comp. de quelques tiges de la flore carbonifère (i: Nouvelles Archives du Muséum, 2^ième sér., t. II, p. 277; tab. 14, figg. 5 og 6).

[7]) Cours de bot. fossile, 1^e année; pag. 37, cfr. p. 117 og pl. 16, fig. 9 (Poroxylon-Stammens Ledningsstræng).

[8]) I et Arbejde af Vetters (Die Blattstiele d. Cycadeen, Inaug.-Diss.,

Renault[1]) finde vi saaledes i 1886 Udtrykket „faisceaux diploxylé“ [og i Compt. rend. for 24. Maj samme Aar]; i 1887 dannede Solms-Laubach[2]) Udtrykket „mesarch“ egentlig mere en passant, thi han anvender det ikke en Gang i sin egen Lærebog, men fra det Aar forekommer det hyppigere og hyppigere, især i palæontologiske Forfatteres Arbejder. Strasburger[3]) bruger det dog endnu ikke, men i 1895 adopteres Betegnelsen, saa vidt jeg kan sé, for første Gang af Williamson & Scott[4]) i deres store Arbejde om *Lyginodendron* og *Heterangium*. I 1897 træffe vi Betegnelsen igen anvendt om det samme Forhold, som da opdagedes i Kimbladet af *Salisburya* af Worsdell[5]); vil man specielt fæste Opmærksomheden paa Kulplanternes mesarche Hadroms Udvikling i centripetal og -fugal Retning, er Udtrykket diploxyl ikke ilde; men i Ginkgo's Kimblad er „Diploxyliteten“ ikke saa stærkt udpræget, saa at „mesarch“ her bliver heldigere. I denne samme Afhandling foreslaas Udtrykket „endarch“ [som vi have anvendt ovenfor] for første Gang; det er dannet af Scott, som ogsaa i sin Lærebog[6]) fra 1900 anvender mesarch, endarch og exarch, uden at man egenlig her han se, hvem disse Udtryk skyldes. Angaaende Forfattere, som efter dette Tidspunkt have beskæftiget sig med den mesarche

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Leipzig, 1884) er det derfor meget paafaldende, at han ikke nævnes, lige saa lidt som det nævnte Udtryk synes Forfatteren bekendt. Han beskriver i det hele taget Hadromet ganske urigtig, ja synes end ikke at kende de Barys Haandbog. Det kan for øvrigt i Parenthes bemærkes, at heller ikke Wettstein (Handbuch d. syst. Botanik, II, 1 Theil, 1903, p. 121), der dog er af allernyeste Datum, synes at kende de terminologiske Betegnelser, som anvendes om disse Emner; det, han anfører om Cykadékarstrængene, er i og for sig rigtigt, men ikke udtömmende, hvilket er saa meget mere forunderligt, som Bennettitaceerne i den Henscende ere korrekt beskrevne.

[1]) Archives Bot. du Nord de la France, p. 237.

[2]) Einleitung in die Phytopalaeontologie, p. 263.

[3]) Ueber den Bau u. die Verrichtungen der Leitungsbahnen, 1891; p. 155.

[4]) Cfr. Philos. Transact. Roy. Soc., vol. 186, 1895 B, p. 703.

[5]) Transact. of the Linn. soc., 2d ser., vol. V, p. 301; (cfr. især pl. 23, fig. 3, som har megen Lighed med Rhizophora).

[6]) Studies in fossil Botany, p. 137, Anm.

Struktur og anvendt Betegnelsen, kunne nævnes Scott[1]), Worsdell[2]), Jeffrey[3]) [cfr. især hans Fotografi 43, Tab. VI af *Lyginodendron* (= *Lyginopteris* Potonié [Lehrbuch d. Pflanzenpalaeontologie, 1899])]; i 1903 har Enrico[4]) givet os Cycadé-Hadromets Udviklingshistorie, og endelig kan nævnes Matte's[5]) Undersøgelser fra 1904 [cfr. dog Worsdell's Bemærkninger hertil[6])] samt Lyon's[7]) Arbejde over Ginkgo fra samme Aar. Det er ikke alene hos Cycadeer, Ginkgoaceer og uddøde Kryptogamer [Bennettitaceer, Cordaitaceer], vi finde mesarche Hadrompartier; ogsaa nulevende Karkryptogamer besidde saadanne, saasom *Osmunda cinnamomea* [cfr. Jeffrey, l. c., p. 124 og Tab. 3, Fig. 23, Faull[8]), derimod ikke *O. regalis* (cfr. Strassburger[9]), Zenetti[10])] og Bladkarstrængen hos *Isoëtes* [oprindelig set af Russow (Vergl. Untersuch., Tab. XI, Fig. 27), senere undersøgt af Kruch[11])].

Denne ejendommelige Hadromudvikling, at altsaa de første (og snævreste) Kar anlægges i Midten af Prokambiet, medens Metahadromets Uddannelse skrider ud derfra til alle Sider, er det jo

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[1]) Anat. characters presented by the peduncle of Cycadaceae (Ann. of Bot., 1897, vol. XI, p. 399; cfr. hermed fig. 106 (af Stangeria) i forrige Bog, p. 316). Fremdeles: Scott i British Associations Report, 1900; p. 945, (Poroxylon og Cordaites).

[2]) The vascular structure of the sporophylls of the Cycadaceae (i Ann. of Bot., XII, 1898; p. 203); cfr. hertil Stopes i Flora 1904, p. 435, samt Worsdell: Berichtigung i Flora 1905, p. 381.

[3]) Structure and development of the stem in the Pteridophyt. and Gymnosperms (Philos. Transact., vol. 195 B., p. 136; 1903).

[4]) Sviluppo del fascie vascol. d. foglie d. Cyc. [Ann. di botan., vol. I, p. 109].

[5]) Recherches sur l'appareil libéro-ligneux des Cycadées. Diss. Caen, 1904.

[6]) The new Phytologist, vol. VIII, 1904, p. 247.

[7]) The embryogeny of Ginkgo [i Minnesota Bot. Studies, vol. III, 1904; pag. 284, og fig. 59].

[8]) Anatomy of the Osmundaceae [Botan. Gazette, vol. 32, 1901; pag. 388, samt tab. XVI, figg. 15 og 17]. Fænomenet er her set, men ikke udtrykkelig benævnt.

[9]) Bau und Verrichtungen der Leitungsbahnen, Jena, 1891, p. 448.

[10]) Botanische Zeitung, Originalarb., 1895.

[11]) Istologia ed istogenia del fascie conduttore delle foglie di Isoëtes; [i Malpighia, vol. IV, 1890—81; p. 69, og især tab. I, fig. 2].

netop, vi finde hos de to ovenfor behandlede *Rhizophora*-Arter; angaaende den tredje, *Rh. conjugata* L., kunne vi fatte os i Korthed, da den i den Henseende ganske ligner de to andre; der er i dens Rodparenkym, som er noget mere storcellet, men i øvrigt er udstyret med ganske de samme sejbastagtige Trichoblaster, ikke saa mange Phlobaphener, og Vævet er noget løsere med flere og større Intercellulærrum; Korklaget, hvormed Barken er beklædt, er mægtigere og Stencellegrupperne noget større. Især er denne Arts Rødder let kendelige ved deres meget tydelige Endoderm, af hvis (paa Tværsnit) rektangulære eller kvadratiske Celler mange have noget fortykkede Vægge (svage O-Skeder), medens de mellemliggende ere de sædvanlige, tyndvæggede med (især paa Snit, der ere klarede med Klornatron og Glycerin) fremtrædende, forkorkede Radialvægge. Paa de Støtterødder, som have staaet til min Raadighed, var det udadvendende Metahadrom langt stærkere udviklet end det øvrige, et Forhold, som kun sjældnere findes hos de to andre, ovenfor beskrevne Arter; ofte syntes det mig, som om Udviklingen kunde være endarch; i hvert Tilfælde kan det indre Metahadrom være indskrænket til eet à to Kar. Medens Karstrængene hos *Rh. Mangle* og *mucronata* som oftest eller dog meget hyppig have to Leptompartier, er eet saadant Regelen hos *R. conjugata*; imellem Karstrængene findes ligesom hos de to andre Arter kun een Leptomstræng, men den kan være temmelig tyk.

Naar Tykkelsevæxten begynder, sættes hos alle tre Arter det Kambium, som befinder sig i Karstrængene, først i Arbejde, men slutter sig meget snart til det lidt senere indenfor det interfasciculære Leptom opstaaende Dannelsesvæv. Sejbastudviklingen har samtidig grebet noget mere om sig, og hos *Rh. Mangle* og *mucronata* indesluttes til sidst det primære Hadrom saa meget i dette Væv, at det paa Tværsnit bliver vanskelig iagttageligt. For øvrigt udformer Tykkelsevæxten sig paa den af Warming skildrede Maade; og den skal derfor ikke nærmere forfølges her; der dannes ingen Pericykelkork.

Det vil have sin Interesse at undersøge Kimrodens Anatomi; Warming[1]) skriver om den: „In der kleinen Radicula scheint keine wesentliche Änderung im Bau statt zu haben"; dette maa betyde: i Sammenligning med den hypocotyle Stængels Bygning; denne har jeg forøvrigt funden ganske, som af Warming skildret. Kimroden er utvivlsomt ganske funktionsløs: den er overordentlig lille; paa de tre Kimplanter af *R. Mangle*, som have staaet til min Raadighed, har jeg ikke kunnet anslaa dens Længde til mere end 2, höjst 3 Mm. Den afviger i sin Anatomi baade fra Støtterødderne og fra Hypokotylet og er meget lig en normal Rod: Hadrom og Leptom afvexle med hinanden, men hint er indskrænket til to à tre Kar, ja endog til et eneste. En Endoderm er ikke til Stede, og det kan forekomme, at der mellem to Hadrompartier (om „Straaler" som i en almindelig Rod kan her ikke godt tales) findes to Leptompartier, men saa mange, som vi træffe i Hypokotylet mellem to af dets (kollaterale, aabne og endarche) Karstrænge, hvor jeg har set indtil elleve, fandtes ikke paa mit Materiale.

Endnu fortjener et sidste Spørgsmaal, som kunde paatrænge sig, et Par Ord. Vi kende indtil Dato ingen anden Rod med en Bygning som den, vi ovenfor saa fandtes hos Støtteroden. Man kunde med rette spörge, om denne da virkelig er en Rod; herpaa mener jeg at maatte svare ja, ti den har endogen Oprindelse og er forsynet med en Rodhætte, men iblandt de afvigende Rodstrukturer er Støtterodens unægtelig meget mærkelig. Tiden vil nu vise, om vi paa andre Steder, muligvis blandt *Rhizophora*'ens Slægtninge Myrtiflorerne, skulde træffe den mesarche Hadromudvikling; foreløbig kendes den, som ovenfor udviklet, aldeles ikke hos Angiospermerne.

Universitetets botaniske Laboratorium, Marts 1905.

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[1]) l. c., pag. 545.

Figurforklaring til Tab. V.

Figurerne ere med Undtagelse af Fig. 1, som er rent skematisk, tegtegnede med Abbes camera clara efter Zeiss Ocul. 1, Obj. D D.

Fig. 1. Et lille Stykke af en Støtterods Tværsnit af *Rhizophora mucronata* Lam. Skematisk for at vise Lednings- og Styrkevævets Topografi. *end.* = Endoderm; *s* = Sejbaststrængene paa Hadromstrængenes Inderside; *h* = Hadrom; *k* = Kambium; *l* = det til Hadromstrængene knyttede Leptom; *p* = det interfasciculære Leptom. Roden er i fuldtudviklet, primært Stadium; Tværsnittet er taget ca. 11 cm. fra Rodspidsen.

Figg. 2 og 4. Tværsnit af to kollaterale Karstrænge fra Støtteroden af *Rhizophora mucronata* Lam. i primært Stadium. I Fig. 4 er Hadromparenkymet ikke indtegnet.

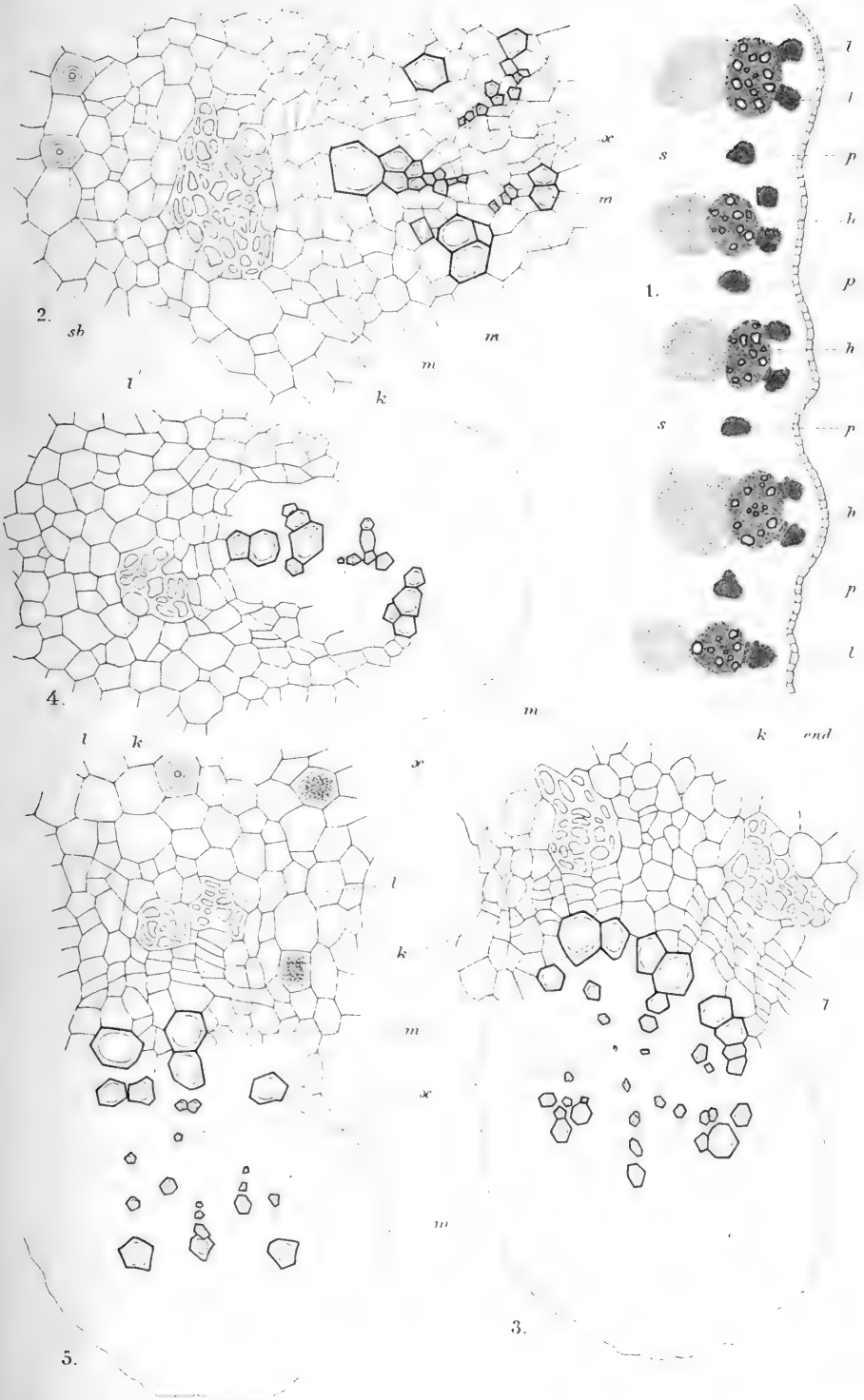
Figg. 3 og 5: Som foregaaende, men af *Rhiz. Mangle* L. Karstrængen i Fig. 3 har to Leptompartier.

I de fire sidste Figurer betyder:

l = Leptomstrænge;
k = Kambium;
x = Protohadromkar (Vasalprimaner); } udgör tilsammen det
m = det primære Hadroms „metaxylem"; } „mesarche" Primærhadrom.
sb = Sejbastceller („Idioblasterne").

I Rummet indeni den buede Linie, som begrænser Karstrængen indadtil i Figg. 3, 4 og 5, udvikles de mægtige Styrkevævsstrænge, som i Fig. 1 betegnes ved *s*.

KBHVN. BIANCO LUNO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Arbejder fra den Botaniske Have i København. Nr. 23.

CONTRIBUTIONS A LA CONNAISSANCE DU GENRE SIPHONOCLADUS SCHMITZ

PAR

F. BÖRGESEN

C'est en 1879 que F. SCHMITZ fonda le genre *Siphonocladus* pour deux espèces décrites par lui, *Siphonocladus Wilbergi* (= *S. pusillus* (Kütz.) Hauck) et *S. Psyttaliensis*; depuis, on a classé successivement dans ce genre plusieurs espèces dont la plupart avaient été décrites antérieurement. Le Sylloge Algarum de DE-TONI, I, p. 358—360, en cite 9 espèces, mais il est probable qu'un examen approfondi établira qu'il y a là plus d'un double emploi. De plus M. F. KJELLMAN (7) a décrit, en 1897, une espèce, originaire du Japon, qu'il nomma *S. fasciculatus*, et M. N. SVEDELIUS (18) a créé, en 1900, une espèce, *S. brachyartrus*, d'après des matériaux recueillis sur les côtes du Détroit de Magellan[1].

Pour la présente étude j'ai utilisé des matériaux recueillis, en 1891 et 1895—1896, au cours de deux voyages aux Antilles danoises. Parmi ces matériaux se trouvait une récolte faite sur la côte méridionale de l'île de S^te^ Croix; l'Algue qui la compose avait été jetée sur la plage en quantité considérable; je l'ai rapportée au *S. tropicus* (Crouan) J. Ag., et j'ai

[1] M. MARSHAL HOWE avait désigné sous le nom de *S. tropicus* une espèce qui ne rentre pas dans cette espèce (Phycotheca Bor.-Am. No. 1031). M. HOWE m'a fait savoir qu'il la décrira prochainement en en faisant une espèce nouvelle.

pu m'assurer plus tard, à Lund (Suède), qu'il y avait concordance absolue entre les exemplaires que j'ai recueillis et ceux qui sont conservés sous le nom de *S. tropicus* dans l'herbier J. Agardh. Quant au reste des matériaux en question je suis d'avis qu'il faut le rapporter à *S. membranaceus* (Ag.) Born., espèce très commune sur toutes les côtes des Antilles danoises où elle habite les eaux peu profondes; on l'y rencontre soit adhérente, fixée aux roches et aux bancs de coraux, soit sous forme de boules flottantes ægagropiloïdes, de couleur verte.

Siphonocladus tropicus, dont nous allons nous occuper d'abord, est une plante très curieuse; malheureusement je ne l'ai pas trouvée adhérente. D'après les matériaux qui ont été à ma disposition, le thalle forme des touffes abondamment ramifiées, atteignant une hauteur de 3 à 6 centimètres; sa coloration est d'un vert clair. Une partie des matériaux recueillis ont été desséchés, d'autres ont été conservés dans de l'alcool trop étendu; ils ont acquis, par suite, une consistance trop molle.

A ma connaissance le développement de cette plante n'a pas été l'objet de recherches détaillées (voir toutefois J. Agardh I p. 102), mais F. Schmitz a décrit le développement de *Siphonocladus pusillus* (Kütz.) Hauck, qu'il avait recueilli dans le golfe d'Athènes et qui paraît être une espèce très voisine de *S. tropicus*.

Comme c'est le cas pour *S. pusillus*, le thalle primitif de *S. tropicus* est ordinairement claviforme, simple et de structure continue (fig. 1 a); il ressemble beaucoup à celui des *Valonia* et atteint des hauteurs de 2 à 4 cm, et des largeurs d'environ 0,1 cm. Notons cependant qu'il se présente quelquefois sous des formes moins régulières; on trouve même des exemplaires ramifiés (voir par exemple la fig. 1, b). Dans la partie inférieure, plus rétrécie, aux parois particulièrement épaisses, se voient plusieurs (4, 6 ou même 10) étranglements annulaires bien distincts (fig. 1); j'en ai trouvé de pareils dans

un échantillon de *Siphonocladus pusillus* que m'avait gracieusement prêté le major Reinbold. D'après ce que m'a confirmé M. Reinbold, cet échantillon a été recueilli par Hauck. Cepen-

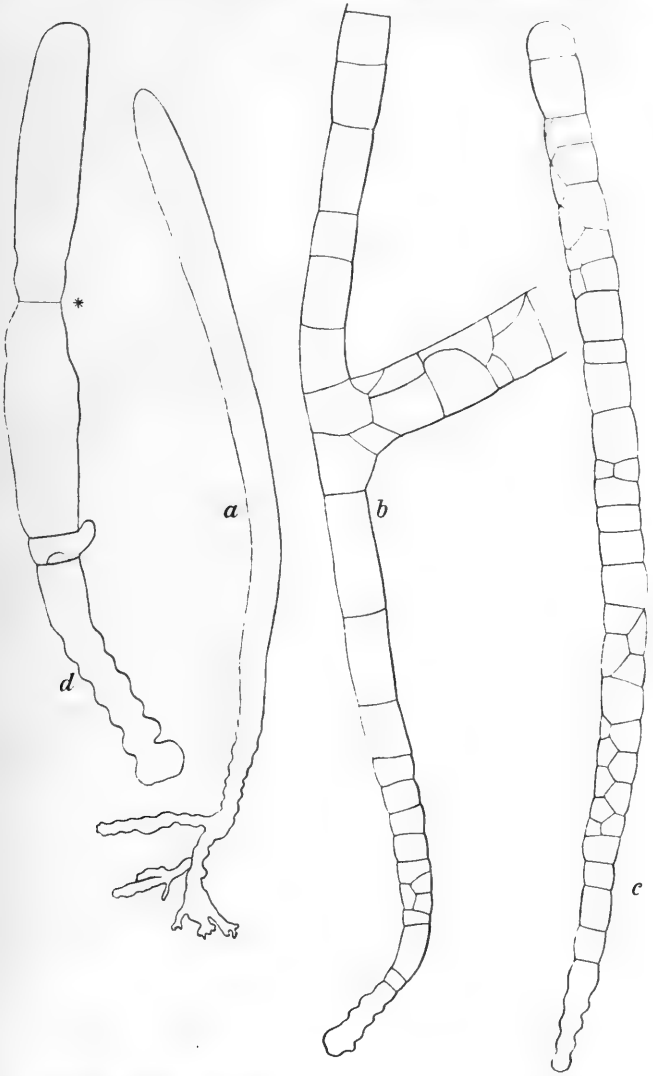

Fig. 1. *Siphonocladus tropicus*; *a*, individu jeune, à thalle simple; *b*, *c*, *d* portions de thalle représentant des stades de développement divers (voir le texte). (Echelle d'env. $^{10}/_{1}$).

dant Hauck ne fait pas mention de cette particularité, et Schmitz la passe également sous silence, aussi M. Wille écrit-il (19) dans sa diagnose du genre *Siphonocladus*: „die Äste sind ein- oder mehrzellig, ähnlich dem Hauptstamme und wie dieser ohne ringförmige Einschnürungen", ce qui n'est exact ni pour l'axe primaire ni pour les ramifications; nous aurons plus loin l'occasion d'y revenir. Dans le grand ouvrage dont il a commencé la publication (13) M. Oltmanns n'a pas non plus mentionné ce fait.

A la base, *Siphonocladus tropicus* est fixé par des crampons, à ramifications abondantes et irrégulières (fig. 1, a), à parois très épaisses et contenant souvent des quantités considérables d'amidon. Les crampons communiquent avec la cellule qui les a émis; leur mode de ramification est irrégulièrement dichotome ou coralloïde (fig. 2). Malgré des explorations réitérées je n'ai jamais trouvé trace de cloisonnement dans les crampons; cette espèce diffère par là de *Siphonocladus pusillus* dont les crampons présentent des cloisons très distinctes (voir la représentation que donne Schmitz, 16, pl. XII, fig. 1). On en trouve également dans les crampons de *Siphonocladus membranaceus* (fig. 11) dont il sera question plus loin.

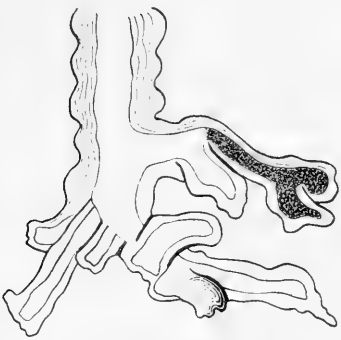

Fig. 2. *S. tropicus*; crampon. (Echelle d'env. $^{30}/_{1}$).

Division des cellules. Comme nous venons de le dire, le thalle primitif de *Siphonocladus tropicus* est unicellulaire et simple, mais à un moment plus ou moins avancé de son existence, il se divise en un nombre, ordinairement assez grand, de cellules, et cette multiplication des cellules s'effectue de la manière suivante: le contenu cellulaire (protoplasme avec noyaux, chloroleucites,

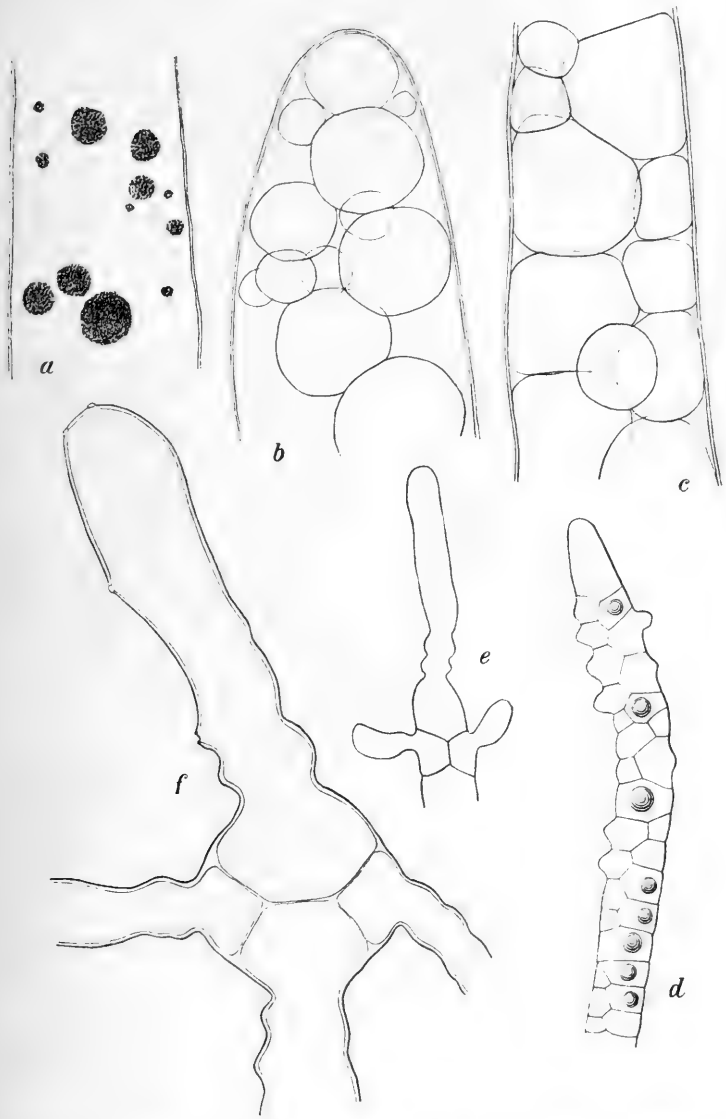

Fig. 3. *S. tropicus*; *a*, *b*, *c*, stades divers de la formation cellulaire; *d*, branche où les cellules présentent des excroissances qui s'allongeront en rameaux nouveaux; *e*, sommet d'une branche dont la cellule terminale a émis un rameau; *f*, coupe transversale d'un filament ramifié. (Echelle de *a*, *b*, *c*, *f*: $^{30}/_{1}$; de *d*, *e*: environ $^{10}/_{1}$).

etc.), qui forme dans la jeune cellule une couche pariétale uniforme, se divise en portions globuleuses plus ou moins grandes (fig. 3, *a*), très riches en amidon. Ces globules sont d'abord dépourvus de membrane, mais à mesure qu'ils grandissent ils se revêtent d'une membrane nettement distincte (fig. 3, *b*); en général ils contiennent plusieurs noyaux. Par suite de leur accroissement en volume, ces cellules filles tendent à remplir la cavité de la cellule mère (fig. 3, *c*), elles s'y trouvent de plus en plus serrées (fig. 1 *b*, *c*), et la pression qu'elles exercent les unes contre les autres leur donne des formes polyédriques. Peu à peu il s'établit des soudures entre les membranes partout où il y a contact entre les cellules filles ou entre ces dernières et la cellule mère. Cependant, en mettant dans de la glycérine une cellule nouvellement divisée, on y voit les cellules filles se séparer de la paroi de la cellule mère, leur membrane s'étant resserrée (fig. 4, *b*).

Cette formation des cellules présente de grandes analogies avec celle des cellules périphériques (*Randzellen*) des *Valonia*. D'après Famintzin (6) la naissance de ces cellules superficielles dans *Valonia utricularis* est précédée d'une accumulation d'amidon dans les parties du protoplasme pariétal où vont se former les cellules. Famintzin écrit ceci (p. 342):

„Wenn man eine in diesem Entwickelungsstadium sich befindende *Valonia* unversehrt unter dem Mikroskop betrachtet, so sieht man an den Stärkemehl führenden Stellen dunkele scharf umschriebene Anhäufungen von Chlorophyll führendem Plasma durchschimmern, welche in der Protoplasmaschicht sitzen, plattgedrückt sind und der Zellenwand anliegen. Von der Fläche gesehen, haben sie gewöhnlich eine kreisförmige Gestalt. Sie sind von dem übrigen Zelleninhalte noch durch keine Membran getrennt und ausser der dunkleren Färbung in Nichts von dem letztern verschieden. .... Erst später wird jede dieser Anhäufungen durch eine eigene Membran abgegrenzt, welche sich mit ihrer ganzen

Aussenfläche der Membran der Mutterzelle anlegt und mit derselben in eins verschmilzt."

Il y a donc beaucoup d'analogie entre les deux cas, autant que j'en puis juger d'après les matériaux dont je dispose; notons toutefois que les cellules périphériques de *Valonia* sont limitées au protoplasme pariétal dès le début de leur développement, tandis que les cellules filles de *Siphonocladus tropicus* occupent toute la partie intérieure de la cellule mère, au moins à une époque avancée de leur développement; il n'y a alors que la partie basilaire à étranglements annulaires qui en soit dépourvue. Une autre différence mérite d'être notée; dans *S. tropicus* la substance protoplasmique de la cellule est entièrement absorbée par les cellules filles, ou peu s'en faut; dans *Valonia* au contraire les cellules en voie de formation n'absorbent que quelques portions peu étendues de la couche pariétale, le reste demeure intact.

D'autre part, la multipartition des cellules de *Siphonocladus tropicus* rappelle beaucoup celle qui se produit dans *Dictyosphæria* où toute la masse cellulaire se divise en un grand nombre de cellules filles (comparer les descriptions de MM. Askenasy (2) et Wille (19, p. 145)).

Enfin on peut comparer la formation des cellules de *S. tropicus* à la formation de kystes dans les sporanges telle qu'elle s'opère par exemple chez les Dasycladiacées. On sait que M. Oltmanns désigne sous le nom de kystes les cellules ordinairement sphériques qui naissent dans les gametanges, en nombres plus ou moins grands, par suite de contractions auxquelles participe le contenu cellulaire tout entier (protoplasme, chloroleucites, noyaux etc.). Une fois la division achevée, les jeunes cellules se couvrent d'une membrane. Considérée à ce point de vue, la cellule mère dans *S. tropicus* devient analogue à un sporange où naîtrait une multitude de spores asexuées pour germer ensuite dans le sporange même.

De cette curieuse multipartition des cellules résulte un

cloisonnement très irrégulier, les cellules filles ayant des dimensions et des formes extrêmement variées. Tantôt elles sont séparées par des cloisons horizontales, lorsqu'elles occupent chacune la largeur entière de la cellule primitive (fig. 1, *b*, *c*); tantôt les cloisons suivent des directions très diverses et offrent souvent des sinuosités irrégulières; cela arrive surtout quand deux ou plusieurs cellules, de volumes différents, se trouvent placées au même niveau à peu près et se partagent par conséquent la largeur de la cellule mère. La disposition irrégulière des cloisons s'accorde très bien avec ce que dit Schmitz (15, p. 169—170) en parlant de *S. pusillus*; quant à leur origine, l'explication que nous en donnons diffère du tout au tout de celle que propose Schmitz pour le *S. pusillus*. Schmitz dit:

„Hat diese bisher ungegliederte Stammzelle dann etwa die Länge von 2—3 Cm. erlangt, so zertheilt sie sich plötzlich durch eine grössere oder geringere Anzahl von Querwänden in eine Reihe von Gliederzellen, deren Endzelle stets die übrigen Gliederzellen an Länge übertrifft."

Schmitz a d'ailleurs observé lui-même le mode de formation cellulaire que je viens de décrire; il l'a noté comme plus ou moins fréquent dans tous les genres de Siphonocladiacées en ajoutant qu'il l'a également observé dans d'autres espèces de Siphonées; dans un ouvrage plus récent (16) Schmitz a publié une communication encore plus détaillée (voir l. c. p. 33) que je me permettrai de citer ici:

„Das Plasma der Siphonocladiaceen-Zelle ist fast bei allen Arten sehr lebenszäh. Bei Verletzungen einzelner Zellen geschieht es vielfach, dass nur der unmittelbar getroffene Theil des Plasmas abstirbt. Die übrige Plasmamasse ballt sich dagegen zu einer oder mehreren grösseren oder kleineren Kugeln zusammen, die sehr schnell unter Ausscheidung einer Membran zu besonderen Zellen sich gestalten. Diese kugeligen Zellen zeigen durchweg genau den Bau der Mutter-

zelle, nur sind die Chlorophyllkörper hier zunächst infolge der Contraktion des ganzen Plasmas sehr dicht zusammengedrängt und vielfach übereinandergeschoben. — In manchen Fällen ballt sich die gesammte unverletzte Plasmamasse der Mutterzelle zu einer einzigen derartigen Kugel zusammen oder theilt sich doch nur in wenige grössere Kugeln. In anderen Fällen dagegen (z. B. häufig bei *Valonia* und bei *Siphonocladus Wilbergi*) zerfällt die gesammte Plasmamasse in sehr zahlreiche Kugeln verschiedenster Grösse. Alle diese Kugeln aber erhalten dabei je nach ihrer Grösse eine entsprechende Anzahl von den Zellkernen der Mutterzelle. Die grösseren Kugeln besitzen stets eine grössere Anzahl von Zellkernen, in den kleineren wird die Zahl der Kerne eine geringere, die kleinsten endlich enthalten je einen einzelnen Zellkern. Niemals aber habe ich den Fall beobachtet, dass eine solche Kugel, die sich unter Membranausscheidung zu einer besonderen selbständigen Zelle ausbildete, ganz ohne Zellkern gewesen wäre. Solche Stücke des Plasmas der Mutterzelle, welche bei jenem Zerfallen des ganzen Zellplasmas in einzelne Abschnitte keinen Zellkern enthalten, gehen vielmehr stetz zu Grunde, ohne sich zu selbständigen neuen Zellen auszubilden."

Que le mode de division cellulaire dont il s'agit ici soit provoqué dans *S. tropicus* par des lésions résultant du contact des objets extérieurs, j'ai de la peine à le croire. Un examen très approfondi ne m'a fait découvrir, dans les matériaux que j'ai étudiés, aucun signe qui pût s'interpréter dans ce sens; les cellules mères et les cellules filles paraissent toujours être demeurées intactes et représenter par conséquent un état absolument normal. Il est vrai que les exemplaires examinés par moi ont tous été recueillis sur la plage; ils avaient donc été jetés dans un milieu qui ne leur était pas normal, mais à en juger par leur aspect ils n'y étaient pas restés longtemps. Notons ensuite qu'on rencontre souvent des

exemplaires qui présentent dans une seule et même cellule mère quelques parties où le processus de division a atteint le terme définitif de son développement et d'autres où les globules sont encore à l'état naissant (voir la fig. 3; *b* et *c* représentent deux portions de la même cellule mère). Je ne pense donc pas que les observations de Schmitz puissent être étendues à *S. tropicus*; vu l'étroite parenté qui unit *S. tropicus* à *S. pusillus* elles me paraissent même assez incertaines en ce qui concerne cette espèce; je ferai observer encore que Schmitz lui-même est d'avis (voir le passage ci-dessus cité) que la formation par globules peut se produire dans des cellules non endommagées et qu'elle est particulièrement fréquente chez *S. pusillus*. D'après moi, le mode décrit par Schmitz s'accorde mieux avec ce qui se passe, dans des cas plus rares il est vrai, dans *S. membranaceus*, dont il sera question plus loin; toutefois je suis loin de penser que lorsque la formation cellulaire par globules a lieu dans cette plante, elle y est toujours provoquée par des causes externes.

Quant à la question de savoir si, dans *S. tropicus*, la division des cellules s'opère quelquefois par bipartition ordinaire, je n'ose en proposer une solution. Dans les matériaux recueillis par moi, je n'ai observé qu'une seule fois, dans une plante jeune, en un point un peu resserré, quelque chose qui pût être interprété comme une cloison ébauchée (fig. 1, *d*, l'endroit marqué d'un astérisque). J'incline à croire que la bipartition peut avoir lieu dans *S. pusillus*, en tous cas j'ai trouvé, dans les matériaux prêtés par M. Reinbold, un individu divisé par une seule cloison. Je m'empresse d'ajouter qu'au moment où ces matériaux se trouvaient à ma disposition, mon attention n'avait pas encore été attirée sur cette question de la division par globules; il s'agissait pour moi de déterminer la parenté qui existe entre cette espèce et *S. tropicus*; malheureusement les matériaux en question ne se prêtaient pas très bien à

cette sorte d'observations à cause de la jeunesse et du petit nombre des individus.

D'après Schmitz, *S. pusillus* aurait toujours une cellule terminale plus grande que les autres cellules (voir plus haut et l. c. pl. XII, fig. 1); il en est autrement dans *S. tropicus* où nous voyons des cellules apicales de dimensions variables, tantôt plus grandes (fig. 3, *d*), tantôt plus petites, quelquefois même tres inférieures à celles des autres cellules filles.

Ramification. Le thalle primitif à structure continue se change donc, grâce à cette division par globules, en un thalle cellulaire qui finit par se ramifier. En examinant des exemplaires où le processus de la ramification est en train de se produire, on voit naître de chaque cellule, même de la cellule apicale, des excroissances en forme de bosses (fig. 3, *d*). Ces excroissances s'agrandissent, deviennent cylindriques, puis claviformes et prennent peu à peu un aspect semblable à celui de la cellule primaire tout en restant un peu plus petites, surtout plus courtes (fig. 4). Elles présentent à leur base les mêmes étranglements annulaires que le

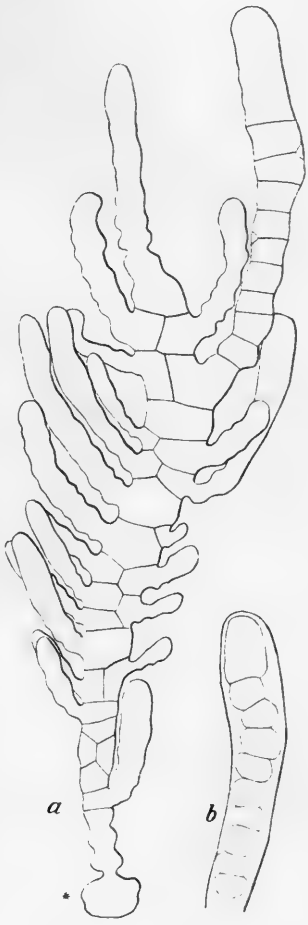

Fig. 4. *S. tropicus*; *a*, pousse latérale ramifiée avec la partie basilaire (marquée d'un *). Les rameaux sont encore unicellulaires à l'exception du second de droite à partir du sommet. Après avoir trempé dans de la glycérine les cellules de ce rameau prenait l'apparence figurée dans *b* (Echelle d'env. $^{15}/_{1}$).

thalle primitif, mais moins nombreux, et commencent, comme celui-ci, par avoir une structure continue. L'union est tellement intime entre les rameaux et leur cellule mère que non seulement ils restent toujours en communication avec elle (fig. 3, *f* et 4, *a*) mais lorsqu'un rameau est arraché il emporte presque toujours la cellule d'où il est né (fig. 1, *b*, *c*, *d* et fig. 4, *a*). Les rameaux sont émis au centre de la face extérieure de la cellule, et si celle-ci est petite, il arrive qu'elle se trouve entièrement occupée par la surface d'insertion du rameau. Dans quelques cellules exceptionnellement allongées le rameau est inséré en haut sur le côté extérieur.

Schmitz décrit comme il suit le développement du processus dans *S. pusillus* (15, p. 169—170):

„Nach dieser Gliederung des ganzen Schlauches in eine einfache oder (infolge abwechselnd rechts und links geneigter Scheidewände) dobbelte Reihe von Gliederzellen streckt sich die Endzelle der ganzen Reihe einfach in die Länge; sämmtliche Gliederzellen, aber mit Ausnahme der untersten, bilden seitliche Ausbuchtungen, die nach und nach zu Seitenästen heranwachsen."

La description que donne Schmitz du mode de croissance de la cellule apicale chez *S. pusillus* diffère de ce que j'ai observé dans *S. tropicus*; ici la cellule apicale se comporte comme les autres cellules; le rameau émis par elle, si toutefois elle en émet, présente toujours des étranglements annulaires à sa base (fig. 3, *e* et fig. 4, *a*).

Les cellules à rameau, nous venons de le dire, ont d'abord une structure continue, mais on y voit bientôt se produire un développement analogue à celui qui a été décrit plus haut: la masse cellulaire se contracte pour former des globules plus ou moins grands qui finissent par remplir la cavité, et les cellules ainsi produites développent à leur tour de nouveaux rameaux latéraux. Le même processus se répétant plusieurs

fois de suite il en résulte des touffes plus ou moins abondamment ramifiées.

Ici se pose la question de savoir si les cellules en voie de ramification perforent la membrane de la cellule mère ou bien si cette membrane grandit avec les cellules qui s'y trouvent renfermées. Nägeli nous apprend (12, p. 157) que dans *Valonia utricularis*, où la formation et le développement ultérieur des cellules périphériques offrent tant d'analogies avec

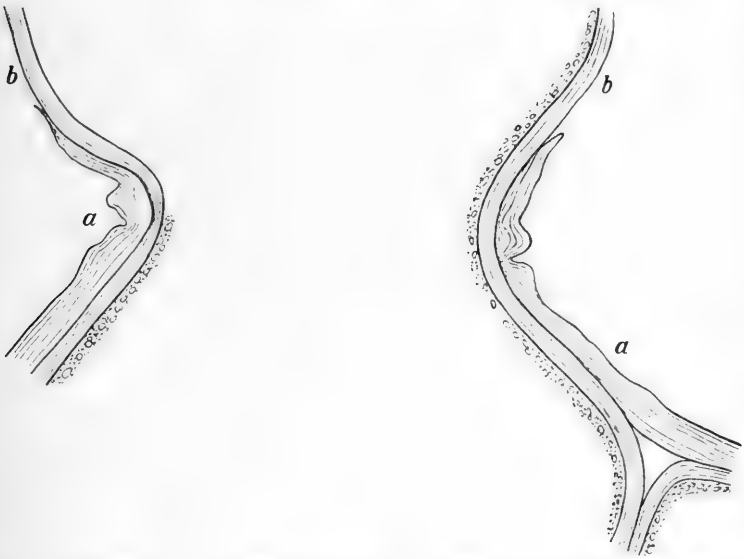

Fig. 5. *S. tropicus*; coupe longitudinale de la base d'un rameau; *a*, membrane de la branche primaire; *b*, paroi du rameau. (Echelle de $^{200}/_{1}$).

ce qui se passe dans *S. tropicus*, la cellule à rameau en voie de croissance perce la membrane de la cellule mère: Famintzin dit au contraire (6, p. 342):

„Die Membran der Mutterzelle wird beim Wachsen der Tochterzelle nicht durchbrochen, wie es Nägeli angiebt, sondern überzieht stets die Tochterzelle und wächst durch Intussusception fort auf die gleiche Weise wie bei *Cladophora* und anderen Algen."

Pour résoudre cette question il aurait fallu avoir à sa disposition des coupes transversales minces du thalle, mais des coupes de cette sorte étaient difficiles à obtenir à cause de la consistance trop molle des matériaux. Après des essais réitérés j'ai toutefois réussi à en obtenir une coupe passable qui est représentée à la fig. 5. Elle montre à n'en pouvoir presque pas douter que la cellule à rameau perce la membrane de la cellule mère; on y voit la membrane perforée et pliée.

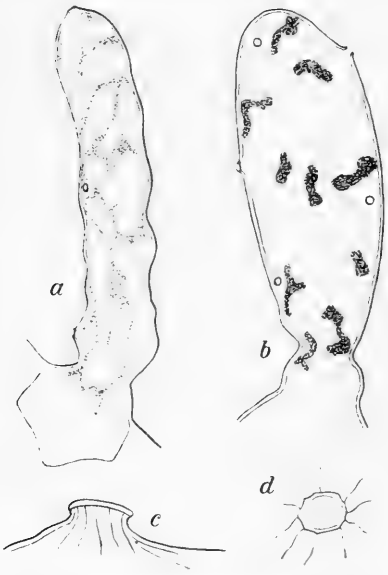

Fig. 6. *Siphonocladus tropicus*; *a*, sporange jeune; *b*, sporange plus âgé; *d*, partie perforée de la membrane du sporange, vue d'en haut; *c*, la même partie vue de profil. (Echelle de *a*, *b*: $^{30}/_{1}$, de *c*, *d*: $^{200}/_{1}$).

Reproduction. Quant à la reproduction des *Siphonocladus*, nos connaissances se réduisaient jusqu'ici à ce qui a été observé par Schmitz dans *S. pusillus*, à savoir que:

„Sämmtliche Zellen der ganzen Pflanze, mit Ausnahme der unteren Zellen der Stammbasis, entwickeln dann aus ihrem Inhalte zahlreiche Zoosporen."

Dans *S. tropicus* j'ai constaté également la formation de zoospores. Cette formation a lieu dans les plus récentes des cellules à rameau où la division n'a pas encore commencé à se produire. Mais contrairement à ce qui se passe dans *S. pusillus*, si j'ai bien compris la description très sommaire de Schmitz, la reproduction s'opère dans *S. tropicus* non pas simultanément dans toutes les jeunes cellules à rameau mais suivant un certain ordre de succession. On trouve sur une même

branche des cellules purement végétatives, d'autres où les zoospores ont commencé à se former et d'autres encore qui sont des sporanges vidés. Le premier stade de la formation des zoospores est représenté par la contraction de la masse cellulaire (noyaux, chloroleucites, protoplasme, etc.) en cordons épais (fig. 6, *a*), la chose se passe absolument comme dans *Valonia* (cf. Famintzin, 6, pl. X, fig. 11, 12, 13) et dans *Bryopsis* (cf. Oltmanns 13, p. 305, fig. 190). Les cordons finissent par se réunir en masses plus ou moins grandes, de forme irrégulière (fig. 6, *b*), qui se développent probablement en un nombre considérable de zoospores; le mauvais état des matériaux observés ne m'a pas permis d'en déterminer la forme. Le zoosporange se compose d'une cellule et du rameau qui en est issu; sa membrane est perforée de petits trous ronds (fig. 3, *f* et fig. 6, *a*, *b*) bordés d'anneaux un peu épaissis qui se montrent en relief sur la surface et d'où rayonnent des stries cuticulaires (fig. 6, *c*, *d*).

Structure des cellules. Les membranes sont épaisses et lamelleuses (fig. 2 et fig. 5). La couche externe est homogène, de consistance ferme. Elle se colore en rouge foncé par le rouge de ruthénium, tandis qu'elle reste à peu près incolore après traitement par le chloro-iodure de zinc. Les lamelles internes se colorent en rouge moins vif par le rouge de ruthénium; traitées par le chloro-iodure de zinc, elles se gonflent assez et offrent quelquefois une faible réaction de cellulose. Par l'acide chlorhydrique la couche lamelleuse se gonfle beaucoup et la lamellation devient très distincte; la couche externe demeure intacte. Ceci semble indiquer que la couche externe se compose de substances pectiques, tandis que les lamelles internes sont constituées par de la cellulose faiblement pectinisée. La surface extérieure de la membrane présente des stries bien visibles.

Contre la surface intérieure de la membrane est appliquée une mince couche de protoplasme (fig. 5) renfermant des

chloroleucites et des noyaux. L'espace intérieur à la couche protoplasmique est rempli d'un suc limpide qui contient souvent des cristaux composés de prismes ou bien de systèmes combinés de prismes et de pyramides. Ces cristaux, solubles dans l'acide chlorhydrique sans dégagement de gaz, insolubles dans l'acide acétique, sont probablement constitués par un oxalate de chaux. Dans *S. pusillus*, Schmitz n'a pas trouvé de cristaux (16, p. 8), tandis qu'il en a constaté la présence dans *S. psyttaliensis* (16, p. 4).

Les chloroleucites contenus dans le protoplasme sont discoïdes, irrégulièrement polyédriques, de grandeur variable et reliés entre eux par des fils minces (fig. 7, *a*). Dans la cellule jeune,

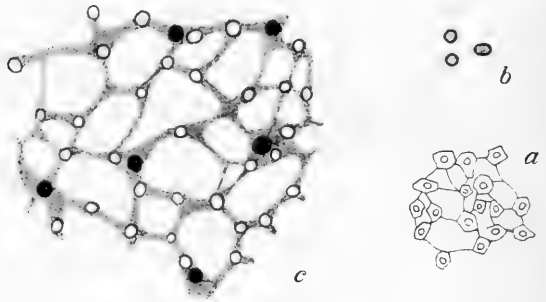

Fig. 7. *Siphonocladus tropicus; a,* chloroleucites contenant des pyrénoïdes; *b,* pyrénoïdes; *c,* chloroleucites avec pyrénoïdes; les corps de couleur foncée sont les noyaux. (Echelle de *a*: $^{200}/_{1}$, de *b* $^{250}/_{1}$, de *c* $^{300}/_{1}$).

à croissance rapide, les chloroleucites forment un réseau régulier; dans la cellule plus âgée les mailles du réseau s'élargissent, et son aspect devient de plus en plus irrégulier (Fig. 7, *c*). La plupart des chloroleucites renferment chacun un pyrénoïde arrondi ou ovale, à bord épaissi (fig. 7, *b*). Les pyrénoïdes sont plus ou moins riches en amidon; il sont très amylacés dans les cellules où la division commence à se produire; dans les cellules jeunes à croissance très intense eur teneur en amidon est relativement faible.

Les noyaux sont très nombreux dans la couche pariétale

Ce fait avait déjà été remarqué par Schmitz (16, p. 24); il avait eu recours, pour faire paraître les noyaux, à la coloration par l'hématoxyline et, dans les cas de surcoloration, au lavage par une solution d'alun. Je me suis servi de ce procédé grâce auquel les noyaux deviennent très visibles (fig. 7, c). Ils sont de forme à peu près sphérique; leur diamètre est un peu supérieur à celui des pyrénoïdes; il atteint 4 μ environ. Je n'ai pas trouvé de noyaux en dehors de la couche pariétale; sur ce point mes observations concordent parfaitement avec celles de Schmitz dans *S. pusillus* et *S. psyttaliensis*; elles ne s'accordent pas avec la description donnée par M. Svedelius de l'espèce observée par lui, où les noyaux se rencontrent aussi dans les fils protoplasmiques qui s'entrecroisent dans la cavité cellulaire. Pour ce qui est de la distribution des noyaux, je les ai trouvés à peu près également répartis sans pouvoir reconnaître, pas plus que M. Svedelius, cette régularité accusée dans leurs rapports avec les chloroleucites, dont parle Schmitz.

En vue des comparaisons à établir j'ai examiné une autre espèce habitant les côtes des Antilles danoises et dont je crois avoir établi l'identité avec *S. membranaceus* (Ag.) Born. Elle est proche parente de cette autre espèce que Schmitz avait rapportée au genre *Siphonocladus* sous le nom de *S. psyttaliensis*. *S. membranaceus* est très commun sur les côtes en question; il y vit fixé sur les roches et les bancs de coraux des eaux peu profondes; souvent on le trouve aussi façonné en boules ægagropiliformes dont le diamètre peut dépasser 6 cm.

Le thalle filamenteux constitue un feutre de pousses dressées dont les ramifications enchevêtrées s'accrochent les unes aux autres par des crampons espacés. Ces pousses orthotropes naissent de filaments horizontaux munis de crampons descendants qui servent à la fixation de la plante (fig. 8); le tout forme une espèce de coussinet dont le diamètre atteint

quelquefois 4 cm. L'épaisseur des filaments est de 180 μ environ.

Pour s'expliquer le développement d'un „coussinet“ il faut probablement prendre pour point de départ une plante isolée dont le thalle plus ou moins rameux adhère au substratum par un seul crampon. A mesure que la plante grandit,

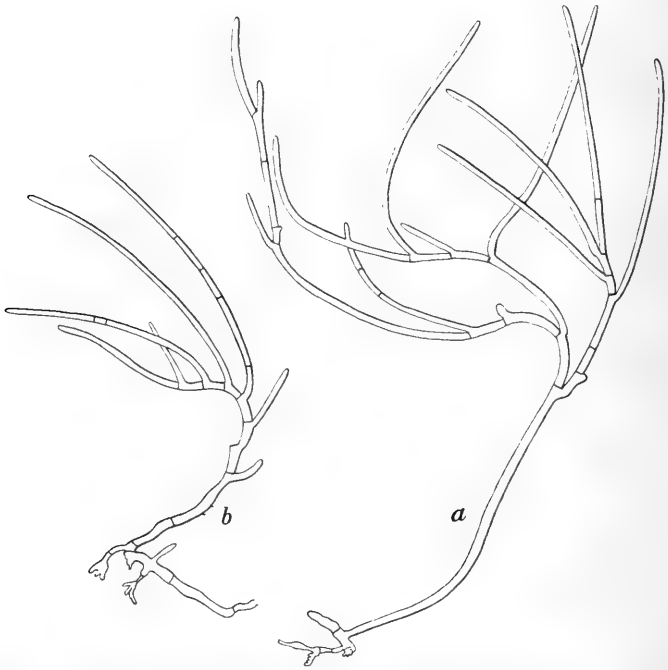

Fig. 8. *Cladophoropsis membranacea*; deux individus ayant fait partie d'une touffe (Echelle d'env. $^5/_1$.)

les branches latérales, celles surtout qui ont une direction à peu près horizontale, émettent des crampons et se fixent à leur tour (fig. 9). Les branches ainsi fixées se détachent souvent de la plante mère par suite de la mort d'une cellule du thalle; elles continueront alors leur développement sous la forme de plantes indépendantes. Probablement il arrive aussi, assez souvent, que les filaments se dissocient en frag-

ments de longueur variée (voir la fig. 10). M. Svedelius a mentionné ce phénomène qui était, d'après lui, assez fréquent dans *S. brachyartrus*. En somme, le développement du thalle de *S. membranaceus* rappelle beaucoup celui des Ægagropiles tel qu'il a été décrit par M. Kjellman (8).

Considérons d'abord les pousses dressées (fig. 8 et 9). Il est impossible de méconnaître les très grandes ressemblances qu'elles présentent avec celles des espèces décrites par MM. Kjellman (7) et Svedelius (18). Souvent la pousse reste simple dans sa partie inférieure; elle ne commence à se ramifier que vers la moitié de sa hauteur. Les rameaux de premier ordre sont alternes; les suivants sont ordinairement unilatéraux. La longueur des cellules est très variable, elle peut atteindre la moitié de celle du filament. Autant que j'en puis juger d'après mes observations, les rameaux naissent immédiatement au-dessous des cloisons; M. Kjellman a constaté que la même chose a lieu dans *S. fasciculatus*.

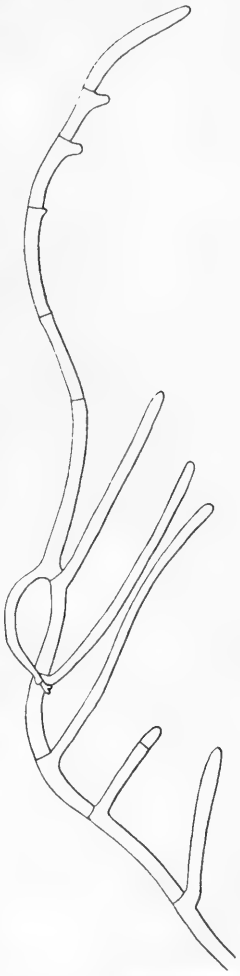

Fig. 9. *Cl. membranacea*. (Echelle d'env. $^{8}/_{1}$.)

La croissance est nettement terminale; les cellules apicales sont généralement très longues; même dans les toutes dernières ramifications, à croissance moins vive, la cellule terminale atteint probablement toujours une longueur plusieurs fois supérieure à sa largeur (fig. 9). Peu à peu elle se divise par bipartitions successives en plusieurs

cellules plus ou moins longues qui émettent, en haut sur leur face extérieure, tout contre la cloison supérieure, un rameau latéral. Par son système de ramification et, d'une manière générale, par son mode de croissance, cette plante se rapproche des Cladophores (et notamment des Ægagropiles); ce qui l'en distingue c'est la communication[1] où sont ses rameaux avec la cellule mère.

Fig. 10. *Cl. membranacea*; fragment d'un filament émettant, en haut: des pousses latérales, en bas: des crampons. (Echelle: $^{10}/_{1}$.)

F. Schmitz a donné une description, assez différente, de la ramification chez *S. psyttaliensis*, espèce probablement très voisine de *S. membranaceus*, comme il a été dit plus haut. Après avoir insisté sur les ressemblances qui rattachent cette Algue aux Ægagropiles, Schmitz écrit (15, p. 171—172):

„Bei genauerer Untersuchung stellt sich heraus, dass das Wachsthum dieser Alge ein ganz analoges ist wie bei der vorhergenannten Species [*S. pusillus*]. Der dünne cylindrische Stamm wächst in die Länge und zerfällt darauf durch die Querwände in eine wechselnde Anzahl von Gliederzellen. Die Endzelle, stets grösser, als alle übrigen Zellen, wächst darauf in derselben Weise wie bisher an ihrer Spitze weiter fort, um nach einiger Zeit abermals in eine Reihe von Gliederzellen sich zu theilen. Jene Gliederzellen aber bilden sämmtlich an ihrem oberen Ende Seitenäste, die nun ganz ebenso wie jene Endzelle selbst sich weiterhin entwickeln: sie strecken sich zu beträchtlicher Länge und theilen sich alsdann ebenfalls in eine Reihe von Gliederzellen."

[1] Dans certaines espèces de Cladophores, par exemple dans *Cl. profunda* Brand (Hedwigia 1895, p. 223), la cloison basilaire du rameau est presque toujours placée à quelque distance de la surface d'insertion.

Je ne trouve pas que le mode de croissance de *S. membranaceus*, qui est très probablement à peu près celui de *S. psyttaliensis*, puisse être regardé comme tout à fait analogue à celui qui caractérise *S. tropicus* et, selon toute probabilité, *S. pusillus*; l'une des différences qui les séparent est assez importante: dans les deux premières espèces, les rameaux ont une croissance terminale et se divisent peu à peu en un nombre plus ou moins grand de cellules, tandis que chez *S. tropicus* les rameaux cessent de croître après avoir atteint une certaine longueur et se divisent ensuite en un nombre considérable de cellules.

Les branches latérales ont le même mode de croissance que l'axe primaire; tantôt elles ont le port plus ou moins dressé, tantôt elles s'enchevêtrent dans les ramifications des pousses voisines. Les filaments portent deux espèces de crampons. Les uns sont très courts, parfois unicellulaires, quelquefois même en communication avec la cellule mère. Ils se terminent en un disque étendu, à bords coralloïdes ou ramifiés en dichotomie. Cette espèce de crampons ressemble beaucoup à celles qui sont caractéristiques des *Struvea* et des *Microdictyon*. En s'accrochant aux filaments voisins ils tiennent réunis les individus dont se compose chaque coussinet (*cœnobium*, cf. Kjellman 8, p. 15).

Les crampons appartenant à la seconde catégorie atteignent des longueurs plus considérables; ils se dirigent vers le bas et servent à la fixation de la plante (fig. 9). Ces derniers crampons naissent de préférence dans les parties inférieures des systèmes ramifiés; ils sont surtout fréquents sur les pousses à direction presque horizontale, grâce à eux le coussinet peut se dissocier en individus libres (voir plus haut). Les crampons fixateurs présentent des ramifications abondantes et irrégulières, ils contiennent un nombre considérable de cellules relativement courtes (fig. 11, *a*) qui sont d'ordinaire très amylacées, à l'exception toutefois de celles qui adhèrent immédiatement

au substratum. Comme c'est d'ailleurs le cas pour la plupart des parties constitutives de cette Algue, les cellules des crampons fixateurs ont une remarquable puissance de multiplication; détachées de la plante mère, elles ne tardent pas à

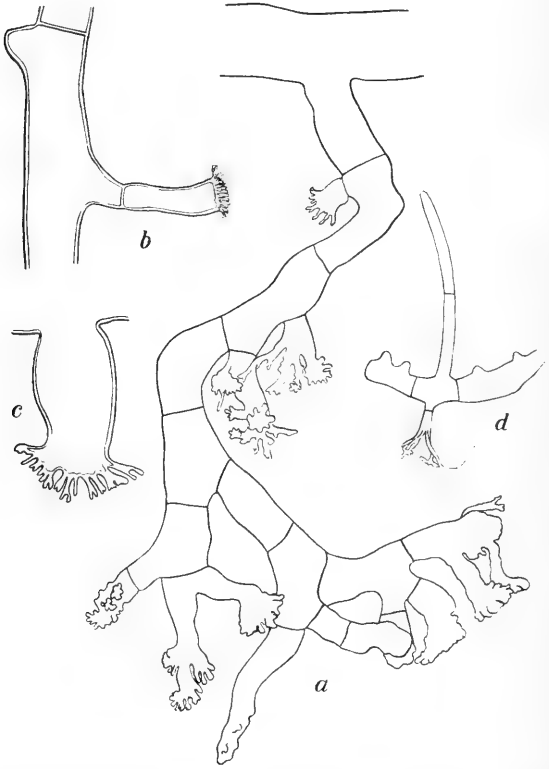

Fig. 11. *Cl. membranacea*; *a*, *b*, *c*, crampons; *d*, fragment d'un filament horizontal d'où partent une pousse dressée et un crampon. (Echelle de *a*: $^{20}/_{1}$, de *b*, *c*: $^{30}/_{1}$, de *d*: $^{15}/_{1}$.)

émettre des pousses dressées, et ce phénomène se produira même si la partie détachée ne se compose que d'un très petit nombre de cellules (fig. 11, *d*); une seule suffit pour les faire naître.

A côté du mode de ramification dont nous venons de parler, on rencontre quelquefois dans les cellules plus âgées, ayant atteint le terme de leur développement, une ramification qui résulte du développement de plusieurs pousses adventives disposées d'une façon très irrrégulière. Ces pousses doivent leur origine à une formation de globules très analogue à celle que nous avons rencontrée dans *S. tropicus* où elle

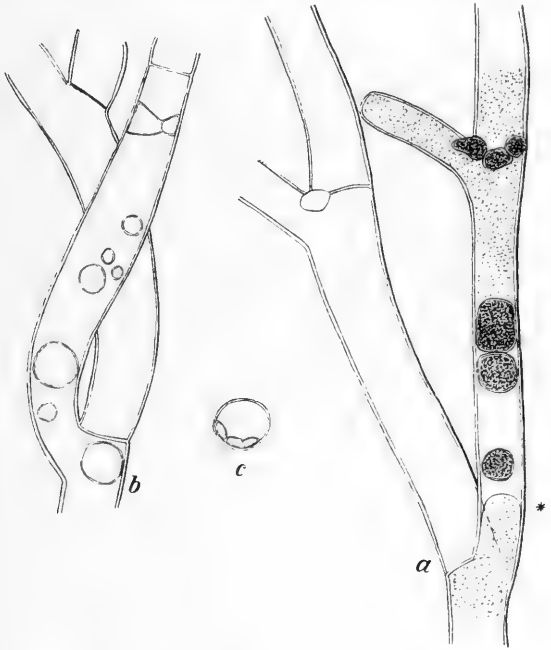

Fig. 12. *Cl. membranacea*; *a*, *b* portions de filaments renfermant des globules en voie de formation; à l'endroit indiqué par un astérisque, le contenu de la partie inférieure de la cellule à pris une forme voûtée; *c*, coupe transversale d'un filament où se voient trois petites cellules (Echelle d'env. $^{30}/_{1}$.)

était le mode de multiplication caractéristique, probablement unique, des cellules. Dans *S. membranaceus*, au contraire, ce phénomène est de moindre importance, se produit moins souvent; il y a des cas où il semble dû à quelque blessure conformément à l'opinion émise par Schmitz au sujet de

S. pusillus (voir plus haut p. 266). La formation des globules s'opère exactement comme chez *S. tropicus*: le protoplasme avec les chloroleucites et les noyaux qu'il contient se contracte en globules plus ou moins grands qui revêtent bientôt une membrane. Ces contractions du protoplasme ont lieu tantôt dans toutes les parties de la cellule, tantôt dans des portions limitées, centrales ou périphériques indistinctement (fig. 12). Les globules ainsi formées ont des volumes très variables; il y en a dont le diamètre égale à peu près celui de la cellule. Lorsqu'ils sont petits, ils se trouvent ordinairement placés contre la membrane de la cellule mère; sur une coupe transversale de la cellule, leurs sections présenteront alors des profils comprimés (fig. 12, *c*). Par leur forme et par leur développement, ces cellules globuleuses rappellent beaucoup les cellules périphériques des *Valonia* (cf. F. Schmitz, 16, pl. 12, fig. 2). Elles peuvent donner naissance à des rameaux latéraux mais très souvent elles attendent pour cela que l'occasion se présente; si cela arrive, si, par exemple, un morceau est arraché à la plante, les cellules globuleuses qu'elle contient émettent des rameaux; elles remplissent dans ce cas la fonction de bourgeons latents.

Structure des cellules. La membrane est assez mince; elle consiste en une couche externe, qui se colore en rouge vif après traitement par le rouge de ruthénium, et plusieurs lames internes, dont la coloration est beaucoup moins vive après le même traitement. Le chloro-iodure de zinc jaunit la couche externe, et provoque dans les lames les plus intérieures une faible réaction de cellulose. Par les acides forts tels que l'acide chlorhydrique les lames internes se gonflent beaucoup tandis que la couche externe n'est pas influencée. Il faut donc croire que cette couche est constituée par une substance pectique et que les lames internes sont composées de cellulose faiblement pectinisée. La face extérieure de la membrane présente des stries bien visibles.

Le protoplasme forme une couche pariétale autour de la cavité relativement grande qui est occupée par le suc. Dans ce liquide on trouve quelquefois des cristaux de forme allongée (fig. 13, *b*), souvent même très allongée, composés de prismes qui sont souvent pyramidés. Conformément à ce qui a lieu dans *S. tropicus*, ces cristaux se dissolvent dans l'acide chlorhydrique sans dégagement d'acide carbonique, tandis qu'ils sont insolubles dans l'acide acétique; ils sont donc probablement constitués par un oxalate de chaux, ce qui s'accorde aussi très bien avec ce qui a été constaté par M. Svedelius dans *S. brachyartrus*.

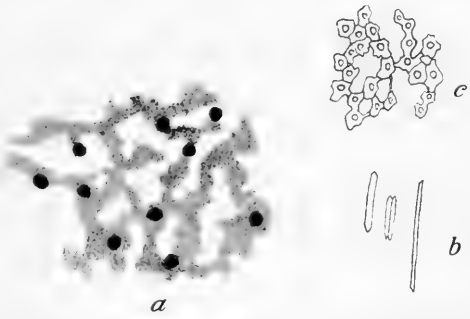

Fig. 13. *Cl. membranacea*; *a*, chloroleucites et noyaux; *b*, cristaux: *c*, chloroleucites avec pyrénoïdes. (Echelle de *a*: $^{250}/_{11}$; de *c*: $^{250}/_{1}$; de *b*: $^{100}/_{1}$.)

Les chloroleucites contenus dans la couche protoplasmique sont assez nombreux pour former, dans la cellule jeune, à croissance active, un tissu réticulé à mailles très serrées; dans la cellule plus âgée les mailles sont plus lâches. Les chloroleucites ont des formes discoïdes, arrondies ou polygonales; ils s'accrochent aux chloroleucites voisins par de petites parties saillantes (fig. 13, *c*); chaque chloroleucite renferme un pyrénoïde réfringent assez volumineux.

Les noyaux, renfermés en quantités considérables dans le protoplasme, sont petits; ils deviennent visibles après traitement par l'hématoxyline (fig. 13, *a*). Je n'ai pas trouvé de noyaux en dehors de la couche pariétale; sur ce point *S. membranaceus* diffère donc de *S. brachyartrus* où M. Svedelius a constaté la présence de noyaux dans les fils protoplasmiques qui forment un lacis à l'intérieur de la cellule; en revanche il y a, à cet égard, concordance entre *S. membra-*

naceus et *S. psyttaliensis*, qui se ressemblent également par l'équidistance des noyaux, moins prononcée, il est vrai, dans *S. membranaceus* que dans l'espèce étudiée par Schmitz. D'après moi, la disposition des noyaux à l'ègard des chloroleucites est aussi moins régulière dans *S. membranaceus* qu'elle ne l'est dans *S. psyttaliensis* observé par F. Schmitz qui dit (l. c., p. 7):

„Jedem Zellkerne entspricht eine Gruppe zusammengedrängter Chlorophyllkörper, von welcher mehrere Reihen von Chlorophyllkörpern ausstrahlen (fig. 7)."

Il résulte de la représentation que j'en donne (fig. 13), que les noyaux sont souvent situés aux endroits où se rencontrent les cordons formés par les chloroleucites mais qu'on en trouve aussi aux extrémités des dits cordons.

Autant que j'en puis juger d'après les diagnoses souvent assez incomplètes dont nous disposons actuellement, les espèces rapportées jusqu'ici au genre *Siphonocladus* se groupent naturellement autour des deux espèces sur lesquelles F. Schmitz a fondé le genre. Le *S. tropicus* dont j'ai parlé plus haut est évidemment proche parent du *S. pusillus*, et les autres espèces (il y en a d'ailleurs auxquelles on refusera peut-être cette qualification) semblent présenter de grandes analogies avec *S. psyttaliensis* qui est très voisin de *S. membranaceus*.

La question se pose donc de savoir s'il faut vraiment classer dans un seul et même genre ces deux groupes d'espèces. Avant d'essayer d'y répondre, nous allons résumer les diverses opinions émises jusqu'ici sur la place qu'il faut attribuer, dans le système des Algues, au genre *Siphonocladus*.

F. Schmitz, qui a créé le genre, dit (l. c., p. 171—172):

„Die Gattung *Siphonocladus*, die auf die genannten beiden Algenformen sich gründet, bildet nun ein Bindeglied zwischen mehreren Gattungen grüner Algen, die bisher im

Algensystem in sehr verschiedenartiger Weise untergebracht worden sind. Auf der einen Seite nähert sich *Siphonocladus* sehr der Gattung *Valonia*, auf der anderen Seite aber schliesst sich diese Gattung nahe an *Cladophora* mit ihren Verwandten an".

Les genres qui constituent ainsi, d'après Schmitz, un groupe naturel à part ont été désignés par lui sous le nom de *Siphonocladiaceæ*, ce sont: *Chaetomorpha*, *Cladophora*, *Microdictyon*, *Anadyomene*, *Siphonocladus*, *Valonia* etc., et Schmitz fait observer les analogies remarquables que présente, dans tous ces genres, la structure de la substance cellulaire.

J. Agardh (1) rapproche le genre *Siphonocladus* de *Valonia* du groupe des Valoniacées.

M. N. Wille (19) range le genre *Siphonocladus* dans la famille des Valoniacées tout en faisant observer les ressemblances qui le rapprochent des Cladophoracées.

Au cours de sa description du *S. fasciculatus* M. Kjellman écrit (7, p. 38):

„Le sommet abondamment ramifié présente des cloisons nombreuses disposées avec la même régularité presque que chez les *Cladophora*" [1].

Et M. Svedelius (18, p. 311):

„In mancherlei Beziehung neigt unsere Form auch den Cladophoreen zu, teils in der inneren Anordnung des Plasmas und im Zusammenhang damit der Kerne, teils in der Umwandlung der Zweige in Wurzeln (vgl. *Acrosiphonia*), während sie doch in der Bildung ihrer Sprosse und in der sozusagen secundären Wandbildung sich als *Siphonocladus* zu erkennen giebt". Et plus loin, à la même page: „Es lässt sich auch nicht läugnen, dass vor allem die hier von mir beschriebene Art zahlreiche Berührungspunkte mit den Cladophoreen zeigt".

[1] „I den rikgreniga toppen är deremot septeringen riklig och nästan lika regelbunden som hos en *Cladophora*".

Il ressort des passages ci-dessus cités qu'à l'exemple de F. Schmitz, qui a le premier rapproché le genre *Siphonocladus* des *Cladophora* aussi bien que des *Valonia*, les auteurs plus récents ont tantôt rapproché ce genre des *Valonia*, tantôt ils ont fait valoir les ressemblances qui le rattachent aux Cladophoracées; je m'explique cette double tendance par l'existence, dans le dit genre *Siphonocladus*, de deux types assez distincts dont l'un se rapproche des Valoniacées tandis que l'autre est plus voisin des Cladophoracées.

Dans l'ouvrage très important (13) dont il vient de commencer la publication, M. Oltmanns rapporte au groupe des *Siphonocladiales* les quatre familles suivantes: *Cladophoraceæ, Siphonocladiaceæ, Valoniaceæ* et *Dasycladaceæ*. Il y donne des Cladophoracées la diagnose que voici:

„Alle Zellen in den Sprossen verschiedenen Grades sind annähernd gleich. Ein Hauptstamm tritt nicht hervor. Typus *Cladophora*". Les Siphonocladiacées y sont caractérisés comme il suit: „Eine grosse Zelle bildet einen Hauptstamm, von welchem meist zahlreiche reich verzweigte Äste ausgehen. Letztere aus kleineren Zellen gleichartig zusammengesetzt. Typus: *Siphonocladus*"[1].

Cette diagnose ne me semble vraie que pour les deux espèces: *S. tropicus* et *S. pusillus*. Il est vrai que F. Schmitz écrit dans sa description de *S. psyttaliensis* (15, p. 171):

„Bei genauerer Untersuchung stellt sich heraus, dass das Wachsthum dieser Alge ein ganz analoges ist wie bei der vorher genannten Species. *Der dünne cylindrische Stamm* wächst in die Länge und zerfällt darauf durch die Querwände in eine wechselnde Anzahl von Gliederzellen";

mais je me demande s'il faut prendre cette remarque au

[1] A la page 267 (13) M. Oltmanns écrit ceci: „Junge *Struvea*-Pflanzen stellen ebenso wie *Siphonocladus* zunächst nur keulenförmige Stiele dar". D'après moi cela est vrai seulement de *S. tropicus* et de *S. pusillus*; leur ressemblance avec les *Struvea* est encore augmentée par les étranglement annulaires que porte leur thalle à sa base.

pied de la lettre. Faut-il croire que Schmitz a vraiment vu des individus jeunes de l'espèce en question? A ma connaissance toutes les espèces appartenant à ce groupe n'ont été trouvées qu'à l'état stérile; Schmitz lui-même n'a trouvé que des individus stériles de *S. psyttaliensis*; l'espèce décrite par M. Kjellman était stérile de même que celle étudiée par M. Svedelius, et les échantillons de *S. membranaceus* que j'ai pu examiner jusqu'ici étaient également stériles. M. Svedelius note expressément qu'il n'a pas trouvé un seul individu de *S. brachyartrus* à racine primaire, et je peux dire pour ma part que je n'en ai pas trouvé non plus dans *S. membranaceus*. Admettons cependant qu'il existe des individus jeunes nés de plantes fructifères — car où trouvera-t-on une racine primaire proprement dite si ce n'est dans de telles plantes primitives — est-il à supposer alors qu'ils se distinguent essentiellement des jeunes *Cladophora*?

Je ne trouve pas en comparant les deux représentations de port que je donne (fig. 8) avec *Ægagropila canescens* représenté par M. Kjellman (8, pl. 2), qu'il y ait des différences remarquables à noter dans la forme extérieure des individus. Prenons par exemple la fig. 2 de M. Kjellman. Elle représente une pousse dressée ramifiée en haut et née de filaments horizontaux comme c'est aussi le cas pour les exemplaires figurés par moi.

Il me semble résulter des faits ci-dessus que les espèces dont se compose le groupe voisin de *S. membranaceus*, présentent des affinités remarquables avec la famillle des Cladophoracées, et que par contre *S. pusillus* et *S. tropicus* se rapprochent beaucoup des autres genres (*Struvea, Chamædoris, Apjohnia*, etc.) attribués par M. Oltmanns à la famille des Siphonocladiacées, et offrent d'ailleurs de grandes analogies avec les Valoniacées. Il faudrait donc, d'après moi, séparer le premier groupe d'espèces du genre *Siphonocladus* qui ne comprendrait ainsi que les deux espèces *S. pusillus* et *S. tro-*

picus (je n'ose décider, vu l'état peu satisfaisant des diagnoses s'il faut leur rattacher quelques-unes des autres espèces jusqu'ici décrites). Quant au second groupe d'espèces, je propose d'en faire un genre à part nommé *Cladophoropsis* à cause des ressemblances considérables qui le rapprochent des Cladophoracées. Ce genre comprendrait les espèces suivantes: *S. membranaceus, fasciculatus, brachyartrus, voluticula* Hariot (cf. Journal de Botanique, I, 1887, p. 56 et Mission scientifique du Cap Horn. t. V. Botanique, p. 22.), *Zollingeri, modonensis, psyttaliensis* et peut-être quelques autres encore. Le genre *Cladophoropsis* rentrerait naturellement dans la famille des Cladophoracées. Il est très voisin des Cladophores, surtout des Ægagropiles et s'en distingue notamment par la communication des rameaux avec l'axe ou le rameau d'où ils sont nés. Le genre *Siphonocladus* au contraire, délimité comme je viens de le proposer, offre un développement très analogue à celui des *Valonia*; il faudrait le classer parmi les Valoniacées: Il est vrai qu'il se rapproche d'autre part des *Struvea*, des *Chamædoris*, etc., et c'est pourquoi M. Oltmanns range ces genres dans une famille à part, celle des Siphonocladiacées, mais est-il vraiment nécessaire de rapporter ces genres et celui des *Valonia* à des familles différentes? Je préférerais, pour ma part, les attribuer tous à la famille des Valoniacées.

Avant de terminer cette étude je vais donner une description comparative des deux genres.

Siphonocladus.

La plante primitive est constituée par une seule cellule claviforme qui cesse de croître après avoir atteint un certain développement. Son thalle unicellulaire présente, à la base,

Cladophoropsis.

Les espèces appartenant à ce genre ont des thalles filamenteux réunis en touffes ou en boules ægagropiliformes. Les touffes et les boules se composent d'un grand nombre

des étranglements annulaires; il se fixe à l'aide de crampons abondamment ramifiés.

La division des cellules s'opère par la naissance, dans la cellule mère, d'un grand nombre de cellules globuleuses qui finissent par se souder en croissant. Les rameaux poussent dans toutes les directions. Les rameaux, nés chacun du côté extérieur d'une de ces cellules secondaires originairement globuleuses, percent la paroi de la cellule primitive; ils en reproduisent exactement la forme, ayant par exemple les mêmes étranglements annulaires à leur base.

Quelquefois la cellule terminale n'émet pas de rameau, mais très souvent il en naît un tout à fait pareil à celui des autres cellules. On a trouvé des exemplaires fertiles. Chaque sporange se compose d'un rameau et d'une partie basilaire située dans le filament même qui a donné naissance au rameau.

d'individus plus ou moins ramifiés, fixés par des crampons abondamment ramifiés eux-mêmes. Pas d'étranglements annulaires. Plante primitive inconnue. Ce genre d'Algues s'accroît par le sommet, et la division des cellules se fait par bipartition ordinaire, mais le cloisonnement a un caractère fort irrégulier par suite de la longueur très variée des cellules. Le mode de ramification est le même que chez les Cladophoracées: une excroissance née de la partie supérieure de la cellule se développe en un rameau communiquant[1] avec la cellule d'où il est né.

Les parties plus âgées des individus présentent quelquefois une espèce de ramification secondaire très irrégulière qui n'a d'ailleurs pas été observée jusqu'ici en dehors de *Cl. membranacea* et qui consiste en la naissance de rameaux émis par les cellules globuleuses dont le thalle contient une quantité relativement faible.

[1] Dans quelques espèces, on trouve toutefois, dans des cas rares, une cloison basilaire située à la surface d'insertion (cf. Kjellman l. c. p. 38).

Des espèces comprises dans ce genre on n'a recueilli jusqu'ici que des échantillons stériles. En revanche la multiplication végétative est très abondante.

Après avoir écrit la présente étude j'ai reçu un ouvrage de M. Brand intitulé: Über die Anheftung der Cladophoraceen und über verschiedene polynesische Formen dieser Familie (Beihefte 2. Bot. Centralblatt. Bd. XVIII H. 2. 1905). M. Brand y donne la description de deux nouvelles espèces qu'il rapporte au genre *Boodlea*, à savoir *B. composita* et *B. kaenana*, où on trouve parfois des parties de thalle exemptes de cloisons raméales basilaires. Le cas est surtout fréquent dans *B. kaenana*. J'avais observé la même chose dans *B. Siamensis* recueilli au Siam par M. Johs. Schmidt et décrit par M. Reinbold, mais dans cette Algue le phénomène était limité aux ramifications tout à fait récentes, ce qui indique probablement qu'aux endroits en question la cloison n'avait pas encore été ébauchée. Quoi qu'il en soit, le fait en question semble indiquer qu'il doit y avoir quelque affinité entre le genre *Cladophoropsis* et le genre *Boodlea*.

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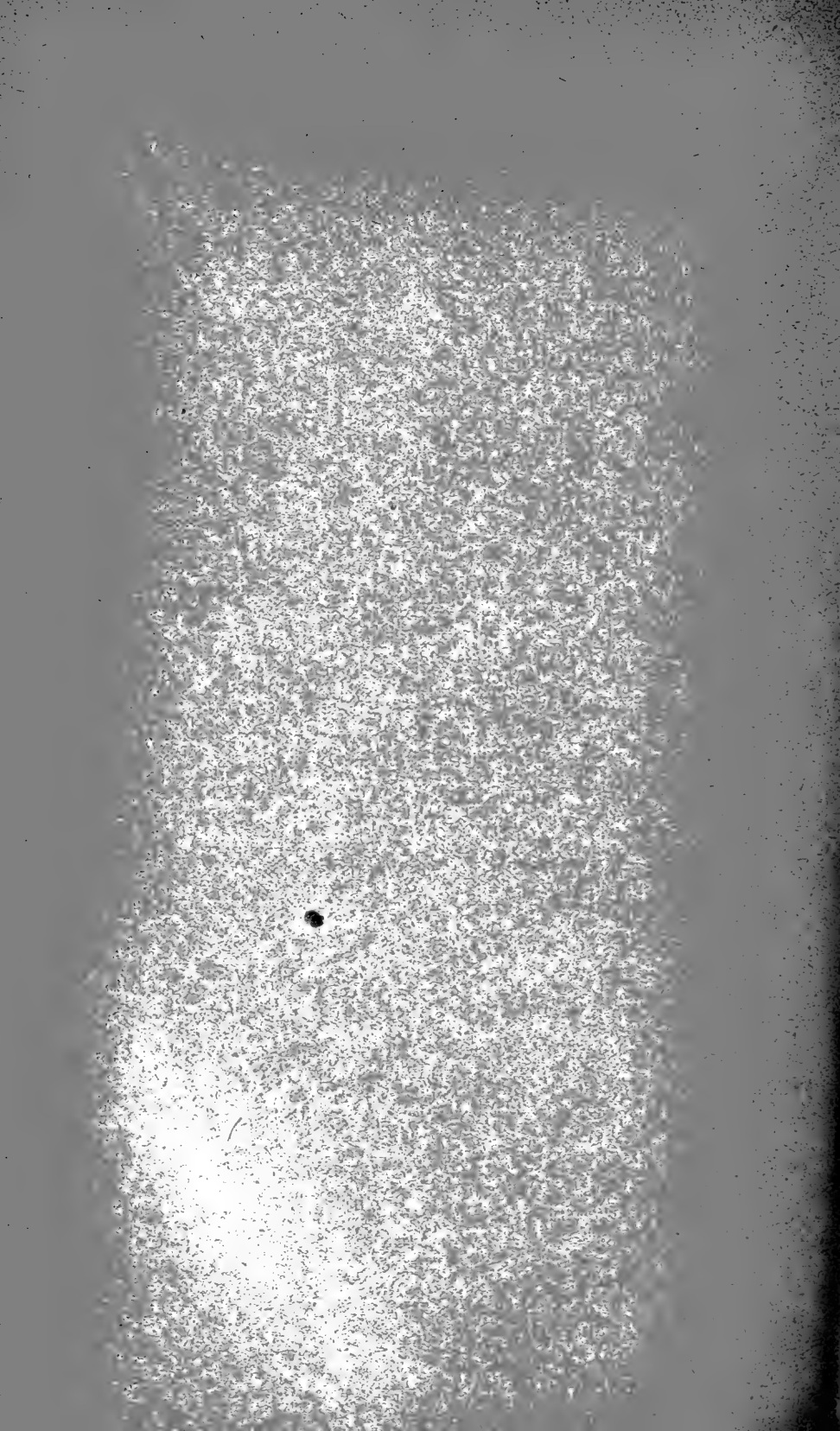

Arbejder fra den Botaniske Have i København. Nr. 24.

List

of the phanerogams and vascular cryptogams found on the coast 75°—66°20′ lat. N. of East Greenland.

By

Chr. Kruuse.

Reprinted from „MEDDELELSER OM GRØNLAND". Vol. XXX.

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1905

The basis of this list are the plants collected by N. Hartz and the author on the Danish expedition to East Greenland in 1900; the older statements from the former expeditions to these regions have also been embodied viz.: Scoresby, Sabine, Zweite deutsche Nordpolarfahrt (Copeland and Pansch), den danske Expedition 1891—92 (N. Hartz), den svenske Expedition 1899 (A. G. Nathorst and P. Dusén), den danske Baadexpedition 1898—99 (Chr. Kruuse), den danske Baadexpedition 1900 (C. G. Amdrup).

During a visit in Stockholm and Upsala 1904 the author had opportunity of going through the great collections from these regions preserved in Kgl. Vetenskaps Akademien and the University of Upsala, and as a matter of course I have gone through the great Greenland herbarium in the botanical Museum of Copenhagen.

As to the limitation of the species I have followed Joh. Lange's Conspectus Floræ Grœnlandicæ with the alterations necessitated by the works of later inquirers, especially Gelert and Ostenfeld: Flora arctica I and Gelert: Notes on arctic plants (Botanisk Tidsskrift. Bd. 21).

On the coast of East Greenland, 75°—66°20′ lat. N., there are collections from the following places:

A. Northern coast-part between 75° and 73°30′ lat. N. Shannon Ø.
B. Northern inlet-part between 73°30′ and 70°20′ lat. N.

C. The Scoresby Sund-part comprises Inlet-localities between 71°30′ and 70° lat. N.

D. The Kap Dalton-part comprises localities between 70° and 69°25′ lat. N.

E. Southern coast-part comprises localities between 69°25′ and 66°20′ lat. N.

The finder is stated in a parenthesis after the locality in the following way:

A. = C. G. Amdrup
C. & P. = Copeland and Pansch
D. = P. Dusén
H. = N. Hartz
K. = Chr. Kruuse.
A. G. N. = A. G. Nathorst.

A. "!" behind the names signifies that I have seen the specimens.

A. Northern coast-part between 75°—73°30′ lat. N.

	lat. N.
Shannon Ö	75°
Kuhn Ö	75°
Store og Lille Pendulum Öer	74° 30′
Sabine Ö	74° 30′
Hvalros Ö	74° 30′
Dronning Augusta Dal	74° 25′
Kap Borlase Warren	74° 15′
Clavering Ö	74° 10′
Hold with hope	73° 30′

B. Northern inlet-part from 73°30′—70°20′ lat. N.

	lat. N.
Kap Bennet	73° 28′
Franz Joseph Fjord	73° 30′-73°10′
Moskusoxefjord	73° 30′
Bontekoe Ö	73° 10′
Kjerulf Fjord	73° 10′
Ruth Ö	73° 5′

	lat. N.
Sophia Stræde	72° 55′
Röhs Fjord	72° 40′
Forsblad Fjord	72° 30′
Polhem Dal	72° 30′
Scott Keltic Ö	72° 48′
Kap Parry	72° 30′
Mackenzie Bugt	72°
Antarctic Havn	72°
Örsteds Dal	71° 49′
Kap Brown	71° 48′
Fleming Inlet	71° 40′
Pingels Dal	71° 38′
Kap Fletcher	71° 36′
Murrays Ö	71° 32′
Kap Greg	70° 58′

C. The Scoresby Sund-part comprises the inlet-localities between 71°30′ and 70° lat. N.

	lat. N.
Klitdalen	70° 53′-58°
Vargodden	70° 51′
The Liverpool Kyst side of Hurry Inlet	70° 50′
The Jameson Land side Nathorst Fjeld	70° 48′
Fame Öer	70° 50′
Point Constable	70° 45′
Vardeklöft	70° 36′
Kap Hope	70° 27′
Kap Stewart	70° 25′
The west side of Jameson Land	71° 16′-70°25′

D. The Kap Dalton-part comprises localities between 70° and 69°25′ lat. N.

	lat. N.
Kap Brewster	70° 9′
Dunholm	69° 55′
Turner Sund	69° 45′
Henry Land	69° 35′
Kap Dalton	69° 25′

E. Southern coast-part comprises the localities between 69°25′ and 66°20′ lat. N.

	lat. N.
Storbræ	68° 49′
Kap Vedel	68° 30′
Kap Irminger	68° 5′
Skærgaards Halvöen	68° 7′
Nordre-Aputitek	67° 48′
Söndre-Aputitek	67° 16′
Nualik	67° 16′
Kap Christiansen	67° 13′
Jagos Fjord	67° 6′
Langöen (Ikerasarmiut)	67° 4′
Kap Warming	67° 1′-2′
Lilleö	66° 58′
Kajarsak	66° 49′
Itivsalik	66° 47′
Kap Jörgensen	66° 45′
Nanertalik	66° 36′
Kap G. Holm	66° 36′
Ikersuak	66° 27′
Vahls Fjord	66° 22′

Fam. 1. Rosaceae.

1. **Dryas octopetala** L.

Lge. Consp. Fl. Grœnl. p. 2 & 234. Hartz Fanerog. p. 319 Dusén Gefässpfl. p. 12.

α. genuina.

Northern inlet-part: Fleming Inlet (K.)! Canning Ld. (H. & K.)!
Scoresby Sund: Nordvestfjord, Röde Ö, Danmarks Ö (H.)! Hurry Inlet (D.)! Liverpool Kyst (H. & K.)! Klitdalen (H. & K.)!
Kap Dalton-part: Turner Sund and Kap Dalton (K.)! Not found south of 69°25′ lat. N.

β. minor Hook.

Common between 74° and 69°, collected by all travellers.

λ. *hirsuta* Hartz.

Northern coast-part: Hold with hope (H.)!
Scoresby Sund: Jameson Land (H.)! Danmarks Ö (H.)! Nordvestfjord (H.)! Klitdalen, Hurry Inlet (H. & K.)! (stony plain.)

∂. *argentea* A. Blytt.

Northern coast-part: Sabine Ö, Bontekoe Ö, Kap Parry (D.)! Hold with hope (H.)! Jameson Land (H.)! Ispynt in Vestfjord (H.)!
Southern inlet-part: Hurry Inlet, Klitdalen (in downs) (H. & K.)!

* **integrifolia** (M. Vahl) Hartz l. c.

Northern inlet-part: Polhem Dal (H. & K)! Röhs Fjord (D.)! Franz Joseph Fjord (D.)!
Southern inlet-part: Röde Ö, Hjörnedal, Danmarks Ö (H.)!

f. *intermedia* Natth.

Only found in Scoresby Sund from Danmarks Ö, Hjörnedal (H.)!

2. **Potentilla pulchella** R. Br.

Lge. Consp. p. 4 & 234. Buchenau & Focke l. c. Hartz Fanerog. p. 320. Dusén Gefässpfl. p. 14.

f. *humilis* Lge.

Northern coast-part: Common.
Pendulum Ö (D.)! Sabine Ö (D. H. & K.)! Dr. Augusta Dal (D.)! Kap Borlase Warren (D. H. & K.)! Clavering Ö (C. & P. D.)!
Scoresby Sund: Jameson Land (H.)!
The Kap Dalton-part: Turner Sund (H. & K.)!

f. *elatior* Lge.

Jameson Land (H. & K.)! Hurry Inlet (D. H. & K.)!

3. **Potentilla maculata** Pour.

Lge. Consp. Fl. Grœnl. p. 6 & 234. Hartz Fanerog. p. 321. Dusén Gefässpfl. p. 14.

a. vulgaris Lge.

Northern coast-part: Sabine Ö (H. & K.)! Clavering Ö (A. G. N.)!
Northern inlet-part: Fleming Inlet (H. & K.)!
Southern inlet-part: Hurry Inlet (D.)! Vardekløft (H. & K.)! common in Scoresby Sund (H.)!

Kap Dalton-part: Turner Sund (H. & K.)!
Southern coast-part: common, yet not collected between 69°30′ and 67°.

f. *hirta* Lge.

Turner Sund (H. & K)! Kap Warming (K.)!

f. *debilis* Lehm.

Jameson Land (H.)!

f. *gelida* (C. A. Mey.) Hartm.

Danmarks Ö, Nordvestfjord (H.)!

4. **Potentilla emarginata** Pursh.

Lge. Consp Fl. Grœnl. p. 8 & 235. Buchenau & Focke l. c. Hartz Fanerog. p. 322. Dusén Gefässpfl. p. 14. (Pot. fragiformis v. pariflora Trautv.)

Northern coast-part: Pendulum Ö (D.)! Sabine Ö (all travellers), Hvalros Ö (D.)! Kap Borlase Warren (H. & K.)! Hold with hope (H.)!
Northern inlet-part: Scott Keltic Ö, Antarctic Havn (A. G. N.)!
Scoresby Sund: Common.
Kap Dalton-part: Kap Dalton, Turner Sund (H. & K.)!

5. **Potentilla nivea** L.

Lge. Consp. p. 8 & 235. Buchenau & Focke l. c. Hartz Fanerog. p. 322. Dusén Gefässpfl. p. 15.

Common everywhere between 74°30′ and 69°30′, collected by all travellers.

v. *subguinata* Lge.

Northern coast-part: Hold with hope (H.)!

v. *subviridis* Lehm.

Scoresby Sund: Gaaseland (H.)!

6. **Sibbaldia procumbens** L.

Lge. Consp. p. 11 & 236. Hartz Fanerog. p. 322. Dusén Gefässpfl. p. 15.

Northern inlet-part: Fleming Inlet 71°40′, Pingels Dal 71°38′ (H. & K.)!
Scoresby Sund: Rather common, Gaaseland, Nordvestfjord, Danmarks Ö, Jameson Land (H.)! Hurry Inlet (D.)! Hurry Inlet Klöften (H. & K.)!
Kap Dalton-part: Kap Dalton, Turner Sund (H. & K.)!
Southern coast-part: Common on the coast south of 69°30′, noted in all localities. Kap Irminger, Skærgaards Halvöen, N.-Aputitek (A.)!

7. **Alchimilla glomerulans** Bus.

Alchimilla vulgaris L. Hartz Fanerog. p. 322. Lge. Consp. p. 11 & 237 ex parti.

The specimens collected by Hartz in Gaaseland belong all to this form of A. vulg. that more to the southward of the east-coast is very common. In no localities visited in 1899 and 1900 this considerable species was found, and only south of 66°20′ it becomes common.

Fam. 2. Halorrhagidaceae.

8. **Hippuris vulgaris** L.

Lge. Consp. Fl. Grœnl. p. 13, Rosenv. Till. p. 658. H. vulg. *β* maritima. Hartz Fanerog. p. 323. Dusén Gefässpfl. p. 15.

Up to 40 ctm. high, strong; in ponds in the interior.

Scoresby Sund: Danmarks Ö, Röde Ö, Renodde (H.)! Hurry Inlet (A. G. N.)!

f. *maritima* (Hellen) Hartm. non Lge.

Liverpool Kyst, Ryders Dal, Ulveodde (H. & K.)! Jameson Land near Nordostbugt (H. & K.)! 15—30 ctm. high.

The present form especially remarkable by the short leaves (air-leaves smaller than 10^{mm}, water-leaves up to 5^{mm}) and whorls, small in number (up to 8 leaves), passes smoothly into the main form without distinct limits. It is found in small pools with shallow water (under 30 ctm.) that during the summer are liable to drying up.

Fam. 3. Callitrichaceae.

9. **Callitriche verna** L. *β* **minima** Hoppe.

Lge. Consp. p. 14 & 238. Hartz Fanerog. p. 323.

Scoresby Sund: In lakes and pools in Danmarks Ö and Röde Ö.

Fam. 4. Oenotheraceae.

10. **Epilobium anagallidifolium** Lam.

Hausskn. Monograph p. 152. Rosenv. Til. p. 659. Dusén Gefässpfl. p. 16. E. alpinum. Lge. Consp. p. 14 & 238.

Scoresby Sund: In the interior of Hurry Inlet (D.)! Vardeklöft in herby slopes (H. & K)! Ulveodde (H. & K.)!

Up to 10 ctm. high, grows most often socially on humid, sandy slopes round brooklets, where the coat of snow is strong, and may here be coverforming on areas of the size of one □ fathom (4 □ M.).

11. **Chamaenerium latifolium** (L.) Spach.

Lge. Consp. Fl. Grœnl. p. 16 & 239. Hartz Fanerog. p. 323. Dusén Gefässpfl. p. 16.

On steep slopes in the table-land, often snowless (H.)!

Common in North-East Greenland between 75° and 69° 25′ (Sabine, Scoresby, C. & P., H., D., H. & K.). In Scoresby Sund as far as 2200′ above the level of the sea (H.)! In the southern coast-belt only scarce. Kap Vedel (A.)! Lilleö (K.)! Vahls Fjord (K.)!

f. *stenopetala* Hausskn. Monogr. p. 191.

Scoresby Sund: Common in Danmarks Ö (H.)!
Southern coast-part: Skærgaards Halvöen (A.)!

f. *parviflora* Hartz l. c.

Only found in Röde Ö (H.)!

Fam. 5. Empetraceae.

12. **Empetrum nigrum** L.

Lge. Consp. p. 18 & 240. Buchenau & Focke l. c. Hartz Fanerog. p. 324. Dusén Gefässpfl. p. 16.

Here and there.

Northern coast-part: Kuhns Ö (C. & P.)! Sabine Ö (H. & K.)! Mackenzie Bugt (C. & P.)! Clavering Ö (D.)!

Northern inlet-part: Scott Keltic Ö (D.)! Forsblad Fjord (D. H. & K.)! Röhs Fjord (D.)! Kap Parry, Antarctic Havn (D.)!

Scoresby Sund: Here and there, but not common (H.)! Jameson Land common (H. & K.)! Hurry Inlet common (D. H. & K.)!

Kap Dalton-part: Kap Dalton, Turner Sund rather rare (H. & K.)!

It is collected in all visited localities south of 69°30′.

It is nowhere except in Jameson Land formation or cover-forming north of 69° and seeches most often shelter against the predominant winds. It is most often hermophroditic and is in several places observed with ripe fruit.

Fam. 6. Caryophyllaceae.

13. **Silene acaulis** L.

Lge. Consp. p. 19 & 241. Buchenau & Focke l. c. Hartz Fanerog. p. 324. Dusén Gefässpfl. p. 17.

Common everywhere between 75° and 66°20′, observed by all travellers and in all localities. The tufts reach a diameter of 30—40 ctm. and a height of 7—10 ctm., but the wind-ward is often eroded or dead, so that the tuft has the form of a horse-shoe.

f. *albiflora* Lge.

Not rare in humid localities in Scoresby Sund (H.)!

14. **Viscaria alpina** (L.) Don.

Lge. Consp. p. 19 & 241. Hartz Fanerog. p. 324.

In thickets and herby slopes, snowcovered in winter, up to 15 ctm. high. Common in the interior of Scoresby Sund: Dan-

marks Ö, Gaaseland, Röde Ö, Vestfjord (H.)! but else it is not observed anywhere north of 66° 20′ lat. N.

15. **Melandrium apetalum** (L.) Fzl.

Lge. Consp. p. 19 & 241. Buchenau & Focke l. c. Hartz Fanerog. p. 324. Dusén Gefässpfl. p. 18.

In table-land.

Northern coast-part: Common, observed by all travellers.
Northern inlet-part: Kap Franklin, Bontekoe Ö, Scott Keltic Ö. Antarctic Havn.
Scoresby Sund: Not common. Jameson Land, Gaaseland (H.)! Hurry Inlet, Ryders Dal in downs, Liverpool Kyst (H. & K.)!
Southern coast-part: Kap Dalton, Turner Sund (H. & K.)!

The species has not been observed south of 69°30′.

16. **Melandrium involucratum** (Cham. & Schld.) *β* **affine** (J. Vahl) Rohrb.

Lge. Consp. p. 20 & 241. Buchenau & Focke l. c. Hartz Fanerog. p. 324. Dusén Gefässpfl. p. 18.

In heath and table-land.

Observed by all travellers between 75° and 69°30′ and in all localities on the coast. It appears according to Dusén l. c. less frequently in the northern inlet-part, while it is common in Scoresby Sund. It has not been collected south of 69° 30′.

17. **Melandrium triflorum** (R. Br.) Vahl.

Lge. Consp. p. 20 & 241. Buchenau & Focke l. c. Hartz Fanerog. p. 325. Dusén Gefässpfl. p. 18.

In heath and table-land. Here and there between 65° and 70°.

Northern coast-part: Common, observed by all travellers.
Northern inlet-part: Common.
Scoresby Sund: Rather common, Jameson Land, Danmarks Ö a. o. plac. (H.)! Kap Stewart (D.)! Hurry Inlet (A. G. N.) Klitdalen (H. & K.)!

The species has a more northern extension than the preceding one; its southern limit is a little more northern, to which also the

apparent disagreement of the statements of its frequency in Hartz and Dusén is proportionate.

18. **Sagina Linaei** Presl.

Lge. Consp. p. 21 & 242. Hartz Fanerog. p. 325.

Northern inlet-part: Kap Seaforth (H. & K.)!
Scoresby Sund: Jameson Land (H.)!
Southern coast-part: Skærgaards Halvöen (A.)!

19. **Sagina nivalis** (Lindbl.) Fr. ex pterte.

Lge. Consp. p. 22 & 242.

Northern coast-part: Sabine Ö, Kap Borlase Warren (H. & K.)!
Kap Dalton-part: Turner Sund (H. & K.)!
Southern coast-part: The gulf south of Storbræ, Nordre-Aputitek (A.)!

20. **Sagina caespitosa** (J. Vahl) Lge.

Lge. Consp. p. 21 & 242. Hartz Fanerog. p. 325.

Northern coast-part: Kap Borlase Warren (H. & K.)!
Scoresby Sund: Jameson Land (H.)!

21. **Alsine biflora** (L.) Wbg.

Lge. Consp. p. 23 & 243. Buchenau & Focke l. c. Hartz Fanerog. p. 325. Alsine triflora Dusén Gefässpfl. p. 19.

Rather common between 74°30′ and 66°20′ especially on the coast, but also in the interior it is found extended especially in the southern part.

f. *flor. lilacinis* Hartz l. c.

Northern inlet-part: Kap Seaforth, Canning Land (H. & K.)!
Scoresby Sund: Danmarks Ö, Gaaseland (H.)!

22. **Alsine stricta** (Sw.) Wbg.

Lge. Consp. p. 25 & 243. Hartz Fanerog. p. 326.

Scoresby Sund: Gaasefjord (H.)!

23. **Alsine verna** Bartl.

Lge. Consp. p. 24 & 243. Buchenau & Focke l. c. Hartz Fanerog. p. 325. Alsine rubella Wbg. Dusén Gefässpfl. p. 19.

β. rubella (Wbg.) Lge.

Northern coast-p.: Pendulum Ö (D.)! Sabine Ö (all travellers)! Hvalros Ö (D.)! Kap Borlase Warren (H. & K)! Hold with hope (H. D.)! Kap Bror Ruys (C. & P.)! Mackenzie Bugt (Gr.)!

Northern inlet-p.: Moskusoxefjord (Gr.)! Geolog Fjord (D.)! Franz Joseph Fjord (C. & P.)! Kjerulf Fjord (D.)! Forsblad Fjord (A. G. N.)! Kap Seaforth (H. & K.)! Canning Land at Kap Fletcher (H. & K.)!

Scoresby Sund: Jameson Land (H.)! Kap Brewster (H. & K)! Hurry Inlet (H. & K. D.)! Kap Stewart (D.)!

Southern coast-p.: Kap Dalton (H. & K.)!

γ. hirta (Wormsk.) Lge.

Kap Borlase Warren (H. & K.)!

Scoresby Sund: Common in dry thickets (H.)! Hurry Inlet, Liverpool Kyst (H. & K.)!

Kap Dalton-p.: Turner Sund (H. & K.)!

δ. propinqua (Richards) Lge.

Northern inlet-p.: Kap Brown (H. & K.)!

Scoresby Sund: In the interior of Scoresby Sund: Röde Ö, Kobberpynt (H.)!

Kap Dalton-p.: Turner Sund (H. & K.)!

24. **Halianthus peploides** (L.) Fr. var. **diffusa** Hornem.

Lge. Consp. p. 26 & 243. Buchenau & Focke l. c. Hartz Fanerog. p. 326. Dusén Gefässpfl. p. 20.

Northern coast-p.: Sabine Ö (H. & K.)! Lille Pendulum Ö (D.)! Clavering Ö (C. & P. Akerbl.)! Kap Borlase Warren (C. & P.)!

Northern inlet-p.: Franz Joseph Fjord (A. G. N.)! Kjerulf Fjord (D.)! Forsblad Fjord (D. H. & K.)! Canning Land (H. & K.)!

Scoresby Sund: Common in the interior inlets west of Hurry Inlet (D.)!

25. **Arenaria ciliata** L. *β* **humifusa** (Wbg.).

Lge. Consp. p. 27 & 243. Buchenau & Focke l. c. Hartz Fanerog. p. 326. Dusén Gefässpfl. p. 20.

Northern coast-p.: Common, noted by all travellers, especially in Sabine Ö a very predominant character plant in the lower parts.
Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Sophia Stræde (A. G. N.)! Fleming Inlet, Kap Seaforth, Canning Land (H. & K.)!
Scoresby Sund: Jameson Land, Gaaseland (H.)! Hurry Inlet (D.)! Klitdalen, Vardeklöft, Pt. Constable, Liverpool Kyst (H. & K.)!
Kap Dalton-p.: Turner Sund, common in the lowland, Kap Dalton (H. & K.)!

The species has not been found south of 69°30′ lat. N.

26. **Stellaria humifusa** Rottb.

Lge. Consp. p. 28 & 244. Buchenau & Focke l. c. Hartz Fanerog. p. 326. Dusén Gefässpfl. p. 20.

Northern coast-p.: Common, Sabine Ö (all travellers)! Kap Borlase Warren (D. H. & K.)!
Northern inlet-p. Bontekoe Ö, Scott Keltic Ö, Forsblad Fjord (D.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Danmarks Ö, Jameson Land (H.)! Hurry Inlet common (D. H. & K.)!
Kap Dalton-p.: Turner Sund, Dunholm (H. & K.)!
Not found between 69°30′ and 66°20′.

The species lives in flats of clay and sand near the beach together with Glyceria maritima f. vilfoidea and Carex glareosa and seems to prefer the outer coast in contradistinction from what is the case south of 66° lat. N.

27. **Stellaria longipes** Goldie.

Lge. Consp. p. 29 & 244. Buchenau & Focke l. c. Hartz Fanerog. p. 326. Dusén Gefässpfl. p. 21.

Common everywhere between 74°30′ and 69°30′ and noted by all travellers, not found on the coast more to the south.

28. **Cerastium trigynum** Vill.

Lge. Consp. p. 30 & 244. Hartz Fanerog. p. 326.

Northern inlet-p.: Fleming Inlet 71° 40′ in humid places (H. & K.)!
Scoresby Sund: Common, especially east of Danmarks Ö (H.)!
Hurry Inlet, Jameson Land, common (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Kap Vedel, Kap Irminger, Skærgaards Halvöen, N.-Aputitek (A.)!

Commonly extended south of 67° 20′.

The species is stated among the plants found by Sabine, but has not been refound by any later traveller in the places visited by S. (Pendulum Öer?). This uncommonly northern locality must therefore be omitted as uncertain, as it is not precisely stated where the specimens were collected.

It likes humid places: pools, the banks of brooklets, herby slopes and the borders of perennial snow-drifts, but is also found in the table-land, in places where there is water in spring. It thrives on the southern coast especially in and round Eskimau ruins where it forms a thick cover.

29. **Cerastium alpinum** L.

Lge. Consp. p. 31. Buchenau & Focke l. c. Hartz Fanerog. p. 327 ex parte. Dusén Gefässpfl. p. 20.

α. legitimum Lindbl.

Not rare and found in numerous localities between 74° 30′ and 69° 30′.

β. lannatum Lindbl.

Commonly extended everywhere in East Greenland in all forms of vegetation and as well on the coast as in the interior.

γ. procerum Lge.

Northern inlet-p.: Moskusoxefjord (Gr.)!
Scoresby Sund: Gaaseland, Danmarks Ö (H.)!

30. **Cerastium Edmonstonii** (Watson) Murb. & Ostenf. var. **caespitosum** (Malmgr.) Dusén Gefässpfll. p. 22.

Cerastium arcticum Lge. p. ex part. Cerastium alpinum L. v. caespitosum Malmgren. Hartz Fanerog. 327. Cerast. latifolium Hooker in Scoresby: Journal p. 413.

Northern coast-p. Sabine Ö! Lille Pendulum Ö! Clavering Ö (D.)! Hold with hope (H.)!
Northern inlet-p.: Fleming Inlet, Kap Seaforth (H. & K.)!
Scoresby Sund: Hurry Inlet (D.)!
Kap Dalton-p.: Turner Sund (H. & K.)!

I have within this species classed only specimens undoubtedly corresponding with Malmgren's C. alp. v. caespit., as it appears to me that the limits drawn by Murbeck round C. Edmonstonii are so wide that it enters into the domain of C. alpinum. Malmgren's var. (C. arcticum) is on the other hand a form very characteristic and easily recognizable in East Greenland, and it cannot be confounded with C. alp., at any rate not when it is seen in nature. Its appearance in flats of sand and clay distinguishes this plant from the above-named species that lives on rocks.

Fam. 7. Cruciferae.

31. **Lesquerellia arctica** (Richards) Watson.

Hartz Fanerog. p. 327. Dusén Gefässpfl. p. 22. Vesicaria arctica R. Br. Lge. Consp. p. 34 & 246.

Northern coast-p.: Dronning Augusta Dal (A. G. N.)!
Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Mackenzie Bugt (Gr. D.)! Ruth Ö (A. G. N.)! Sophia Stræde (A. G. N.)! Röhs Fjord (D.)! Forsblad Fjord (D. H. & K.)!
Scoresby Sund: Jameson Land, Röde Ö, Vestfjord and several places, common (H.)! Hurry Inlet (D.)! Klitdalen in flats of sand and clay, and in plains of stone, Fame Öer (H. & K.)!

During the flowering the numerous flower-stalks are ascending, but then they straighten themselves fitting tightly to the field until the fruit is ripe. Then they again bend upwards rising the siliques 4—6 ctm. above the ground.

32. **Cochlearia officinalis** L.

Gelert i G. Anderson & H. Hesselman Spetsbergens Kärlväxtflora, Bihang till K. Sv. Vetensk. Akad. Handl. Bd. 26. Afd. III. Nr. 1. p. 34.

The folloving forms of this variable species we have seen from the territory.

β. groenlandica Gelert.

Dusén Gefässpfl. p. 23. C. Grœnlandica L. Lge. Consp. p. 35 ex parte. C. fenestrata R. Br. Hartz Fanerog. 327 ex parte. Buchenau & Focke l. c. Coclearia anglica Scoresby Journal.

Northern inlet-p.: Kap Bennet (D.)! Kap Seaforth.
Kap Dalton-p.: Kap Dalton, Dunholm (H. & K.)!

f. *minor* (Lge.) Gelert.

Northern coast-p.: Hvalros Ö, Lille Pendulum Ö (C. & P., H. & K.)!
Kap Borlase Warren (H. & K.)! Hold with hope (H.)!
Scoresby Sund: Jameson Land, Danmarks Ö (H.)!
Kap Dalton-p.: Turner Sund (H. & K.)!
Southern coast-p.: Kap G. Holm (K.)!

β. oblongifolia (D. C.) Gelert.

C. fenestrata (R. Br.). Hartz l. c. ex parte.

Northern coast-p.: Lille Pendulum Ö (D.)! Hvalros Ö (Gr.)!
Northern inlet-p.: Murrays Ö (D.)!
Scoresby Sund: Hurry Inlet (D.)! Jameson Land in Moskær (H.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

No one of the forms is frequent, they keep mostly near the coast of the sea and are found there almost exclusively in manured spots, ruins, fowling cliffs and islets, and gull hillocks; its scarce appearance is certainly due to the spread population of Eskimaux disappeared long ago and the insignificant birdlife.

33. **Draba alpina** L.

Lge. Consp. p. 37 & 247. Buchenau & Focke l. c. Hartz Fanerog. p. 328. Dusén Gefässpfl. p. 24. Dr. leptotala Dusén l. c.

Commonly extended between 69° 20′ and 74° 30′. The main form is very easily recognizable on account of the strongly yellow flowers, dark stalks and very thick and coarse hairy coat in stars. The hairiness of the capsule is very variable also in the same individual, so that it is scarcely possible to base a systematical distinction on this circumstance. The forms mentioned by Dusén with white petals belong to Draba Fladnizensis.

β. glacialis (Kjellm.) Gelert.

Northern coast-p.: Sabine Ö (H. & K.)! Kap Borlase Warren (H. & K)!
Scoresby Sund: Danmarks Ö, Jameson Land, Gaaseland (H.)!

γ. oblongata (R. Br.) Gel.

Dr. leptopetala Dusén (non Th. Tr.) l. c.

Hold with hope (A. G. N.)!

34. **Draba glacialis** Adams.

Gelert Notes on arctic Plants Bot. Tidsskr. Bd. 21. 3. H. p. 294. Dr. Martinsiana I Gay Dusén Gefässpfl. p. 26.

β. aspera (Adams) Gelert.

Northern coast-p.: Lille Pendulum Ö (D.)! Sabine Ö (D.)!

γ. stenopetala Trautv.

Northern coast-p.: Lille Pendulum Ö (D.)!

35. **Draba crassifolia** Grah.

Lge. Consp. p. 38 & 247. Hartz Fanerog. p. 328. Dusén Gefässpfl. p. 25.

Northern coast-p.: Hold with hope (H.)!
Scoresby Sund: Jameson Land, Gaaseland, Danmarks Ö, Nordvestfjord (H.)! Kap Stewart (D.)!
Kap Dalton-p.: Kap Dalton (H. & K)!

Likes humid localities, and seeks shelter between stones or higher vegetation in herby or grassy slopes or river-beds.

36. **Draba aurea** M. Vahl.

Lge. Consp. p. 39 & 247. Hartz Fanerog. p. 328.

Scoresby Sund: Common in the interior. Danmarks Ö, Gaaseland, Röde Ö, Nordvestfjord o. fl. St. (H.)!
Southern coast-p.: Kap Warming (K.)!

This considerable species shuns the outer coast preferring dry, gravelly localities exposed to the south high on the mountains in the interior of the country; it is therefore possibly far more extended than it appears from the above-named few localities, but has hitherto avoided the investigations.

37. **Draba repens** M. v. Bieb.

Dusén Gefässpfl. p. 23.

Scoresby Sund: Hurry Inlet (A. G. N)! Ryders Dal, Point Constable (H. & K.)!

Grows socially and colours large spots beautifully yellow, prefers humid table-land, the banks of half dried pools and sandy ground. It excludes almost all other plants from its habitat, but still it forms no complete cover, the ascending stalks being leafless on the whole of the lower part.

38. **Draba nivalis** Liljeb.

Lge. Consp. p. 39 & 248. Buchenau & Focke l. c. Hartz Fanerog. p. 328. Dusén Gefässpfl. p. 26. Draba arctica Dusén l. c. ex parte.

Northern coast-p.: Sabine Ö (all travellers). Kap Borlase Warren (H. & K.)! Mackenzie Bugt (Gr.)!
Northern inlet-p.: Canning Land (H. & K.)!
Scoresby Sund: Common (H.)! Hurry Inlet (D.)!
Kap Dalton-p.: Kap Dalton, Turner Sund (H. & K.)!
Southern coast-p.: Lilleö, Vahls Fjord (K.)!

39. **Draba Fladnizensis** Wulf.

Gelert Notes on arctic plants. Bot. Tidsskr. 21. Bd. 3. H. p. 302. Dr. Wahlenbergii Hartm. Lge. Consp. Fl. Grœnl. p. 40 & 248. Hartz Fanerog. p. 328. Dusén Gefässpfl. p. 25. Buchenau & Focke l. c. Dr. muricella B. & F. l. c. D. rupestris f. parva B. & F. D. altaica (Led.) Hartz l. c.

This very variable, but yet rather easily recognizable species appears in many forms, size and hairiness varying very considerably; it possibly comprises several species, but we have not been able to acknowledge this with the material in hand where the different forms pass evenly into each other. I class within this all white-flowered, ciliate short-ribbed individuals. It is rather commonly extended in all formations over the coast, yet decreasing distinctly in number and size towards the North where it is displaced by D. alpina from which certain forms cannot be distinguished when sterile or having done flowering. In the southern part of the coast-region it is very common also in the interior.

Northern coast-p.: Lille Pendulum Ö (D.)! Sabine Ö (H. & K.)! Clavering Ö (C. & P. D.)! Kap Borlase Warren (H. & K.)! Hold with hope (H.)!
Northern inlet-p.: Mackenzie Bugt (Gr.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Gaaseland, Danmarks Ö, Jameson Land a. o. places (H.)! Hurry Inlet (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: N.-Aputitek, Storbræ (A.)! Vahls Fjord (K.)!

40. **Draba hirta** L.

Lge. Consp. Fl. Grœnl. p. 42. Buchenau & Focke l. c. Hartz Fanerog. p. 329. Dusén Gefässpfl. p. 25. D. rupestris C. & P. D. D. corymbosa R. Br. Hartz l. c.

Rather common everywhere in Northeast Greenland and noted by all travellers. Varies very much, but the forms cannot be kept distinct.

41. **Draba arctica** J. Vahl.

Lge. Consp. Fl. Grœnl. p. 43. Buchenau & Focke l. c. Hartz Fanerog. p. 329. Dusén Gefässpfl. p. 26.

Commonly extended between 69° 30′ and 75° lat. N., observed by all travellers; between 66° 20′ and 69° it has not been observed.

42. **Braya purpurascens** (R. Br.) Bunge. f. **siliculis glabris** Hartz.

Braya glabella Lge. Consp. p. 46 & 250. Hartz Fanerog. p. 329. Dusén Gefässpfl. p. 26. Platypetalum purpurascens R. Br.

Northern coast-p.: Sabine Ö, Kap Borlase Warren (H. & K.)! Dronning Augusta Dal (A. G. N.)! Clavering Ö (D.)!
Northern inlet-p.: Franz Joseph Fjord (D.)! Moskusoxefjord (Gr.)! Ruth Ö (A. G. N.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Jameson Land (H.)! Fame Öer (A. G. N. H. & K.)! The downs in Ryders Dal (H. & K.)!

In sandy or clayey-sandy flats. Bears rather well sand-drift.

43. **Braya alpina** Sternb. & Hoppe.

Hartz Fanerog. p. 329. Dusén Gefässpfl. p. 27. Braya glabella Richards non Lge. & Hartz. Arabis petræea Buchenau & Focke l. c.

Northern inlet-p.: Franz Joseph Fjord (B. & F. D)! Ruth Ö (A. G. N.)!
Scoresby Sund: Fladepynt in Vestfjord, Kingua Gaasefjord (H.)! Hurry Inlet, Ryders Dal in stony plains and in downs (H. & K.)!

In the interior of the country in sandy flats and in downs. Sets ripe fruit in abundance.

44. **Eutrema Edwardsii** R. Br.

Dusén Gefässpfl. p. 27.

Northern coast-p.: Mackenzie Bugt (Gr.)!

45. **Cardamine bellidifolia** L.

Lge. Consp. Fl. Grœnl. p. 47 & 251. Buchenau & Focke l. c. Hartz Fanerog. p. 329. Dusén Gefässpfl. p. 27.

Northern coast-p.: Sabine Ö (all travellers)! Lille Pendulum Ö (C & P., A. G. N.)! Hvalros Ö (G.)! Kap Borlase Warren (D.)! Clavering Ö (D.)! Hold with hope (H., D.)!
Northern inlet-p.: Scott Keltic Ö (D.)! Kap Greg (H. & K.)!
Scoresby Sund: Common. Kap Tobin (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Kap Vedel, N.-Aputitek (A)! Jagos Fjord, Kap Warming, Lilleö, Itivsalik (K.)!

var. *laxa* Lge.

Kap Dalton (H. & K.)!

The main species is found spread in heath, table-land and pools and is commonly extended; it likes humid cracks in the rocks and is certainly often snowless in winter.

46. Cardamine pratensis L.

Lge. Consp. p. 48 & 251. Hartz Fanerog. p. 329. Dusén Gefässpfl. p. 27.

Northern coast-p.: Mackenzie Bugt (G.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Jameson Land, Danmarks Ö (H.)! Nordvestbugt, Liverpool Kyst, Hurry Inlet (H. & K.)!

Is as a rule sterile and propagates only by the deciduous leaflets. This form is strongly hydrophile and is most often found submerse in smaller puddles and pools; but it appears also in more dry, sandy localities with flower, but without any seed in the thin stunted siliques. The species sets certainly never in these regions seeds that have the power of germination.

47. Arabis alpina L.

Lge. Consp. p. 48 & 251. Hartz Fanerog. p. 330. Dusén Gefässpfl. p. 28.

Northern inlet-p.: Fleming Inlet (H. & K.)! 71°40′ lat. N.
Scoresby Sund: Common (H.)! Kap Stewart (D.)! Hurry Inlet (A. G. N.)! Vardeklöft, Liverpool Kyst and several places (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Kap Irminger (A.)! Kap Warming (K.)!

The species appears in several forms, partly as low, 3—5 ctm. high peduncles and 0·5—1 ctm. long leaves in 1—2 ctm. broad rosettes (f. *minor* Lange), partly in more or less hairy forms however connected by transitions (Hartz f. *glabrata*). A specimen of (Lange f. *ruderalis*) has been observed at Kap Stewart.

48. Arabis Holboellii Hornem.

Hartz Fanerog. p. 330.

Scoresby Sund: Common in the interior, Gaaseland, Röde Ö, Vestfjord (H.)!

Kap Dalton-p.: Turner Sund (H. & K.)!

In gravelly and stony slopes and in dry thickets, is not found in the coast region.

Fam. 8. Papaveraceae.

49. **Rapaver radicatum** Rottb.

Hartz Fanerog. p. 330. Dusén Gefässpfl. p. 41. P. nudicaule. Lge. Consp. p. 52 & 253. Buchenau & Focke l. c.

Common everywhere between 75° and 69° 30′. It appears especially in the northern coast part (Sabine Ö) in incredible numbers and in unusually strong tufts; on a single tuft Hartz counted 38 full-blown flowers and 34 large buds. On the top of Harefjæld and in humid ground at Germania Havn the white-flowered form was very frequent. In the southern part (Scoresby Sund and the Kap Dalton part) the white-flowered form is more rare. South of 69° 30′ the species is very rare and only found in few places, Kap Vedel, Storbræ (A.)! Langö, Jagos Fjord (K.)!

f. *pygmæa* Hartz.

5—10 ctm. high.

Northern coast-p.: Hold with hope (H.)!
Scoresby Sund: Danmarks Ö (H.)!

f. *glabriuscula* Hartz.

Foliis læte viridibus, parce hirsutis, ad P. nudicaule L. (P. croceum Ledeb.) accedens.

Scoresby Sund: Jameson Land (H)!

Fam. 9. Ranunculaceae.

50. **Thalictrum alpinum** L.

Lge. Consp. p. 53 & 253 (Hartz Fanerog. p. 231. Dusén Gefässpfl. p. 29.

Northern inlet-p.: Fleming Inlet 71° 40′ (H. & K.)!
Scoresby Sund: Gaaseland, Danmarks Ö, Kingua Gaasefjord, not

common (H.)! Hurry Inlet (D. H. & K.)! Kap Dalton (H. & K.)! Not found between 69°30′ and 66°20′.

In herby and grassy slopes in humid sheltered places, snow-covered in winter.

51. **Batrachium paucistamineum** (Tausch.) var. **eradicata** (Læst.).

Gel. Bot. Tidsskr. Bd. 19, p. 28.

Scoresby Sund: Danmarks Ö (H.)! Nordostbugt (H. & K.)! Hurry Inlet (Arfvidson)! The specimens are all together sterile.

In pools and small, shallow puddles, very rare.

52. **Ranunculus glacialis** L.

Lge. Consp. p. 54 & 254. Buchenau & Focke l. c. Hartz Fanerog. p. 331. Dusén Gefässpfl. p. 29.

Common on the coast in the whole examined region and noted by all travellers, but not observed in the interior of the inlets. Is wanting in Scoresby Sund (H.)! The flowers vary very much in colour, partly according to their age (from purple to almost white). Sets seeds in abundance.

53. **Ranunculus pygmaeus** Wbg.

Lge. Consp. p. 55 & 254. Buchenau & Focke l. c. Hartz Fanerog. p. 331. Dusén Gefässpfl. p. 30.

Northern coast-p.: Lille Pendulum Ö (C. & P.)! Sabine Ö (H. & K.)! Hold with hope (H.)!
Northern inlet-p.: Jackson Ö (C. & P.)! Mackenzie Bugt (Gr.)! Scott Keltic Ö (A. G. N.)! Kap Seaforth, Fleming Inlet (H. & K.)!
Scoresby Sund: Common (H.)!
Kap Dalton-p.: Kap Brewster, Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Common everywhere (A., K.)!

var. *Langeana* Nath.

Northern inlet-p.: Fleming Inlet (H. & K.)!
Scoresby Sund: Gaaseland, Danmarks Ö (H.)! Hurry Inlet (H. & K.)! Kap Dalton (H. & K.)!

As well the main species as var., among which transitions are found, grow in humid places and are common on the whole of the coast, flowers and sets seeds in abundance.

54. **Ranunculus hyperboreus** Rottb.

Lge. Consp. p. 55 & 254. Hartz Fanerog. p. 331. Dusén Gefässpfl. p. 30.

Northern coast-p.: Hvalros Ö (D.)! Sabine Ö (A. G. N. H. & K.)! Kap Borlase Warren (D. H. & K.)!
Northern inlet-p.: Antarctic Havn (A. G. N.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Kap Stewart, Danmarks Ö, Kingua Gaasefjord (H.)! Hurry Inlet (D. H. & K.)!
Kap Dalton-p.: Kap Dalton (H. & K.)!

In shallow ponds and pools, most often sterile. Rather rare.

55. **Ranunculus nivalis** L.

Lge. Consp. p. 56 & 254. Buchenau & Focke l. c. Hartz Fanerog. p. 331. Dusén Gefässpfl. p. 30.

Northern coast-p.: Lille Pendulum Ö (C. & P. A. G. N.)! Sabine Ö, Kap Borlase Warren (H. & K.)! Hold with hope (H.)!
Northern inlet-p.: Mackenzie Bugt (Gr.)! Kap Seaforth (H. & K.)! Fleming Inlet (H. & K.)!
Scoresby Sund: Jameson Land, Danmarks Ö (H.)! Hurry Inlet (H. & K.)!
Kap Dalton-p.: Kap Brewster, Kap Dalton (H. & K.)!

56. **Ranunculus altaicus** Laxm.

Lge. Consp. p. 56 & 254. Buchenau & Focke l. c. Hartz Fanerog. p. 332. Dusén Gefässpfl. p. 30.

Northern coast-p.: Sabine Ö (all travellers)! Lille Pendulum Ö (D.)! Kap Borlase Warren (H. & K. D)! Hold with hope (D.)! Clavering Ö (D.)! Jackson Ö, Kap Bror Ruys (C. & P.)!
Northern inlet-p.: Bontekoe Ö, Murrays Ö (D.)! Fleming Inlet, Kap Seaforth (H. & K.)!
Scoresby Sund: Jameson Land, Gaaseland, Danmarks Ö (H.)! Kap Stewart (D.)! Hurry Inlet (H. & K.)!

57. **Ranunculus arcticus** R. Br.

Freyn in G. Anderson och H. Hesselman Bidrag till Spetsbergens och Beeren Eilands Karlväxtflora, Bihang t. Kgl. Sv. Vet. Acad. Handl. Bd. 26. Afd. III No. 1 p. 49. Dusén Gefässpfl. p. 31. R. affinis R. Br. Hartz Fanerog. p. 332.

Northern coast-p.: Sabine Ö (H. & K.)! Lille Pendulum Ö, Clavering Ö (D.)!
Northern inlet-p.: Franz Joseph Fjord (C. & P.)!
Scoresby Sund: Gaaseland (H.)!
Kap Dalton-p.: Kap Dalton (H. & K.)!

Var. **Willanderi** (Natt.) Freyn.
Kap Dalton (H. & K.)!

Fam. 10. Saxifragaceae.

58. **Saxifraga hieracifolia** Waldst. & Kit.

Lge. Consp. p. 59. Buchenau & Focke l. c. Hartz Fanerog. p. 332. Dusén Gefässpfl. p. 31.

Northern coast-p.: Kap Bror Ruys (C. & P.)!
Northern inlet-p.: Scott Keltic Ö, Forsblad Fjord (D.)! Fleming Inlet (H. & K.)!
Scoresby Sund: Jameson Land (H.)! At Nordostbugt, Hurry Inlet Klöften and several places on Liverpool Kyst (H. & K.)! Kap Brewster (H. & K.)!

In boggy pools and humid heath, not common in any of the examined localities except Jameson Land.

59. **Saxifraga nivalis** L.

Lge. Consp. Fl. Grœnl. p. 59. Buchenau & Focke l. c. Hartz Fanerog. p. 332. Dusén Gefässpfl. p. 31.

Common everywhere between 75° and 67° in all formations.

var. *tenuior* Wbg.

Has also been observed in several places, but keeps most to the coast.

60. **Saxifraga stellaris** L. *β* **comosa** Poir.

Lge. Consp. Fl. Grl. p. 60. Hartz Fanerog. p. 332. Dusén Gefässpfl. p. 32.

Northern coast-p.: Sabine Ö (Sabine, H. & K.), Kap Borlase Warren (H. & K.)! Hold with hope (H.)! Lille Pendulum Ö (D.)!
Northern inlet-p.: Kap Greg (H. & K.)!
Scoresby Sund: Common.
Kap Dalton-p.: Common.

The main species has not been observed north of 67° lat. N., var. not south of 69° 25′ lat. N.

61. **Saxifraga cernua** L.

Lge. Consp. Fl. Grl. p. 61 & 256. Hartz Fanerog. p. 333. Dusén Gefässpfl. p. 32.

Commonly extended everywhere in pools, table-land, herby slopes, grassy slopes and heath. Snow-covered in winter.

var. *ramosa* Gmel.

Northern coast-p.: Hold with hope (H.)!
Scoresby Sund: Danmarks Ö (H.)! Kap Stewart, Kap Dalton (H. & K.)!

Is found in manured places as Greenland ruins, at places of residence and house-walls and is here often very robust, glandular-hairy and sticky.

62. **Saxifraga rivularis** L.

Lge. Consp. Fl. Grl. p. 61 & 256. Hartz Fanerog. p. 333. Dusén Gefässpfl. p. 33.

Commonly extended over the whole of the coast, but appears somewhat more rarely in the interior of the country, likes humid places as pools, cracks in the rocks and herby slopes.

β. purpurascens Lge. l. c.

Northern coast-p.: Hold with hope (H.)!
Scoresby Sund: Kap Brewster (H. & K.)!
Southern coast-p.: Turner Sund (H. & K.)!

γ. var. *hyperborea* (R. Br.) Engl. Lge. l. c.

Northern coast-p.: Sabine Ö (H. & K.)! Mackenzie Bugt (Gr.)
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

63. **Saxifraga decipiens** Ehrh.

Lge. Consp. Fl. Grl. p. 62 & 257. Hartz Fanerog. p. 333.
Saxifraga cæspitosa L. Dusén Gefässpfl. p. 33.

The species is found in the following forms:

α. *caespitosa* (L.) Engl.

Commonly extended everywhere between 75° and 67°, likes humid localities with shelter.

β. *uniflora* (R. Br.) Lge.

Northern coast-p.: Kap Borlase Warren (H. & K.)! Hold with hope (H.)!
Scoresby Sund: Gaaseland (H.)! Jameson Land (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Kap Vedel, Storbræ, Skærgaards Halvöen (A.)!

γ. *Sternbergii* (Willd.) Engl.

Kap Brewster (H. & K.)!

δ. *cryptopetala* Berlin. Kärlväxter insamlade under den svenska Expeditionen till Grönland 1883, Öfversigt af Kgl. Vet. Ak. Förh.

Northern inlet-p.: Kap Greg (H. & K.)!

64. **Saxifraga tricuspidata** Rottb.

Lge. Consp. Fl. Grl. p. 63.

Scoresby Sund: Hurry Inlet (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

The specimens are about 10 ctm. high, strong and have a few flowers; fruit has not been observed, but on the other hand numerous fruit stalks from previous years. The species has not before been observed in East Greenland, and we have only found it very scarcely on rocks with good shelter in the 3 above-named localities between 70° 50′ and 69° 25′ lat N. In West Greenland it is common north of 64° lat. N. and has besides a western extension over the

American Archipelago; it must certainly have immigrated to the East coast by the way north of the country, as it is completely wanting in lower latitudes.

65. **Saxifraga hirculus** L.

Lge. Consp. Fl. Grl. p. 64. Hartz Fanerog. p. 233. Dusén Gefässpfl. p. 34.

Northern coast-p.: Sabine Ö, Pendulum Ö, Clavering Ö, common (all travellers)! Kap Borlase Warren (H. & K.)! Mackenzie Bugt (C. & P. Gr.)! Dronning Augusta Dal (A. G. N.)!

The species is very common in the coast regions between 75° and 73° lat. N., but else it is not known from Greenland, it flowers abundantly, the tufts are as a rule only low (about 5 ctm.) and very thick; but also higher and more lonely individuals are found in favourable localities. It is scarcely possible to insist on any limitation between the main species and Engler's var. alpina, wherefore we put down the plant under the former.

66. **Saxifraga aizoides** L.

Lge. Consp. Fl. Grl. p. 64 & 257. Hartz Fanerog. p. 333. Dusén Gefässpfl. p. 34.

Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Kjerulf Fjord (D.)! Antarctic Sund (A. G. N.)! Ruth Ö (D.)! Scott Keltic Ö, Sophia Stræde (A. G. N.)! Röhs Fjord (D.)!

Scoresby Sund: Hurry Inlet (D.)! Ulveodde (H. & K.)! Röde Ö, Ispynt (H.)! Kap Seaforth (H. & K.)!

Is found in humid ground between moss in pools or in wet rocky slopes; it is not common, but is nearly always found growing socially over a greater area.

67. **Saxifraga flagellaris** Willd. var. **setigera** (Pursh) Engl.

Lge. Consp. Fl. Grl. p. 65. Hartz Fanerog. p. 333. Dusén Gefässpfl. p. 34.

Northern coast-p.: Sabine Ö, Pendulum Ö, Kap Borlase Warren (all travellers), Hold with hope (H.)! Mackenzie Bugt (Gr.)! Bontekoe Ö (D.)!

Commonly extended in humid, clayey plains and slopes (table-land between 75° and 73° 10′ lat. N., but not observed more to the south). The individuals stand lonely, with the space of 1—2 foot between them and reach a height of 3—7 ctm., having 5—12 ctm. long off-shoots. This species appears especially in Sabine Ö in exceedingly great numbers and is a characterplant for the lower table-land where it colours large areas with its lively yellow flowers and blood-red stalks.

68. **Saxifraga aizoon** L. f. **brevifolia** Engl.

Lge. Consp. Fl. Grl. p. 65 & 257. Hartz Fanerog. p. 334.

In the interior of Scoresby Sund up to a height of 1000′ above the level of the sea. Nordvestfjord, Gaaseland, Teltplads at Röde Ö (H.)! The species was not found in any of the localities visited in 1900 and has not been observed in the southern coast region north of 67° lat N.

69. **Saxifraga oppositifolia** L.

Lge. Consp. Fl. Grl. p. 66. Hartz Fanerog. p. 334. Dusén Gefässpfl. p. 34.

Commonly extended everywhere between 77° and 67° lat. N. As well f. reptans as f. pulvinata (G. Andersen and H. Hesselman) appear and are nearly as numerous as the greater loosely tufted individuals that correspond with the main species in lower latitudes. It is found in all formations and localities, but is nowhere formation forming.

β. Nathorstii Dusén l. c.

Northern coast-p.: Mackenzie Bugt (K. A. Gr.)! Kap Franklin (K. A. Gr.)!

Northern inlet-p.: Sophia Stræde, Åkerblom Ö, Berzelius Bjerg, Ruth Ö, Dusén Fjord (A. G. N.)! Kap Seaforth (H. & K.)!

We found this remarkable form in great numbers between S. oppositifolia and S. aizoides in a low horizontal sanded flat with rather humid ground.

Fam. 11. Crassulaceae.

70. **Sedum Rhodiola** D. C.

Lge. Consp. Fl. Grl. p. 66. Hartz Fanerog. p. 334. Dusén Gefässpfl. p. 38.

Northern coast-p.: Clavering Ö (C. & P. D.)!
Northern inlet-p.: Scott Keltic Ö, Röhs Fjord, Forsblad Fjord, Murrays Ö, Holloway bay (D.)! Kap Greg (H. & K.)!
Scoresby Sund: Common (H.)!
Kap Dalton-p.: Kap Dalton, Turner Sund.
Southern coast-p.: The gulf s. o. Storbræ, Skærgaards Halvöen (A.)! Nualik, Itivsalik (K.)!

Fam. 12. Plumbaginaceae.

71. **Armeria vulgaris** Willd. var. **sibirica** (Turcz) Rosenv.

Rosenvinge, Andet Tillæg til Grl. Fanerog. p. 683. Hartz Fanerog. p. 334. Dusén Gefässpfl. p. 38. Armeria sibirica Turcz. Lge. Consp. Fl. Grl. p. 70.

Northern coast-p.: Sabine Ö (all travellers)! Dronning Augusta Dal (D.)! Kap Borlase Warren (H. & K.)!
Northern inlet-p.: Forsblad Fjord (D. H. & K.)! Scott Keltic Ö (D.)! Antarctic Havn, Mackenzie Bugt (K. A. Gr.)! Moskusoxefjord (Gr.)!
Scoresby Sund: Hurry Inlet (D. H. & K.)! Liverpool Kyst, Fame Öer (H. & K.)! Kap Stewart (Ryder)!

Appears in sandy stretches near the beach, but is in Ryders Dal also found far up in the country growing luxuriantly in small downs and stony plains.

Fam. 13. Lentibulariaceae.

72. **Pinguicula vulgaris** L.

Hartz Fanerog. p. 384.

Only found in Scoresby Sund in Röde Ö by Hartz in pools, at brooks among moss. On the coast more to the south it is not found before 66° 20′ lat. N.

Fam. 14. Scrophulariaceae.

73. **Veronica alpina** L.

Lge. Consp. Fl. Grl. p. 73. Hartz Fanerog. p. 335.

Northern inlet-p.: Fleming Inlet (H. & K.)! 71° 40′.
Scoresby Sund: Jameson Land, Gaaseland, Danmarks Ö (H.)! Hurry Inlet in the cleft (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Skærgaards Halvöen (A.)! Kap Warming (K.)!

Rare, in herby slopes in well sheltered places where the snow-cover is high in winter, and where there is during the summer an even luxuriant humidity.

74. **Veronica saxatilis** L.

Hartz Fanerog. p. 335.

Scoresby Sund: Gaaseland. In herby slopes. Snow-covered in winter (H.)!
Kap Dalton-p.: Turner Sund. In herby slopes (H. & K.)!
Southern coast-p.: Kap Warming (K.)!

In particularly well sheltered luxuriant, humid, herby slopes with high snow-cover in winter. Very rare. Most northern finding place 70° 15′ lat. N.

75. **Pedicularis lapponica** L.

Hartz Fanerog. p. 335. Dusén Gefässpfl. p. 39.

Northern inlet-p.: Kjerulf Fjord, Röhs Fjord (D.)! Forsblad Fjord (A. G. N. H. & K.)!
Scoresby Sund: Common.
Kap Dalton-p.: Kap Dalton.

The species has not been found south of 69° 25′ lat. N. and not north of 73° 10′ lat. N., while it has been observed on the west coast between 78° and 60°. This difference of extension is certainly not due to the less extensive examination, for in this case it must certainly appear in the relatively well examined district of Angmagsalik south of the here discussed stretch of coast, but here it is certainly wanting. It must therefore be supposed that the

species has immigrated via America (Labrador) and has not yet been able to spread over the whole of the east coast to which it has certainly reached by the way north of Greenland.

76. **Pedicularis flammea** L.

Hartz Fanerog. p. 335. Dusén Gefässpfl. p. 39.

Northern coast-p.: Sabine Ö (H. & K.)! Dronning Augusta Dal, Kap Borlase Warren (D.)!

Northern inlet-p.: Ruth Ö (A. G. N.)! Scott Keltic Ö (D.)! Sophia Stræde (A. G. N.)! Forsblad Fjord (D.)! Canning Land (H. & K.)!

Scoresby Sund: Kap Stewart (D.)! Hurry Inlet (D.)! Jameson Land, Vardeklöft, Liverpool Kyst (H. & K.)! Common West of Danmarks Ö (H.)!

Kap Dalton-p.: Kap Dalton, Turner Sund (H. & K.)!

The species has not been found on the coast between 69° 25′ and 66° 20′ lat. N., and it prefers the interior of the country.

77. **Pedicularis hirsuta** L.

Lge. Consp. Fl. Grl. p. 76. Hartz Fanerog. p. 335. Dusén Gefässpfl. p. 39.

Commonly extended over the whole of the examined coast and observed by all travellers in numerous localities.

78. **Euphrasia latifolia** Pursh.

Dusén Gefässpfl. p. 40. Euphrasia officinalis L. Lge. Consp. p. 79 & 264. Hartz Fanerog. p. 335. Buchenau & Focke. Zweite deutsche Nordp.

Rather rare, found as far as 74° lat. N.

Northern inlet-p.: Jackson Ö (C. & P.)! Franz Joseph Fjord, Kjerulf Fjord (D.)! Forsblad Fjord (A. G. N.)! Fleming Inlet (H. & K.)!

Scoresby Sund: Hurry Inlet (D. H. & K.)! In the interior of Scoresby Sund West of Danmarks Ö (H.)!

Kap Dalton-p.: Turner Sund (H. & K.)! Not observed between 69°30′ and 66° 20′ lat. N. The specimens reach in the outer coast region where the plant is very rare only a height of 1—4 ctm.

in the flowering season (July), while they in the heads of the inlets are 8—15 ctm. high. In the interior it sets fruit in abundance.

79. **Bartschia alpina** L.

Lge. Consp. Fl. Grl. p. 78.

Southern coast-p.: Skærgaards Halvøen (A.)! Kap Warming, Itivsalik, Ikerasarmiut, Vahls Fjord (K.)!

The species was previously not found north of Angmagsalik (by Berlin); the present most northern point, 68°8′, a particularly favourable habitat with manured ground and herby slope is yet considerably more to the south than its northern limit on the west coast. It is very rare north of 66°20′ and only 10 ctm. high, but yet it sets flower everywhere and as far as can be judged from the collected material also fruit. It shuns here the coast, and all finding places are well sheltered, exposed to the south and have the character of herby slopes, while the species more to the south prefers heath.

Fam. 15. Polemoniaceae.

80. **Polemonium humile** Willd.

Lge. Consp. p. 80. Buchenau & Focke l. c. Hartz Fanerog. p. 335. Dusén Gefässpfl. p. 40.

Northern coast-p.: Not rare between 75° and 74° lat. N. in tableland; Sabine Ö (all travellers)! Lille Pendulum Ö (C. & P. D.)! Clavering Ö (C. & P. D.)! Dronning Augusta Dal (D.)! Kap Borlase Warren (D. H. & K.)!

The species grows socially and forms a 10—20 ctm. high cover over spots of an extension of 1—2 □ M. on clayey, sandy ground, especially where the rock comes rather near the surface.

Fam. 16. Gentianaceae.

81. **Gentiana tenella** Rottb.

Lge. Consp. p. 265. Dusén Gefässpfl. p. 41.

Very rare on grassy slopes between 74°30′ and 70°30′.

Northern coast-p.: Sabine Ö 4 1—2 ctm. high flowering specimens (H. & K.)!

Scoresby Sund: Hurry Inlet in Ryders Dal (A. G. N.)! The cleft Hurry Inlet (H. & K.)! The specimens are 2—7 ctm. high with 1—3 flowering stalks and on the greatest ones the capsule is open and contains ripe seeds $^{31}/_{7}$ (H. & K.)!

Fam. 17. Diapensiaceae.

82. **Diapensia lapponica** L.

Lge. Consp. p. 83 & 526. Hartz Fanerog. p. 336.

In table-land and heath.

Scoresby Sund: Common (H.)!

Southern coast-p.: Itivsalik, Kap Jörgensen (K.)!

In this part of the coast (north of 66° 20′) the species is exceedingly rare and not observed above 1000′ height; it has not been found near the sea farther to the north than 67°.

Fam. 18. Pyrolaceae.

83. **Pyrola rotundifolia** L. *α. Grandiflora* (Rad.)

Kolderup Rosenvinge. Medd. om Grönl. XV. p. 68. P. grandiflora Rad. Lge l. c. Hartz, Dusén.

Northern inlet-p.: Kjerulf Fjord, Scott Keltic Ö, Röhs Fjord, Antarctic Havn.

Scoresby Sund: Kap Stewart (D.)! Hurry Inlet, rather common in heath (H. & K. D.)! Common in the interior (H.)!

Fam. 19. Ericaceae.

84. **Arctostaphylos alpina** (L.) Spr.

Lge. Consp. Fl. Grl. p. 86 & 266. Hartz Fanerog. p. 336. Dusén Gefässpfl. p. 41.

Northern inlet-p.: Eleonora Bay in Franz Joseph Fjord (C. & P.)! Moskusoxefjord (K. A. Gr.)! Kjerulf Fjord (D.)! Ruth Ö, Antarctic Havn (A. G. N.)!

Scoresby Sund: Common in the interior west of Danmarks Ö (H.)! Hurry Inlet (D.)! Klitdalen (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

The species appears in table-land and heath and seeks shelter and snow-cover against the winter; it has been observed only a single time in the proper coast-regions and then in such a locality that it was sheltered against the north wind and in a height above the level of the sea-fog. The extension 73° 30′—69° 25′ lat. N. is considerably smaller and also a little more northern than on the west coast.

85. **Phyllodoce coerulea** (L.) Bab.

Lge. Consp. p. 86 & 266. Hartz Fanerog. p. 336.

Scoresby Sund: In the interior not common. Danmarks Ö, Gaaseland (H.)! Turner Sund, Kap Dalton (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)! Kap Warming Itivsalik (K.)! Not found between 69° 25′ and 66° 40′ lat. N.

In humid heath and herby slopes in sheltered places, especially at the foot of vertical cliffs with southern exposition where there is shelter and constant snow-cover. The species sets flower and fruit abundantly in these localities. The north limit is considerably more southern than on the west coast (74° 18′). The break between 69° 25′ and 66° 40′ is partly and mainly due to the scarce breadth of the country free from ice and partly the cursory examination.

86. **Cassiope tetragona** (L.) Don.

Lge. Consp. p. 87 & 266. Hartz Fanerog. p. 336. Dusén Gefässpfl. p. 42.

Common everywhere between 75° and 69° 30′, collected by all travellers. On the coast it cedes to Empetrum while it is dominant in the heath of the interior. It does not form here any thick plantation as Empetrum, but stands in tufts with the space of 1 to several foot between them and of a height of up to 20 ctm. above the ground. The limit between this and the heath of Empetrum may often be very sharp.

87. **Cassiope hypnoides** (L.) Don.

Lge. Consp. p. 87 & 267. Hartz Fanerog. p. 336. Dusén Gefässpfl. p. 42.

Scoresby Sund: Jameson Land, Danmarks Ö, Gaaseland (H.)! Nordostbugt (H. & K.)! Hurry Inlet (D.)! Vardeklöft (H. & K.)! Liverpool Kyst (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton.
Southern coast-p.: Storbræ, Kap Vedel, N.-Aputitek (A.)! Itivsalik, Kap G. Holm (K.)!

In humid places in heath and herby slopes where there is a large and long lasting snow-cover.

88. **Loiseleuria procumbens** (L.) Desv.

Lge. Consp. Fl. Groenl. p. 88.

Southern coast-p.: Nualik, Kap Warming, Itivsalik, Lilleö, Vahls Fjord.

In table-land and heath rather rare and of scarce importance to the character of the vegetation. The north limit 67° 16′ is far more southern than on the west coast about 75°, and this is certainly not due to the less extensive examination, but possibly to a later immigration. Climatic causes have scarcely set bounds to it.

89. **Rhododendron lapponicum** L.

Lge. Consp. Fl. Grl. p. 88 & 267. Hartz Fanerog. p. 337. Dusén Gefässpfl. p. 42.

Northern coast-p.: Kuhn Ö (C. & P.)! Clavering Ö (D.)! Kap Borlase Warren (A. G. N.)!
Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Ruth Ö, Sofia Sund (A. G. N.)! Scott Keltic Ö, Röhs Fjord (D.)! Forsblad Fjord (A. G. N. H. & K.)! Antarctic Havn (A. G. N.)!
Scoresby Sund: Hurry Inlet (D. H. & K.)! Common in the interior of Scoresby Sund (H.)!
Kap Dalton-p.: Turner Sund, Henry Ö (H. & K.)!

The species shuns the outer coast and is not common in the interior; it bears only a slight part in the heath, appears only singly,

but is yet easily recognizable on account of its short, thick, bloodless branches. In the southern coast part between 69°30′ and 66°20′ it has not been observed; probably because convenient localities — evenly sloping, humid heath — are wanting.

Fam. 20. Vacciniaceae.

90. **Vaccinium uliginosum** L.

Lge. Consp. Fl. Grœnl. p. 90. Hartz Fanerog. p. 337. Dusén Gefässpfl. p. 43.

β. pubescens (Horn.) Lge.

Scoresby Sund: Common (H.)!

Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)! Not observed between 69° 25′ and 66° 20′ lat. N.

γ. microphyllum (Lge.).

Common over the whole of the examined coast, collected by all travellers in heath and table-land.

Certainly no reason to separate with Lange l. c. this form as a sub-species, numerous forms of transition being found and both forms of leaves appearing even in the same individual in proportion as the branches are exposed to the wind or sheltered.

Fam. 21. Campanulaceae.

91. **Campanula uniflora** L.

Lge. Consp. Fl. Grœnl. p. 92. Hartz Fanerog. p. 337. Dusén Gefässpfl. p. 43.

Northern coast-p.: Rather common, noted by all travellers.

Northern inlet-p.: Mackenzie Bugt (K. A. Gr.)! Scott Keltic Ö, Robertson Ö, Röhs Fjord (D.)!

Scoresby Sund: Rather common (H.)! Hurry Inlet, common (H. & K.)!

Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

92. **Campanula rotundifolia** L.

Lge. Consp. Fl. Grœnl. p. 93. Hartz Fanerog. p. 338. Dusén Gefässpfl. p. 44.

β arctica Lge. f. *uniflora* (Lge.).

Northern coast-p.: Clavering Ö (D.)!

Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Kjerulf Fjord, Moskusoxefjord (K. A. Gr.)! Scott Keltic Ö (A. G. N.)! Forsblad Fjord (D. H. & K.)! Kap Brown, Fleming Inlet, Kap Seaforth, Pingels Dal (H. & K.)!

Scoresby Sund: Common.

Kap Dalton-p.: Common.

Southern coast-p.: Kap Warming, Itivsalik, Vahls Fjord (K.)!

γ. stricta Schum.

Common in Danmarks Ö in cracks in the rocks up to 40 ctm. high (H.)!

The species grows as far north as 74° 10′ lat. N., but is not common in the coast region, it is on the other hand frequent in the interior of the country in table-land and herby slopes especially under vertical rocky walls.

Fam. 22. Compositae.

93. **Taraxacum phymatocarpum** J. Vahl.

Lge. Consp. Fl. Grœnl. p. 94. Dusén Gefässpfl. p. 44. Taraxac. phymat. f. albift. Kjellm. Hartz Fanerog. p. 338.

Northern coast-p.: Sabine Ö (all travellers)! Lille Pendulum Ö (A. G. N.)! Clavering Ö (D.)! Hold with hope (H. D.)!

Northern inlet-p.: Mackenzie Bugt (K. A. Gr.)! Ruth Ö, Scott Keltic Ö (A. G. N.)! Kap Seaforth (H. & K.)!

Scoresby Sund: Hurry Inlet (D. H. & K.)! Kap Stewart, Jameson Land, Danmarks Ö, Gaaseland (H. H. & K.)!

Forms with yellow and white (red) flowers are nearly equally common and do not seem to be distinctly separated. The species has not been observed south of Kap Stewart. 70° 25′ n. lat.

94. **Taraxacum croceum** Dahlst.

Dusén Gefässpfl. p. 46. Taraxacum officinale Web. Lge. Consp. Fl. Grœnl. p. 94 & 270. Hartz Fanerog. p. 338.

Commonly extended between 72° and 67°20′ lat. N., we have not observed it in our most northern places, Sabine Ö etc., wherefore also we suppose as already shown by Hartz l. c. that Sabine's Leontodan palustre floribus luteis must be classed within the preceding species.

95. **Hieracium alpinum** L.

Lge. Consp. Fl. Grœnl. p. 95. Hartz Fanerog. p. 338.

Scoresby Sund: Hurry Inlet, Jameson Land (H. & K.)! Danmarks Ö, Gaaseland, Mudderbugt (H.)!
Kap Dalton-p.: Turner Sund (H. & K.)!
Southern coast-p.: Skærgaards Halvöen (A.)! Kap Warming, Itivsalik, Vahls Fjord (K.)!

96. **Antennaria alpina** Gärtn.

Lge. Consp. Fl. Grœnl. p. 100. Hartz Fanerog. p. 339. Dusén Gefässpfl. p. 46.

Northern inlet-p.: Fleming Inlet (H. & K.)!
Scoresby Sund: Common.
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: The bay south of Storbræ, Skærgaards Halvöen (A.)! Nualik, Kap Warming, Itivsalik, Kap G. Holm, Vahls Fjord (K.)!

β. glabrata J. Vahl.

Northern inlet-p.: Fleming Inlet (H. & K.)!
Scoresby Sund: Hurry Inlet (H. & K.)! Danmarks Ö, Gaaseland (H.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Kap Warming (K.)!

97. **Erigeron compositus** Pursh.

Lge. Consp. Fl. Grœnl. p. 101. Hartz Fanerog. p. 339. Dusén Gefässpfl. p. 47.

Northern coast-p.: Sabine Ö (all travellers)! Lille Pendulum Ö, Dronning Augusta Dal, Clavering Ö (A. G. N.)!
Scoresby Sund: Hurry Inlet (D.)! Liverpool Kyst (H. & K.)! Jameson Land, Gaaseland (H.)!

In table-land in dry, sandy places as well near the sea as in greater height, rather rare except in the highest North, not observed south of 70° lat. N.

98. **Erigeron uniflorus** L. *β.* **pulchellus** Fr.

Lge. Consp. Fl. Grœnl. p. 102. Hartz Fanerog. p. 339. Dusén Gefässpfl. p. 47.

Northern coast-p.: Sabine Ö (Sabine, D, H. & K.)! Kap Borlase Warren (H. & K.)! Clavering Ö (D.)! Mackenzie Bugt (K. A. Gr.)!
Northern inlet-p.: Moskusoxefjord (K. A. Gr.)! Scott Keltic Ö (D.)! Fleming Inlet, Kap Seaforth (H. & K.)!
Scoresby Sund: Hurry Inlet (D. H. & K.)! Scsbsd. (H.)!
Kap Dalton-p.: Kap Dalton (H. & K.)! Turner Sund (H. & K.)!
Southern coast-p.: Skærgaards Halvöen (A.)! Kap Warming, Itivsalik, Vahls Fjord (K.)!

I am not able to distinguish E. eriocephalus Vahl from E. uniflorus L., and these species are therefore stated together. Vide Berlin l. c. and Rosenvinge, Andet Tillæg til Grönlands Fanerog. og Karkryptogamer p. 700.

99. **Arnica alpina** (L.) Mur.

Lge. Consp. Fl. Grœnl. p. 103. Hartz Fanerog. p. 339. Dusén Gefässpfl. p. 48.

Common in North East Greenland between 74° 30′ and 69° 25 lat. N.

100. **Matricaria inodora** L. v. **phaeocephala** Rupr.

Dusén Gefässpfl. p. 46.

Northern inlet-p-: Kjerulf Fjord (A. G. N.)!

In Eskimo ruins. The species has only been observed in this single place 73° 10′ lat. N. and only in slight numbers. The indi-

viduals are very vigorous and it is but little probable that this conspicuous plant might have avoided our attention in the numerous ruins we have visited; it is therefore not likely that it appears within the district visited by us, and its appearance in the above-named place is very difficult to explain, the more so, because it is only found in few places in West Greenland between 60° 15′ and 60° 55′ lat. N.

Fam. 23. Polygonaceae.

101. **Koenigia islandica** L.

Lge. Consp. Fl. Grœnl. p. 104 & 277. Hartz Fanerog. p. 339. Dusén Gefässpfl. p. 48.

Northern coast-p.: Sabine Ö (all travellers)! Kap Borlase Warren (H. & K.)! Mackenzie Bugt (K. A. Gr.)!
Northern inlet-p.: Antarctic Havn (A. G. N.)!
Scoresby Sund: Hurry Inlet (H. & K.)! Jameson Land (H. & K.)! Danmarks Ö, Gaaseland (H.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Nualik (K.)!

102. **Polygonum viviparum** L.

Lge. Consp. Fl. Grœnl. p. 105. Hartz Fanerog. p. 339. Dusén Gefässpfl. p. 48.

Common everywhere in East Greenland between 74° 30′ and 66° 20′ lat. N.

103. **Oxyria digyna** (L.) Campd.

Lge. Consp. Fl. Grœnl. p. 105. Hartz Fanerog. p. 340. Dusén Gefässpfl. p. 49.

Common everywhere in East Greenland.

104. **Rumex acetocella** L.

Lge. Consp. Fl. Grœnl. p. 106. Hartz Fanerog. p. 340. Dusén Gefässpfl. p. 49.

Northern inlet-p.: Kjerulf Fjord (D.)! Röhs Fjord (D.)! Forsblad Fjord (D. H. & K.)!
Scoresby Sund: Hurry Inlet, Kap Greg (H. & K.)! In the heads of the inlets up to 27 ctm. high (H.)!

Fam. 24. Salicaceae.

105. **Salix herbacea** L.

Lge. Consp. Fl. Grœnl. p. 106. Hartz Fanerog. p. 340. Dusén Gefässpfl. p. 49.

Northern coast-p.: Sabine Ö ♂ Fl. July (H. & K.)!
Northern inlet-p.: Forsblad Fjord (D.)! Antarctic Havn (A. G. N.)! Fleming Inlet, Kap Seaforth (H. & K.)!
Scoresby Sund: Common.
Kap Dalton-p. and southern coast-p.: Common.

106. **Salix arctica** Pall.

Lge. Consp. Fl. Grœnl. p. 108. Hartz Fanerog. p. 340. Dusén Gefässpfl. p. 50. Salix glauca Dusén l. c.

Commonly extended over the whole of N. E. Greenland and E. Greenland.

β. grœnlandica Lundstr.

Northern coast-p.: Sabine Ö, Kap Borlase Warren (H. & K.)! Mackenzie Bugt (K. A. Gr.)!
Scoresby Sund: Hurry Inlet (H. & K.)! Common in the interior.
Kap Dalton-p.: Kap Dalton (H. & K.)!

107. **Salix glauca** L.

Lge. Consp. Fl. Grœnl. p. 110. Hartz Fanerog. p. 341.

Scoresby Sund: Common in the interior (H.)!
Kap Dalton-p.: Kap Dalton (H. & K.)!
Southern coast-p.: Common.

f. *subarctica* (And.) Lundstr.

Scoresby Sund: Hurry Inlet (H. & K.)!

Fam. 25. Betulaceae.

108. **Betula nana** L.

Lge. Consp. Fl. Grœnl. p. 112 & 280. Hartz Fanerog. p. 341. Dusén Gefässpfl. p. 50.

Northern inlet-p.: Common, observed by all travellers. Most northern finding-place 73° 40′, Moskusoxefjord (K. A. G.)!
Scoresby Sund: Common.
Kap Dalton-p.: Common.
Southern coast-p.: Not observed between 69° 25′ and 66° 20′ lat. N.

The species likes heath and table-land in the interior of the country.

Fam. 26. Liliaceae.

109. **Tofieldia palustris** Huds.

F. borealis Wbg. Lge. Consp. Fl. Grœnl. p. 122. Hartz Fanerog. p. 342. Dusén Gefässpfl. p. 51.

Northern inlet-p.: Moskusoxefjord, Scott Keltic Ö (K. A. Gr.)! Röhs Fjord (D.)! Antarctic Havn (A. G. N.)! Forsblad Fjord (H. & K.)!
Scoresby Sund: Hurry Inlet.
Kap Dalton-p.: Not observed.
Southern coast-p.: Itivsalik (K.)!

110. **Tofieldia coccinea** Richards.

Rosenvinge, 2. Tillæg til Consp. Fl. Grœnl. p. 712. Hartz Fanerog. p. 342. Dusén Gefässpfl. p. 51.

Northern inlet-p.: Forsblad Fjord (A. G. N. H. & K)! Rhedin Fjord (A. G. N)!
Scoresby Sund: Hurry Inlet (H. & K.)!

Fam. 27. Juncaceae.

111. **Juncus biglumis** L.

Lge. Consp. Fl. Grœnl. p. 122 & 284. Hartz Fanerog. p. 342. Dusén Gefässpfl. p. 52. Ostenf. Fl. arct. p. 25.

Pools and humid herby slopes; not common north of Scoresby Sund.

Northern coast-p.: Sabine Ö, common, Kap Borlase Warren (K.)! Hold with hope (H.)! Kap Bror Ruys (C. & P.)!

Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Ruth Ö, Bontekoe Ö. Scott Keltic Ö (A. G. N. D.)! Forsblad Fjord (N. K.)! Ørsteds Dal (H. & K.)! Fleming Inlet, 17 ctm. high (K.)!

Scoresby Sund: Common (H.)! Hurry Inlet (D.)! Liverpool Kyst, Jameson Land (20 ctm. high) and the cleft in Hurry Inlet (K.)! Nordostbugt (H.)!

Kap Dalton-p.: Turner Sund (K.)!

Southern coast-p.: Not observed between 69° 30′ and 66° 20′.

112. **Juncus triglumis** L.

Lge. Consp. Fl. Grœnl. p. 123 & 284. Hartz Fanerog. p. 342. Dusén Gefässpfl. p. 52. Ostenf. Fl. arct. p. 25.

In pools; very rare.

Northern coast-p.: Kap Borlase Warren (in a rill, 5 ctm. high (K.)!

Northern inlet-p.: Ruth Ö, Forsblad Fjord (D.)!

Scoresby Sund: Not common in the interior, Röde Ö, Renodde, Ispynt, Hurry Inlet (D.)!

Var. **Copelandi** Buch.

Zweite Deutsche Nordpolsf. p. 51.

Franz Joseph Fjord (C. & P)! Turner Ö (K.)! 900 m. s. m.

113. **Juncus castaneus** Sm.

Lge. Consp. Fl. Grœnl. p. 123 & 284. Hartz Fanerog. p. 343. Dusén Gefässpfl. p. 52. Ostenf. Fl. arct. p. 24.

Northern coast-p.: Clavering Ö (N.)!

Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Röhs Fjord, Forsblad Fjord (D.)!

Scoresby Sund: In pools, Jameson Land, Danmarks Ö, Ispynt (H.)! Hurry Inlet (D.)! Liverpool Kyst and Ryders Dal (K.)!

114. **Juncus trifidus** L.

Lge. Consp. Fl. Grœnl. p. 123 & 284. Hartz Fanerog. p. 343. Ostenf. Fl. arct. p. 26.

Scoresby Sund: In dry slopes, thickets and table-land; more rare in heath. In the interior, Danmarks Ö, Gaaseland, Röde Ö, up to 20 ctm. high (H.)!

Southern coast-p.: Turner Sund in table-land (K.)! Not observed between 69° 30′ and 67° 16′. Commonly extended south of 67° 16′ in table-land and heath.

115. **Juncus arcticus** Willd.

Lge. Consp. Fl. Grœnl. p. 124 & 284. Hartz Fanerog. p. 343. Dusén Gefässpfl. p. 52. Ostenf. Fl. arct. p. 24.

Northern inlet-p.: Röhs Fjord, Forsblad Fjord (D.)! Örsteds Dal 25 ctm. (K.)!

Scoresby Sund: Common in the interior (H.)! Jameson Land (H.)! Ryders Dal, downs at Bielven 40 ctm. high (H.)! Liverpool Kyst (K.)!

116. **Luzula multiflora** (Ehrh.) Lge.

Lge. Consp. Fl. Grœnl. p. 125 & 285. Hartz Fanerog. p. 343. Ostenf. Fl. arct. p. 31. L. campestris D. E. * frigida Buchen. Dusén Gefässpfl. p. 53.

In thickets up to 45 ctm. high.

Scoresby Sund: Röde Ö (H.)! Hurry Inlet (D.)!

117. **Luzula arcuata** (Wbg.) Sw. *β.* **confusa** Lindeb.

Lge. Consp. Fl. Grœnl. p. 127 & 285. L. confusa Lindeb. Hartz Fanerog. p. 343. Dusén Gefässpfl. p. 53.

In table-land and heath, often snow-less in winter. Common everywhere in North East Greenland, observed by all travellers.

f. *subspicata* Lge.

Northern coast-p.: Sabine Ö (K.)! Kap Borlase Warren (K.)!

Northern inlet-p.: Forsblad Fjord, Kap Brown, Kap Greg.

118. **Luzula nivalis** (Læst.) Beurl.

Gelert: Ostenf. Fl. arct. p. 30. L. arctica Blytt. Lge. Consp. Fl. Grœnl. p. 127. Hartz Fanerog. p. 343. Dusén Gefässpfl. p. 54.

Northern coast-p.: Lille Pendulum Ö (A. G. N.)! Sabine Ö, Kap Borlase Warren (H. & K.)! Hold with hope in dry clay-field (H.)!

Scoresby Sund: Hurry Inlet (H. & K.)! Liverpool Kyst (H. & K.)!

f *pygmaea* Hartz.

Scoresby Sund: Jameson Land (H.)!

119. **Luzula spicata** (L.) D. C.

Lge. Consp. Fl. Grœnl. p. 128 & 286. Hartz Fanerog. p. 344. Dusén Gefässpfl. p. 53.

In herby slopes and copses of willows, snow covered in winter.

Scoresby Sund: Danmarks Ö (up to 25 ctm.), Gaaseland, Röde Ö, Kobberpynt and several places, especially in the inner inlets (H.)! Hurry Inlet (D.)! The cleft in Hurry inlet (K.)!

Kap Dalton-p.: Kap Dalton (H. & K.)! Turner Sund (K.)!

Southern coast-p.: Kap Irminger (A.)! Nualik (K.)! Kap Warming (K.)! Itivsalik (K.)! Valds Fjord (K.)!

Fam. 28. Cyperaceae.

120. **Scirpus caespitosus** L. f. **austriaca** Pall.

Sc. caespitos. Lge. Consp. Fl. Grœnl. p. 129 & 286. Rosenv. Till. p. 716. Ostenf. Fl. arct. p. 43.

Southern coast-p.: Itivsalik (K.)!

121. **Eriophorum Scheuchzeri** Hoppe.

Lge. Consp. Fl. Grœnl. p. 129. Hartz Fanerog. p. 344. Dusén Gefässpfl. p. 54.

Common everywhere in East Greenland.

122. **Eriophorum polystachium** L.

Buchenau & Focke Zweite deutsche Nordpolsfarth p. 53. Ostenf. Fl. arct. p. 53. E. angustifolium Roth. Lge. Consp. Fl. Grœnl. p. 130 & 287. Hartz Fanerog. p. 344. Dusén Gefässpfl. p. 54.

Common everywhere in East Greenland.

123. **Elyna Bellardi** (All.).

Lge. Consp. Fl. Grœnl. p. 130 & 287. Hartz Fanerog. p. 344. Ostenf. Fl. arctica. p. 44. Carex parallela Dusén p. 54.

Northern coast-p.: Sabine Ö and Kap Borlase Warren (K.)! Kap Bror Ruys (C. & P.)!
Northern inlet-p.: Franz Joseph Fjord and Röhs Fjord (D.)! Kong Oscar Fjord (H.)! Forsblad Fjord (D., K.)!
Scoresby Sund: Common (H.)! Hurry Inlet (D. H. & K.)!

124. **Kobresia bipartita** (All.) Britton.

Ostenf. Fl. arct. p. 44. K. caricina. Lge. Consp. Fl. Grœnl. p. 130 & 287. Hartz Fanerog. p. 344.

Rare, up to 20 ctm. high (H.)!

Northern inlet-p.: Franz Joseph Fjord (C. & P.)!
Scoresby Sund: Ispynt in Vestfjord (H.)!

125. **Carex nardina** Fr.

Lge. Consp. Fl. Grœnl. p. 131 & 287. Hartz Fanerog. p. 345. Dusén Gefässpfl. p. 55. Ostenf. Fl. arct. p. 48.

Common everywhere in table-land and in other dry places.

126. **Carex dioica** L. v. **parallela** Læstad.

Ostenf. Fl. arct. p. 60. C. parallela, Hartz Fanerog. p. 344 (non Dusén). C. gynocrates Wormsky, Rosenv. Till. p. 717.

In humid pools.

In the innermost of Scoresby Sund: Ispynt in Vestfjord, Röde Ö, tentplace at Röde Ö. rare (H.)!

127. **Carex capitata** Soland.

Lge. Consp. Fl. Grœnl. p. 132 & 287. Rosenv. Till. p. 718. Ostenf. Fl. arct. p. 49.

Southern coast-p.: Lilleö 66° 58′ n. Br. (K.)!

128. **Carex ursina** Dew.

Lge. Consp. Fl. grœnl. p. 132 & 267. Dusén Gefässpfl. p. 55. Ostenf. Fl. arct. p. 59.

Northern coast-p.: Kap Borlase Warren (H. & K.)!
Northern inlet-p.: Röhs Fjord (D.)!
Scoresby Sund: Hurry Inlet (D. H. & K.)!
Kap Dalton-p.: Dunholm (H. & K.)!

129. **Carex scirpoidea** Michx.

Lge. Consp. Fl. Grœnl. p. 132 & 287. Hartz Fanerog. p. 345. Dusén Gefässpfl. p. 55. Ostenf. Fl. arct. p. 82.

Northern inlet-p.: Fleming Inlet (H. & K.)!
Scoresby Sund: Hurry Inlet (D. H. & K.)! Liverpool Kyst (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Lilleö, Jagos Fjord (K.)!

130. **Carex microglochin** Wbg.

Lge. Consp. Fl. Grœnl. p. 133 & 288. Hartz Fanerog. p. 345. Ostenf. Fl. arct. p. 92.

Scoresby Sund: In humid pools among sphagna, not common, in the inner part of Scoresby Sund, in Danmarks Ö, Röde Ö, Vestfjord (H.)!

131. **Carex rupestris** All.

Lge. Consp. Fl. Grœnl. p. 133 & 288. Hartz Fanerog. p. 345. Dusén Gefässpfl. p. 55. Ostenf. Fl. arct. p. 86.

Northern coast-p.: Sabine Ö, Kap Borlase Warren (H. & K.)! Clavering Ö (A. G. N.)!
Northern inlet-p.: Forsblad Fjord (A. G. N.)!

Scoresby Sund: Common.
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

132. **Carex incurva** Lightf.

Lge. Consp. Fl. Grœnl. p. 133 & 288. Hartz Fanerog. p. 345. Ostenf. Fl. arct. p. 49.

In sand in humid places, banks of rivers, pools and the like, rather rare.

Northern coast-p.: Kap Borlase Warren (H. & K.)! Clavering Ö. Bontekoe Ö (D.)!
Northern inlet-p.: Kap Seaforth in Örsteds Dal, Scott Keltic Ö (D.)!
Scoresby Sund: Jameson Land and Gaasefjord (Hartz l. c.), Ryders Dal on Bielven; in a stony plain; in a humid little down Fame Öer (H. & K.)!

133. **Carex Macloviana** D. Urv.

Ostenf. Fl. arct. p. 54. C. festiva Dewey. Lge. Consp. Fl. Grœnl. p. 134 & 288. Hartz Fanerog. p. 345.

Scoresby Sund: In herby slopes, copse and table-land, but only in Gaaseland (H.)!

134. **Carex lagopina** Wbg.

Lge. Consp. Fl. Grœnl. p. 135 & 288. Hartz Fanerog. p. 346. Dusén Gefässpfl. p. 56. Ostenf. Fl. arct. p. 58.

In pools, at melting snow-drifts, on the beach etc.

Northern inlet-p.: Sabine Ö, Lille Pendulum Ö (D.)!
Northern coast-p.: Kap Seaforth (H. & K.)! Fleming Inlet (K.)!
Scoresby Sund: Hurry Inlet (D.)! Klöften and Jameson Land (K.)! Kap Stewart (D.)!
Common in Scoresby Sund (H.)!
Southern coast-p.: Kap Irminger, Skærgaards Halvöen (A.)!

135. **Carex alpina** Sw.

Lge. Consp. Fl. Grœnl. p. 138 & 289. Hartz Fanerog. p. 346.

Scoresby Sund: Danmarks Ö, rare (H.)!

136. **Carex misandra** R. Br.

Lge. Consp. Fl. Grœnl. p. 139 & 289. Hartz Fanerog. p. 346. Dusén Gefässpfl. p. 57. Ostenf. Fl arct. p. 88.

Common between 75° and 79°30′. In heath and table-land, always snow-covered in winter (H.)!

137. **Carex glareosa** Wbg.

Lge. Consp. Fl. Grœnl. p. 137 & 289. Rosenv. Till. p. 720. Ostenf. Fl. arct. p. 58. C. ursina Hartz Fanerog. p. 345.

On clayey and sandy flats near the high-water mark.

Northern coast p.: Sabine Ö (H. & K.)!
Kap Dalton-p.: Kap Dalton, Dunholm (H. & K.)!
Southern coast-p.: Kap Irminger (A.)! Itivsalik (K.)!

138. **Carex bicolor** All.

Lge. Consp. Fl. Grœnl. p. 138. Ostenf. Fl. arct. p. 79.

Southern coast-p.: Only found in N.-Aputitek 67°48′ (A)!

f. *rostrata* Ostenf.

Perigynium plano-convex., rostro brevi integro.

Scoresby Sund: In a pool in Jameson Land at the Nordostbugt (H. & K.)!

139. **Carex salina** Wbg. f. **subspathacea** (Wormsky).

Ostenf. Fl. arct. p. 73. C. subspathacea Dry. Lge. Consp. Fl. Grœnl. p. 140 & 288. Hartz Fanerog. p. 346. Dusén Gefässpfl. p. 56.

In clay and sand on the beach.

Northern coast-p.: Sabine Ö (D. H. & K.)!
Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Scott Keltic Ö (A. G. N.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Jameson Land and Danmarks Ö (1—5 ctm. high) (H.)! Kap Stewart and Hurry Inlet (D.)!
Kap Dalton-p.: Dunholm (H. & K.)!

140. **Carex rigida** (Good.)

Ostenf. Fl. arct. p. 77. Lge. Consp. Fl. Grœnl. p. 145 & 291. Rosenv. Till. p. 723. Hartz Fanerog. p. 392. C. hyperborea Drej. Lge. l. c. p. 160 & 290. Hartz l. c. p. C. Bigelowii. C. saxatilis. C. Fyllæ Holm. C. Warmingii Holm. C. vulgaris Fr. C. stans. Dry. C. limula Fr. C. grœnlandica Lge. C. Drejeriana. Lge l. c.

Northern inlet-p.: Fleming Inlet (H. & K.)!
Scoresby Sund: Common.

f. *Bigelowii* Tuch.

C. hyperborea Drejer. Hartz l. c.

Northern inlet-p.: Forsblad Fjord (H. & K.)!
Southern coast-p.: Kap Vedel, Skærgaards Halvöen (A.)!

141. **Carex capillaris** L.

Lge. Consp. Fl. Grœnl. p. 148 & 292. Hartz Fanerog. p. 346. Dusén Gefässpfl. p. 57. Ostenf. Fl. arct. p. 90.

In heath and table-land, especially in clefts, snow-covered in winter (Hartz)!

Northern inlet-p.: Franz Joseph Fjord (D.)! Kjerulf Fjord (D.)!
Scoresby Sund: Several places (H.)! Hurry Inlet (D. H. & K.)! Liverpool Kyst (K.)! Jameson Land at Nordostbugt (H.)!
Kap Dalton-p.: Turner Sund (K.)! Henry Ö, 850 M. above the sea (Koch)!
Southern coast-p.: Kap Jörgensen (Itivsalik) (K.)!

142. **Carex rariflora** (Wbg.) Sm.

Lge. Consp. Fl. Grœnl. p. 150 & 292. Hartz Fanerog. p. 347. Dusén Gefässpfl. p. 57. Ostenf. Fl. arct. p. 67.

In pools, on banks of rivers and lakes, up to 15 ctm. high (Hartz)!
Scoresby Sund: Danmarks Ö and Röde Ö (H.)! Hurry Inlet (D.)! Jameson Land at the Nordvestbugt (H.)! Rare.

143. **Carex pedata** Wbg.

Lge. Consp. Fl. Grœnl. p. 151 & 293. Hartz Fanerog. p. 347. Ostenf. Fl. arct. p. 87.

In table-land, especially in cracks in the rocks.

Scoresby Sund: Not rare. Danmarks Ö, Gaasefjord, Röde Ö.
Kap Dalton-p.: Turner Sund (K.) 69° 44′.
Southern coast-p.: Langö. 67° 5′.

144. **Carex supina** Wbg.

Lge. Consp. Fl. Grœnl. p. 151 & 293. Hartz Fanerog. p. 347. Dusén Gefässpfl. p. 57. Ostenf. Fl. arct. p. 95.

Northern inlet-p.: The inner part of Kjerulf Fjord (Dus.).
Scoresby Sund: In table-land and dry cracks, together with dry pools in the inner part (H.)!

145. **Carex rotundata** Wbg.

Lge. Consp. Fl. Grœnl. p. 152 & 293. Rosenv. Till. p. 724. Ostenf. Fl. arct. p. 94.

Scoresby Sund: Only found in a pool at the Nordostbugt (H. & K.)!

146. **Carex pulla** Good.

Lge. Consp. Fl. Grœnl. p. 153 & 293. Hartz Fanerog. p. 347. Dusén Gefässpfl. p. 57. Ostenf. Fl. arct. p. 95. C. saxatilis L.

Northern inlet-p.: Forsblad Fjord (D. H. & K.)! Kap Seaforth (Örsted Dal) (H. & K.)!
Scoresby Sund: In pools and puddles, exceedingly common (H.), several places in Hurry Inlet, in pools at the Nordostbugt (H. & K.)!

Fam. 29. Gramineae.

147. **Alopecurus alpinus** Sm.

Lge. Consp. Fl. Grœnl. p. 156. Hartz Fanerog. p. 347. Dusén Gefässpfl. p. 57. Ostenf. Fl. arct. p. 99.

Northern coast-p: Commonly extended and observed by all travellers.
Northern inlet-p.: Scott Keltic Ö, Bontekoe Ö (D.)!
Scoresby Sund: Common in the outer parts, not observed in the inner inlets (H.)! Common in Hurry Inlet (H. & K.)!
Kap Dalton-p.: Turner Sund (H. & K.)!

The species likes sandy and clayey humid flats and manured places (old Eskimo places of residence) and is certainly commonly extended over the whole of the coast north of 69° 25′ lat. N., it is on the other hand not found in the corresponding localities of the interior. It is upon the whole not observed south of 69° 25′, nor is it certainly found, while it grows as far south as 61° 53′ in West Greenland and is not rare there north of 66° lat. N.

148. **Hierochloa alpina** (Lilljebl.) R. & S.

Lge. Consp. Fl. Grœnl. p. 157. Hartz Fanerog. p. 348. Dusén Gefässpfl. p. 58.

Northern coast-p.: Shannon Ö (C. & P.)! Sabine Ö (all travellers)! Kap Borlase Warren (H. & K.)! Hvalros Ö, Clavering Ö (D.)! Hold with hope (H.)!
Northern inlet-p.: Kjerulf Fjord, Scott Keltic Ö, Röhs Fjord, Forsblad Fjord, Kap Parry (D.)! Antarctic Havn (A. G. N.)! Kap Greg (H. & K.)!
Scoresby Sund: Very common, up to 50 ctm. high (H.)! Common in Hurry Inlet (H. & K.)!

The species has not been observed south of 70° lat. N. on the east coast except a single locality 61° 32′, Anoritak (Vahl), that must be considered in coherence with the southern west coast. It is commonly extended from 70° to the most northern visited points as in the corresponding parts of West Greenland, wherefore its appearance certainly must be considered as coherent.

149. **Agrostis borealis** Hartm.

Murb. in Bot. Not. 1898. p. 11. Ostenf. Fl. arct. p. 109. A. rubra L. Lge. Consp. Fl. Grœnl. p. 157 & 295. Hartz Fanerog. p. 348.

Scoresby Sund: Danmark Ö, tentplace at Röde Ö, not common (H.)!

f. *mutica* Hartz l. c.

Scoresby Sund: Röde Ö (H.)!

Only found in the interior of Scoresby Sund and here not common, besides not observed on the coast north of 66°20′ lat. N.

150. **Calamagrostis arundinacea** (L.) Roth.

Ostenf. Fl. arct. p. 102. C. purpurascens R. Br. Lge. Consp. Fl. Grœnl. p. 160. Hartz Fanerog. p. 348. Dusén Gefässpfl. p. 58. C. hyperborea Dusén (non Lge.) l. c. p. 58.

Northern coast-p.: Clavering Ö (D.)!

Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Kjerulf Fjord, Röhs Fjord (D.)! Forsblad Fjord (D. H. & K.)! Polhelms Dal, Kap Greg (H. & K.)!

Scoresby Sund: Common everywhere (H.)! Hurry Inlet common (H. & K.)!

Kap Dalton-p.: Turner Sund (H. & K.)! Stewart Ö (Kock)!

This considerable species forms often thick plantations on the slopes and reaches a height of 50—70 ctm. in the interior of the country; it is very rare immediately near the sea and reaches there only a height of 20—25 ctm. It has upon the whole not been found south of 69°35′ lat. N. in East Greenland.

151. **Calamagrostis neglecta** (Ehrh.) Gelert

Ostenf. Fl. arct. p. 103. C. stricta β borealis. Lge. Consp. Fl. Grœnl. p. 161. Hartz Fanerog. p. 348. Dusén Fanerog. p. 58.

In pools, in sandy flats and on lakes.

Northern inlet-p.: Antarctic Havn (A. G. N.)! Kap Seaforth (H. & K.)!

Scoresby Sund: Hurry Inlet at Ryders Elv (H. & K.)! Nordostbugt (H. & K.)! Kingua Gaasefjord, Vestfjord (H.)!

152. **Aira cæspitosa** L. f. **alpina** (L.).

Ostenf. Fl. arct. p. 113. A. alpina. Lge. Consp. Fl. Grœnl. p. 163 & 296. A. brevifolia Buchenau & Focke l. c. p. 54. Hartz Fanerog. p. 348.

Northern coast-p.: (Sabine!) Sabine Ö (H. & K.)! Kap Phillip Broke (C. & P.)! Hold with hope (H.)!

The collected specimen is small, c. 7 ctm. high and was found in a paved clayey flat near Germania Havn. Outside the range 73° 30′—70° 30′ lat. N. the species is found only south of 66° 20′ lat. N. and certainly it does not occur on the interjacent coast.

153. **Trisetum subspicatum** (L.) Beauv.

Lge. Consp. Fl. Grœnl. p. 164 & 297. Hartz Fan. and Karkrypt. p. 349. Dusén Gefässpfl. p. 59. Ostenf. Fl. arct. p. 110.

Commonly extended everywhere in North East Greenland and observed by all travellers in numerous localities as well near the sea as in the interior of the inlets.

154. **Pleuropogon Sabinei** R. Br.

Lge. Consp. Fl. Grœnl. p. 297. Dusén Gefässpfl. p. 59.

In shallow ponds.

Northern inlet-p.: Mackenzie Bugt 73° 50′ n. Lat. (Gredin)!
Scoresby Sund: Hurry Inlet (Arfvidson)! Pond at Ulveodde. Several ponds on the side of the Liverpool Kyst opposite Fame Öer (H. & K.)!

This remarkable species was first found by Cand. Arvidsen on the Nathorst expedition in 1899 and we found it in several places on Hurry Inlet, and at the same time it was collected far more to the north by Gredin. It is possibly more extended than stated by these few finding-places, but being little conspicuous and easily hiding itself between Carex rariflora to which it bears an outward resemblance, it is easily overlooked which may possibly explain its peculiar appearance.

155. **Dupontia Fischeri** R. Br.

Chloris Melvilliana p. 33. Gelert in Ostenf. Fl. arct. p. 114. Dupontia psilosantha Rupr. Lge. Consp. Fl. Grœnl. p. 165.

Northern coast-p.: Sabine Ö (H. & K.)!
Scoresby Sund: Hurry Inlet Klöften (H. & K.)!

Geograf-distribution: West Greenl. 69° 20′—70° 40′ and 81°30′ lat. N. Arct. America—Asia Spitsbergen. Frantz Joseph Land. Novaya Zemlya—NE. Amerika, N. Russia.

In grassy slopes in humid places.

156. **Phippsia algida** R. Br.

Chloris Melvilleana. Gelert in Ostenf. Fl. arct. p. 101. Catabrosa algida (Sol) Fr. Lge. Consp. Fl. Grœnl. p. 166 & 298. Hartz Fanerog. p. 349. Dusén Gefässpfl. p. 59.

Northern coast-p.: Shannon Ö (C. & P.)! Sabine Ö (H. & K.)! Hold with hope (H.)! Hvalros Ö (Gr.)!

Northern inlet-p.: Kap Bennet (D.)! Franz Joseph Fjord (C. & P.)! Fleming Inlet (H. & K.)!

Scoresby Sund: Common especially in the outer part (H.)! Hurry Inlet; common (H. & K.)!

Kap Dalton-p.: Turner Sund, Kap Dalton, Dunholm (H. & K.)!

Southern coast-p.: N.-Aputitek (Amdrup)! Nualik, Kajarsak, Kap Hildebrandt, Kap Warming (K.)!

The species is common south of Scoresby Sund attaining there especially in the manured places round house ruins and in tent-places a considerable size and luxuriance. Straws of a length of 15 ctm. are not rare and it forms a cover together with Cerastium trigynum. It appears less frequently more to the north and then in humid places and most often near the sea.

157. **Arctagrostis latifolia** (R. Br.) Griseb.

Ledebour Fl. Ross. IV. p. 434. Ostenf. Fl. arct. p. 107. Colpodium latifolium. Lge. Consp. Fl. Grœnl. p. 166. Hartz Fanerog. p. 349. Dusén Gefässpfl. p. 59.

Northern coast-p.: Sabine Ö (H. & K.)! Kap Borlase Warren (D. H. & K.)! Kap Bror Ruys (C. & P.)!

Northern inlet-p.: Moskusoxefjord (Gr.)! Franz Joseph Fjord (C. & P.)! Scott Keltic Ö, Sofia Sund (A. G. N.)!

Scoresby Sund: Common east of Danmarks Ö, but not found in the interior (H.)! Hurry Inlet common (D. H. & K.)!

The species reaches a height of up to 50 ctm. and is only found in the outer part of the inlets, besides along the outer coast, and is rather common. It has not been observed south of 70° lat. N.

158. **Glyceria distans** (L.) Wbg.

Gelert in Ostenf. Fl. arct. p. 127. G. Borreri Lge. Consp. Fl. Grœnl. p. 167. G. arctica Lge. l. c. p. 169. G. vaginata Lge. l. c. p. 168. G. angustata Dusén Gefässpfl. p. 60.

Northern inlet-p.: Kjerulf Fjord (A. G. N., D.)!
Scoresby Sund: Hurry Inlet on Ryder Elv, Hurry Inlet the side of Jameson Land (H. & K.)!

This species was found in a few localities in Hurry Inlet, but only very scarcely in humid, clayey sandy flats, washed out by the river. It formed spread tufts with a space of several meters between them alternating with as many spread individuals of G. maritima. Farther up in the country where the ground was somewhat more dry, a thicker plantation was found mixed up with Potentilla pulchella, Taraxacum phymatocarpun, Carex ursina and Salix grœnlandica. The species has not before been stated from East Greenland, but going through the collections from the Nathorst expedition in Stockholm and Upsala I found under the indication of G. angustata specimens that undoubtedly must be reckoned within this.

159. **Glyceria maritima** (Huds.) Wbg. f. **vilfoidea** And.

Lge. Consp. Fl. Grœnl. p. 168 & 299. G. vilfoidea Lge. l. c. p. 170 & 300. Hartz Fanerog. p. 349. Dusén Gefässpfl. p. 60.

Northern coast-p.: Sabine Ö (A. G. N. H. & K.)! Kap Borlase Warren (H. & K.)! Dronning Augusta Dal (A. G. N.)!
Northern inlet-p.: Forsblad Fjord (A. G. N.)! Polhems Dal (H. & K.)! Kap Seaforth (H. & K.)!
Scoresby Sund: Jameson Land, Danmark Ö, Röde Ö, Nordvestfjord, Gaasefjord and several other places (H.)! Hurry Inlet (A. C. N.)! Fame Öer, the side of Jameson Land in Hurry Inlet, Ulveodde, Liverpool Kyst, Kap Hope, Kap Stewart, Kap Tobin, Nordostbugt (H. & K.)! Stony plain on Bielven (H. & K.)!
Kap Dalton-p.: Turner Sund, Dunholm (H. & K.)!

160. **Glyceria angustata** (R. Br.) Fr.

Lge. Consp. Fl. Grœnl. p. 171 & 300. Hartz Fanerog. p. 349 ex parte. Dusén Gefässpfl. p. 60.

Northern inlet-p.: Vega Sund (D.)! Kjerulf Fjord (D.)!
Scoresby Sund: Jameson Land (H.)! Nordostbugt, Ryders Dal, Fame Öer (H. & K.)!

Going through the collections of the Nathorst expedition I found the above-named specimens which I class within this species. It appears in stony sand near the water. The species has not been observed between 70° and 66° lat. N.

161. **Glyceria Vahliana** (Liebm.) Th. Fr.

Lge. Consp. Fl. Grœnl. p. 171 & 300. G. angustata Hartz Fanerog. p. 349 ex parte. Ostenf. Fl. arct. p. 126.

Scoresby Sund: Kap Stewart (H. 1895), Ryders Dal, Hurry Inlet on the side of the Liverpool Kyst (H. & K.)!

Going through the previous collections I found among the glycerias collected by Hartz one that must certainly be classed within this species which was also done by the late Gelert in Fl. arct. l. c.

162. **Poa abbreviata** R. Br.

Lge. Consp. Fl. Grœnl. p. 172. Hartz Fanerog. p. 349. Dusén Gefässpfl. p. 60.

Northern coast.p.: Sabine Ö (H. & K.)! Lille Pendulum Ö, Hvalros Ö (D.)! Kap Borlase Warren (D. H. & K.)! Clavering Ö (C. & P.)!
Northern inlet-p.: Franz Joseph Fjord (C. & P.)!
Scoresby Sund: Jameson Land (H.)! Hurry Inlet (A. G. N.)!

The species is commonly extended in the northern coast part and appears else but very spread which is also consistent with its high arctic extension in other respects. It must most reasonably be looked on as a high arctic form of P. laxa the northern limit of which is also nearly identical with its southern limit and to which it bears very great resemblance.

163. **Poa glauca** M. Vahl.

Lge. Consp. Fl. Grœnl. p. 172. Hartz Fanerog. p. 350. Dusén Gefässpfl. p. 60.

a. genuina Lge.

Commonly extended over the whole of the east coast in tableland and heath.

β. elatior Anderson.

Scoresby Sund: Commonly extended in the interior (H.)! Hurry Inlet; common, Fame Öer (H. & K.)!

γ. palida Lge.

Southern coast-p.: Kap Irminger (A.)!

δ. abroviolacea Lge.

Scoresby Sund: Kap Stewart (H.)!
Kap Dalton-p.: Turner Sund (H. & K.)!

f. *arenaria* Hartz l. c.

Scoresby Sund: Jameson Land (H.)! Ryders Dal in downs (H. & K.)!

164. **Poa nemoralis** L. v. **palida** Lge.

Lge. Consp. Fl. Grœnl. p. 175. Hartz Fanerog. p. 350.

Scoresby Sund: In a humid crack in the rock in mica-slate, in shelter, snow-covered in winter, Danmarks Ö (H.)!

165. **Poa alpina** L.

Lge. Consp. Fl. Grœnl. p. 176 & 302. Hartz Fanerog. p. 350. Dusén Gefässpfl. p. 61.

Northern coast-p.: Lille Pendulum Ö, Kap Borlase Warren (D.)! Hold with hope.
Northern inlet-p.: Kjerulf Fjord (D.)! Antarctic Havn, Scott Keltic Ö (A. G. N.)!
Scoresby Sund: Common (H.)! Hurry Inlet (H. & K.)! Kap Stewart (D.)!

f. *vivipara.*

Northern inlet-p.: Kap Seaforth (H. & K.)!

Scoresby Sund: In the outer parts (H.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Storbræ (Amdrup)! Kap Warming, Itivsalik (K.)!

166. **Poa pratensis** L.

Lge. Consp. Fl. Grœnl. p. 176 & 301. Hartz Fanerog. p. 350.

Northern inlet-p.: Kap Brown, Kap Greg (H. & K.)!
Scoresby Sund: Commonly extended (H.)! Hurry Inlet; common (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: Kap Grivel (Amdrup)! Kap Warming (K.)!

The northern limit of the species is at 71° 50′ lat. N.

167. **Poa cenisia** All.

Gelert in Ostenf. Fl. arct. p. P. flexuosa Wbg. Lge. Consp. Fl. Grœnl. p. 178 & 302. Hartz Fanerog. p. 351. Dusén Gefässpfl. p. 61. P. filipes Lge. l. c. p. 175. P. laxa R. Br. and P. arctica R. Br. Buchenau & Focke.

Common everywhere in East Greenland and observed by all travellers.

168. **Festuca ovina** L.

Rosenv. Till. p. 735 & 736. Lge. Consp. Fl. Grœnl. p. 179 & 302. Hartz Fanerog. p. 351. Dusén Gefässpfl. p. 62. Buchenau & Focke. Festuca duriuscula L. Lge. l. c. p. 180. F. Richardsonii Hook Lge. l. c. 181. F. *borealis Lge. l. c. 179. F. brevifolia R. Br. Lge. l. c. 179.

Common everywhere in East Greenland and observed by all travellers. The species is very variable, but the variations pass so evenly into each other that it is very difficult to separate them when a greater material is looked at; I therefore put down only the main species and do not state localities for any one of the forms. It is besides my conviction that all forms may be found in nearly every locality if one occupies oneself specially with them.

169. **Festuca rubra** L. var. **arenaria** (Osb.).

Lge. Consp. Fl. Grœnl. p. 180 & 302. Hartz Fanerog. p. 352. Dusén Gefässpfl. p. 62.

Northern coast,p.: Kap Borlase Warren (H. & K.)!
Northern inlet-p.: Kjerulf Fjord (D.)! Forsblad Fjord (A. G. N.)! Kap Seaforth, Fleming Inlet (H. & K.)!
Scoresby Sund: Jameson Land, common in the interior of the inlets (H.)! Hurry Inlet (H. & K.)!

Appears especially in sandy and gravelly flats and is down forming where there is sand-drift. It is more frequent in the interior of the country than on the outer coast because localities convenient for it are oftener found there than on the cleansed coast.

Fam. 30. Lycopodiaceae.

170. **Lycopodium Selago** L. f. **appressa** Desv.

Lge. Consp. Nr. 356 p. 303. Dusén Gefässpfl. p. 62. Hartz Fanerog. p. 352.

Northern coast-p.: Sabine Ö (D. H. & K.)! Hold with hope (H.)!
Northern inlet-p.: Sofia Sund (A. G. N.)! Scott Keltic Ö (D.)! Antarctic Havn (A. G. N.)!
Scoresby Sund: Common (H.)! Hurry Inlet, Jameson Land, Liverpool Kyst (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!
Southern coast-p.: N.-Tasiusak, Itivsalik, Lilleö, Vahls Fjord (K.)!

171. **Lycopodium annotinum** L. f. **pungens** Desv.
(= β alpestre Hartm.) Ostenf. Fl. arct. p. 12.

Lge. Consp. Fl. Grœnl. p. 184. Hartz Fanerog. a. Karkrypt. p. 352.

Scoresby Sund: Not found in the coast region north of 66° 20′ lat. N. (H.)!

172. **Lycopodium alpinum** L.

Lge. Consp. Fl. Grl. p. 184 & 303. Hartz Fanerog. p. 352.

Scoresby Sund: Not found on the coast region north of 66° 20′ lat. N. (H.)!

Fam. 31. Polypodiaceae.

173. **Aspidium fragrans** (L.) Sw.

Ostenf. Fl. arct. p. 5. Lastræa fragrans L. Lge. Consp. p. 186 & 305. Hartz Fanerog. p. 352.

Scoresby Sund: Only in Bregnepynt leaves of the length of 10—12 ctm. (H.)!

174. **Cystopteris fragilis** (L.) Bernh.

Lge. Consp. Fl. Grl. p. 188 & 306. Hartz Fanerog. a. Karkrypt. p. 352. Dusén Gefässpfl. p. 63. Ostenf. Fl. arct. p. 6.

Northern coast-p.: Sabine Ö (D. H. & K.)! Clavering Ö, Jackson Ö (C. & P. D.)! Hold with hope (D.)!
Northern inlet-p.: Franz Joseph Fjord (C. & P.)! Kjerulf Fjord, Ruth Ö, Scott Keltie Ö, Forsblad Fjord (D.)! Kap Brown.
Scoresby Sund: Common (H.)!
Kap Dalton-p.: Turner Sund, Kap Dalton. Not observed between 69° 25′ and 66° 20′ lat. N.

175. **Woodsia ilvensis** (R. Br.).

Gelert in Ostenf. Fl. arct. p. 7. Lge. Consp. Fl. Grœnl. p. 188 & 307. Hartz Fanerog. p. 352. Dusén Gefässpfl. p. 63.

α. rufidula (Michx.) Kock. W. ilvensis R. Br.

Northern coast-p.: Sabine Ö (H. & K.)!
Scoresby Sund: Common (H.)! Hurry Inlet; common (H. & K.)!
Kap Dalton-p.: Turner Sund (H. & K.)!
Southern coast-p.: Kap Warming, Ikerasarmiut, Lilleö, Vahls Fjord (K.)!

β. alpina (Bolton) Ascherson & Gräbner. W. hyperborea R. Br.

Northern inlet-p.: Franz Joseph Fjord (C. & P.)!
Scoresby Sund: Common (H.)! Hurry Inlet (H. & K.)!

γ. glabella (R. Br.) Trautv. W. glabella R. Br.

Northern coast-p.: Sabine Ö (D.)! Hold with hope (H.)! Kap Borlase Warren (D.)!
Northern inlet-p.: Scott Keltic Ö (D.)! Polhems Dal, Forsblad Fjord (H. & K.)! Fleming Inlet (H. & K.)!
Scoresby Sund: Röde Ö (H.)! Hurry Inlet (D.)!

Fam. 32. Ophioglossaceæ.

176. **Botrychium Lunaria** (L.) Sw.

Lge. Consp. Fl. Grœnl. p. 190 & 307. Hartz Fanerog. and Karkrypt. p. 353. Ostenf. Fl. arct. p. 2.

Northern inlet-p.: Fleming Inlet, Pingels Dal (H. & K.)!
Scoresby Sund: Gaaseland (H.)!

Fam. 33. Equisetaceae.

177. **Equisetum variegatum** Schleich.

Lge. Consp. Fl. Grœnl. p. 191. Hartz Fanerog. p. 353. Dusén Gefässpfl. p. 63.

Northern coast-p.: Sabine Ö (D. H. & K.)! Kap Borlase Warren (H. & K.)!
Northern inlet-p.: Kjerulf Fjord (D.)! Ruth Ö, Scott Keltic Ö (A. G. N.)! Forsblad Fjord (D.)! Kap Seaforth, Fleming Inlet (H. & K.)!
Scoresby Sund. Common (H.)! Hurry Inlet; common (H. & K.)!
Kap Dalton-p.: Turner Sund, Kap Dalton (H. & K.)!

β. anceps Milde. Eq. scirpoides Hartz, Buchenau & Focke l. c.

Northern coast-p.: Sabine Ö (all travellers)! Lille Pendulum Ö (D.)! Clavering Ö (D.)! Hold with hope (H.)! Kap Borlase Warren (H. & K.)!
Northern inlet-p.: Kap Seaforth (H. & K.)!

Scoresby Sund: Common (H.)! Hurry Inlet; common (H. & K.)!
Kap Dalton-p.: Kap Dalton (H. & K.)!

Not noted between 69° 25′ and 66° 20′ lat. N.

178. **Equisetum arvense** L.

Lge. Consp. Fl. Grœnl. p. 191. Hartz Fanerog. p. 352. Dusén Gefässpfl. p. 63. Ostenf. Fl. arct. p. 10.

β. borealis Milde.

Scoresby Sund: Common (H.)! Hurry Inlet; common (H. & K.)!
Kap Dalton-p.: Kap Dalton (H. & K.)!

γ. decumbens C. F. W. Mey. (f. alpestre Wbg.)

Commonly extended over the whole of the coast, noted by all travellers.

δ. campestre F. Schultz.

Scoresby Sund: Jameson Land (H.)!

ε. rivulare Huth. (f. arctica Rupr.).

Scoresby Sund: Hurry Inlet (H. & K.)!

ARBEJDER

fra den

Botaniske Have i Köbenhavn

Nr 25

Extrait du *Bulletin de l'Herbier Boissier*, 2me série. — Tome V (1905).
No 8.

GENÈVE
IMPRIMERIE ROMET, 26, BOULEVARD GEORGES FAVON

1904

Extrait du *Bulletin de l'Herbier Boissier,* 2me série. — Tome V (1905).

N° 8.

A LIST OF PLANTS

COLLECTED IN THE

RAHENG DISTRICT, UPPER SIAM

by Mr. E. LINDHARD

determined by C. B. CLARKE, G. HIERONYMUS, O. STAPF a. o.

published from the Botanical Museum of Copenhagen

BY

C. H. OSTENFELD

On the request of the Botanical Museum of Copenhagen Mr. *E. Lindhard,* charged by the *Danish East-Asiatic Company* with timber-felling in the *Raheng District, Upper Siam,* has brought together a small collection of plants preserved in Schweinfurth's manner. As very little is known with regard to the flora of Upper Siam, a list of these plants may be of some interest; the number of species is only 100 and it is evident that so few species do not at all represent the flora. On the other hand they give some idea of the herbaceous vegetation of the country; the list will show that nearly all the enumerated species are herbs. The whole collection has been made in open places in the woods and in river-banks, and we do not fail that the many grasses and herbs form the main vegetation of these sunny and rather dry places in the winter months (December-January); in the summer the herbaceous vegetation is faded away. — A few species, e. g. the ferns and the *Hoya's,* have been collected in more rich localities (shaddy woods along the rivers), and a single species *(Ottelia japonica)* is a water-plant.

No species of tree nor of shrub has been collected, so the list does not give any information of the composition of the forest. The collector,

Mr. *Lindhard* gives the following sketch of the country and the vegetation in the Raheng District :

« *The Raheng District* is situated at about 16° ½ lat. N., and the river-valley with the town lies about 400 feet above the sea-level. It is bounded on the western and southern side by mountains reaching a height of about 5-8000 feet. The Ma-Ping River winds itself through the middle of the district, from North to South and East. Wang Chow forest with « the Wang Chow creek » lies on the south-western bank of the river, 16 miles below Raheng. The collection has taken place alongside of this, on the places mentioned beneath.

« The district may, as regards climate, most appropriately be compared to that op Lower Burma. The rainfall, however, is much smaller here in Wang Chow forest, in as much as the boundary-mountains break the free passage of the south-western Monsum.

« The reasons are very marked, dry in the winter-sixmonths, and wet in summer. The rain commences in March or April; after a few so-called Mango-showers some very intense thunder-showers occur, generally about the close of April, and then the rain continues all through the summer with shorter ar longer intervals (1-4 weeks). The downpour is in June and especially in July often comparatively sparing, but is almost always extremely plentiful in September and October. The rain closes about November.

« During the rainy period the atmosphere is moist and the sky often cloudy. *The temperature* lies then normally between 80° and 90° F. and there is but little difference between day and night. The temperature rises, however, preceeding rain after a dry period of short duration, and it falls distinctly after a considerable rainfall.

« After the cessation of the rainy period, in November, the climate presents great similarities to our Scandinavian September. The air is high and clear, and the nights become cooler and cooler as the days go by. Around New-year the temperature is down at about 50° F. Then little by little the air becomes hazy and smoky, and the nights are close. Gradually everything dries out, and the heat becomes more and more unbearable. The temperature reaches in March and the beginning of April up to more than 100° F. and not rarely does it reach 105°-107° F.

« The vegetation is naturally extremely varying according to the different seasons of the year and to the character of the soil; especially it is decided by the smaller or greater degree of moisture of the soil. In the higher mountains may be found coniferous forests and meadows with stagnating

water (I have not personally observed this). But in the stony, rugged lowland almost all of the trees are without foliage during 2-4 months. Only along natural streams and the like trees with foliage are to be found all the year around. Many different species are in bloom immediately before the commencement of the rainy period, before or together with the shooting of the leaves. Especially noteworthy at this period are the woody Papilionaceæ, the Liliifloræ, the Araceæ, and the Orchids. Of this tropical or subtropical flora nothing has been collected by me, as my time at this season was very busy.

« In the proper rainy period the flowering plants are few and inconspicuous; green in every variety of shade predominates. The rapidity and luxuriance of growth after the first showers and heat is phenomenal. Moisture and shadiness are the main life-conditions for the bottomvegetation. Even though a number of species flower during the entire rainy period, one does not notice many flowers at that time of the year. But against fall, when the rain ceases, a number of species bloom and bear fruit. At this time a very rich flora of herbes and half-bushes prevails, whose home, judging by their habitus, very well might have been in a more temperate region. It is of this flora, as it normally presents itself in December, and occasionally even in January, that I have collected my material. I have taken almost everything, which may be found flowering and fruiting within this very limited territory, at any case every species occurring commonly and in greater numbers.

« The collection ought consequently to give a rather correct idea of the herbaceous flora in a short period of the year, and within a very limited district, viz. : the autumnal bottomvegetation in more or less luxuriant lowland-forests, moreover a number of plants from cleared spaces.

« The vegetation on the sandbanks in the river was at this period not yet properly developed. It frequently does not reach a full development before spring; but also of this vegetation I have collected some few species.

« When all is faded, the underwood commences to burn, and continues so with intervals, while the fall of the leaves gradually advances: January, February and March.

« It is quite an exception when any part of the forest escapes the fire. The government takes absolutely no precautions against the fire, such as done in Burma. Villages and solitary houses burn an open space around them as soon as it may be done, as the fire otherwise, if a storm sets in. very easily may devour an entire village. » —

The localities where Mr. Lindhard has collected, are: *Wang Chow* at Ma-Ping and *Koh Tomyæ,* an island in the same river, further *Long Isom, Tapotsah* and *Nong Boa* along a large tributary to Ma-Ping; the main part of the collection is from *a dry, open,* deciduous wood near Tapotsah.

The plants have been sent to Mr. *C. B. Clarke* who has done us the favour of matching them with the collections in Kew; we thank him most sincerely for his great kindness. Some of the grasses have been determinated by Dr. *O. Stapf* of Kew and the *Selaginellas* by Professor *G. Hieronymus* of Berlin. Also to these gentlemen we express our best thanks.

We have our-selves compilated the list and arranged the names according to *J. D. Hooker, Flora of British India;* further we have done some few critical remarks *(Ottelia* and *Hoya).*

The localities and the indications of the flower-colour have been taken from the labels written by Mr. Lindhard.

This little list has a more special interest now, when *F. I. Williams* is publishing a list of plants from Siam, and when *Johs. Schmidt* is issuing his « Flora of Koh Chang ».

The Botanical Museum of the University, Copenhagen. May 20., 1905.

PHANEROGAMÆ

MALVACEÆ

Hook f., Fl. Brit. India, 1, 317.

1. **Sida carpinifolia** L., Hook. f., l. c., 323; *S. acuta* Burm.
Riverbank at Wang Chow, very common (No. 68); flowers yellow.
2. **Urena repanda** Roxb., Hook. f., l. c. 330.
The mountain near Wang Chow (No. 64); flowers rose.
3. **Hibiscus surattensis** L., Hook. f., l. c. 334.
The mountain near Wang Chow (No. 65); flowers yellow with purple centre.

STERCULIACEÆ

Hook. f., Fl. Brit. India, 1, 353.

4. **Helicteres spicata** Colebr. in Wall., Hook. f., l. c. 366.
Near Tapotsah.

TILIACEÆ

Hook. f., Fl. Brit. Ind., I, 379.

5. **Triumfetta rhomboidea** Jacq., Hook. f., l. c. 395.
Riverbank at Wang Chow, very common (No. 70).

SAPINDACEÆ

Hook. f., Fl. Brit. Ind., I, 668.

6. **Cardiospermum halicacabum** L., Hook. f., l. c. 670.
Riverbank at Wang Chow (No. 78); flowers white.

LEGUMINOSÆ

Hook. f., Fl. Brit. Ind. II, 56.

7. **Crotalaria humifusa** Graham; Hook. f., l. c., 67.
Near Tapotsah (No. 27).
8. **C. alata** Hamilt.; Hook. f., l. c., 69.
Near Tapotsah (No. 2).
9. **Desmodium umbellatum** (L.) DC.; Hook. f., l. c., 161.
Near Tapotsah.
10. **D. gangeticum** (L.) DC.; Hook. f., l. c., 168.
Near Tapotsah.
11. **D. auricomum** Grah.; Hook. f., l. c., 172.
Near Tapotsah (No. 26).
12. **Shuteria hirsuta** Baker; Hook. f., l. c., 182.
Along the river from Long Isom to Nong Boa (No. 51); flowers blue.
13. **Rhynchosia tomentosa** Kurz, *non* Wight et Arn., said to be = *Rh. sericea* Benth, but not quite (C. B. Clarke).
Riverbank near Wang Chow (No. 67); flowers yellow and rose.
14. **Cassia mimosoides** L.; Hook. f., l. c., 266.
Near Tapotsah (No. 25).

MELASTOMACEÆ

Hook. f., Fl. Brit. Ind. II, 512.

15. **Osbeckia truncata** Don.; Wight et Arn.; Hook. f., l. c. 514.
Near Tapotsah (No. 23).

RUBIACEÆ

Hook. f., Fl. Brit. Ind. III, 17.

16. **Hedyotis pinifolia** Wall.; Hook. f., l. c. 60.
Near Tapotsah (No. 9, 10, 25), very common.

17. **Oldenlandia dichotoma** Kœnig; Hook. f., l. c., 67.

Near Tapotsah (No. 9, 10, 25), common.

COMPOSITÆ

Hook. f., Fl. Brit. Ind., III. 219.

18. **Ageratum conyzoides** L.; Hook. f., l. c. 243.

Long Isom and the mountain near Wang Chow (No. 33, 63), common; flowers pale pink.

19. **Eupatorium odoratum** L.; Hook. f., l. c., 244.

Long Isom, the mountain and the riverbank near Wang Chow (No. 32, 61, 71), very common; flowers white.

20. **Blumea sericans** (Kurz) Hook. f., l. c. 262.

The sepata heads here are more like those of B. hieraciifolia DC. which has a different inflorescence (C. B. Clarke).

The mountain near Wang Chow (No. 60); flowers yellow, involucre pink.

21. **B. glomerata** DC., Hook. f., l. c., 262.

The mountain near Wang Chow (No. 59); common; flowers yellow, involucre pink.

22. **B. membranacea** (Wall.) DC. var. *subsimplex* (Wall.) Hook. f., l. c. 265.

Near Tapotsah (No. 6) and near Nong Koh Tomyæ (No. 57); flowers yellow; common.

23. **Laggera flava** Benth.; Hook. f., l. c. 270.

Near Tapotsah (No. 4) and the mountain of Wang Chow (No. 62); flowers yellow; common.

24. **Inula polygonata** DC.; Hook. f., l. c. 293.

Near Tapotsah (No. 3); common.

25. **Blainvillea latifolia** DC.; Hook. f., l. c. 305.

Riverbank near Wang Chow (No. 73); flowers yellow; common.

ASCLEPIADACEÆ

Hook. f., Fl. Brit. Ind. IV. 1.

26. **Hoya** sp.; foliis iis *H. longifoliæ* Wall. similibus (C. B. Clarke).

The specimen collected (No. 47) is sterile, but is very like *H. longifolia* Wall., Hook. f., l. c. 57.

Along the river from Long Isom to Nong Boa, sparingly.

27. **Hoya** n. sp.

Mr. C. B. Clarke writes: « there (i. e. in the Kew Herbarium) is an unnamed Hoya from Celebes very like this ».

Unfortunately also this species has no flowers, but the shape of the leaves is

so unusual, that it may be easy to identify it also when sterile. The leaves are 7-9 cm. long, 5-6 cm. broad, obcordate with a deep sinus at the tip, broadest in the upper part and gradually narrowing towards the cuneate basis, very fleshy; nerves not visible when dry; peduncle short thick.

Along the river from Long Isom to Nong Boa (No. 42).

CONVOLVULACEÆ

Hook. f., Fl. Brit. Ind., IV. 179.

28. **Ipomæa vitifolia** Sweet; Hook. f., l. c., 213.
Riverbank near Wang Chow (No. 74); flowers yellow.

SOLANACEÆ

Hook. f., Fl. Brit. Ind., IV, 228.

29. **Solanum melongena** L.; Hook. f., l. c., 235; *S. ovigerum* Dunal, in Decand., Prodromus, XIII. I. 357.
Cultivated and escaped from cultivation; flowers blue.
Long Isom (No. 38)

30. **S. album** Loureiro; Dunal, l. c. 361.
A common weed in open places in woods; flowers pink.
Long Isom (No. 37).

31. **Datura fastuosa** L.; Hook. f., l. c., 242. (var. *alba* (Nees) Clarke).
A weed; flowers white.
Long Isom (No. 40).

SCROPHULARIACEÆ

Hook. f., Fl. Brit. Ind., IV, 246.

32. **Limnophila diffusa** Benth.; Hook. f., l. c. 266.
Near Tapotsah; marshy places (No. 21); flowers blue.

33. **Vandellia molluginoides** Benth.; Hook. f., l. c., 279.
Near Tapotsah (No. 25).

34. **V. Hookeri** Clarke, Hook. f., l. c., 280.
Near Tapotsah (No. 18).

35. **Bonnaya brachiata** Link et Otto; Hook. f., l. c., 284.
Near Tapotsah (No. 25).

36. **Scoparia dulcis** L.; Hook. f., l. c., 289.
Near Tapotsah (No. 18); common.

37. **Buchnera cruciata** Ham., Hook. f., l. c., 298.
Near Tapotsah (No. 8); flowers white.

ACANTHACEÆ

Hook. f., Fl. Brit. Ind., IV. 387.

38. **Thunbergia laurifolia** Lindl.; Hook. f., l. c., 392.

Riverbank at Wang Chow; common (No. 72).

39. **STAUROGYNE SIAMENSIS** C. B. Clarke, sp. nova; spicis subglobosis, in axillis (fere omnibus) quasi-sessilibus, foliis floralibus spathulato-orbiculatis intermixtis; spica terminali (imo in fructu) ovoidea; corolla vix 1 cm. longa; S. glaucæ O. Kuntze Var. spathulatæ arcte affinis. Annua, 10-18 cm. alta. Folia-lamina usque ad 7 cm. longa spathulato-elliptica, obtusa; petiolus 5-12 mm. longus. Capita in pedunculis 0-2 mm. longis, admodum pilosa, 10-14 mm. in diam.; folia floralia 8-9 mm. longa. Sepala linearia vix 5 mm. longa. Corollæ tubus rectus. Capsula 5 mm. longa.

This new species comes next to Staurogyne glauca, O. Kuntze var. spathulata, i. e. Ebermaiera spathulata, Hassk. It differs in the spathulate-orbicular floral leaves; and greatly in the very axillary inflorescence. In Hasskarl's E. spathulata the terminal spike is linear elongate in fruit (C. B. Clarke).

Near Tapotsah; open places in woods (No. 9, 10, 11, 25).

40. **Hygrophila phlomoides** Nees; Hook. f., l. c. 408.

Near Tapotsah.

41. **NOMAPHILA SIAMENSIS** C. B. Clarke, sp. nova; herbacea, erecta, ramosa, foliis tenuibus; inflorescentiis oblongis (nec globosis), laxis, a foliis floralibus pluribus oblongis ornatis; ceteroquin ut N. stricta Nees. Caulis 3-6 dm. altus, ramis pluries divisis. — Differt a N. stricta ob cymulos laxos a bracteis interspersos.

This new species is closely allied to Nomaphila stricta Nees (and other Nomaphilos). It differs in the herbaceous much branched stem, the oblong (not globose) inflorescences, which have many scattered oblong floral leaves; and do not match the recurved denser inflorescences of N. stricta, Nees. (C. B. Clarke).

Wang Chow forest, near Tapotsah (No. 5) and along the river from Long Isom to Nong Boa (No. 53). Open woods in shaddy and moist places; flowers blue.

42. **Dædalacanthus tetragonus** T. Anders.; Hook. f., l. c., 420.

Along the river from Long Isom to Nong Boa (No. 52); shaddy places; flowers blue.

43. **Hemigraphis quadrifaria** T. Anders.; Hook. f., l. c., 425.

Along the river from Long Isom to Nong Boa (No. 54); moist places; flowers blue.

44. **STROBILANTHES SIAMENSIS** C. B. Clarke, sp. nova; foliis inæqualibus, majore usque ad 15 cm. longis 7 cm. latis, basi paullo spathulatis, interdum auriculatis, in margine subintegris, in facie inferiore albescentibus fere glabratis; corolla 17 mm. longa, gracili; ceteroquin fere ut Str. auriculatus Nees.; spicæ in pedunculis axillaribus terminales strobilatæ, 5-6 cm. longæ,

12 mm. latæ; bracteæ 11 mm. longæ, obovatæ, obtusæ, in margine superiore longe ciliatæ; prophylla 0. Sepala 8 mm. longa, linearia, pilosa. Filamenta glabra; antheræ loculi breviter, ellipsoidei; pollen 55 μ longum, 40 μ latum, longitudinaliter 16-striatum. Pistillum glabrum.

It differs from S. auriculatus Nees (and its numerous allies) firstly by the much smaller flowers; secondly by the leaves which are whitened subglabrate beneath (C. B. Clarke).

Along the river from Long Isom to Nong Boa (No. 55); shaddy places.

45. **Justicia procumbens** L.; Hook. f., l. c., 539.

Near Tapotsah (No. 25, 14); open places in woods.

46. **Rungia parviflora** Nees; Hook. f., l. c., 550.

Near Tapotsah (No. 7).

VERBENACEÆ

Hook. f., Fl. Brit Ind., IV. 560.

47. **Congea tomentosa** Roxb.; Hook. f., l. c., 603.

The mountain near Wang Chow, a very common liane (No. 66); flowers pink.

LABIATÆ

Hook. f., Fl. Brit. Ind. IV. 604.

48. **Ocimum sanctum** L.; Hook. f., l. c., 609.

River-bank at Wang Chow (No. 80); flowers reddish-violet.

49. **Acrocephalus capitatus** (L.) Benth.; Hook. f., l. c., 611.

Near Tapotsah (No. 22).

50. **Dysophylla Peguana** Prain.

Near Tapotsah (No. 23), common; flowers pink.

51. **Anisomeles ovata** R. Brown; Hook. f., l. c., 672.

River-bank at Wang Chow (No. 79); flowers white, very common.

52. **Leucas aspera** Sprengl; Hook. f., l. c., 690.

River-bank at Wang Chow; common in open places (No. 76); flowers white.

AMARANTACEÆ

Hook. f., Fl. Brit. Ind., IV. 713.

53. **Amarantus spinosus** L.; Hook. f., l. c., 718.

Wang Chow forest, Long Isom (No. 36). Very common in open places and in river-banks.

54. **Ærva scandens** (Roxb.) Moquin; Hook. f., l. c., 727.

Along the river from Long Isom to Nong Boa, very common (No. 49).

55. **Æ. sanguinolenta** Blume.

River-bank at Wang Chow, common (No. 69); spikes white.

56. **Achyranthes aspera** L. ; Hook. f., l. c., 730.
River-bank at Wang Chow, common (No. 75).

EUPHORBIACEÆ

Hook. f., Fl. Brit. Ind., V. 239.

57. **Ricinus communis** L., Hook. f., l. c., 457.
Very common in the river-banks in Wang Chow forest (No. 41).
58. **Baliospermum axillare** Blume ; Hook. f., l. c , 461.
River-bank at Wang Chow, common in open places (No. 77).

HYDROCHARITACEÆ

Hook. f., Fl. Brit. Ind., V. 658.

59. **Ottelia japonica** Miquel, Ann. Musei bot. Lugdono-Batavi, vol. II, 271 (Prolusio Fl. Japonicæ) ; determ. C. H. Ostenfeld.

Mr. C. B. Clarke writes : « there are several Ottelias from Eastern Asia in herb. Kew approaching this, but not named ».

I think it may, beyond doubt, be the *O. japonica;* the specimens collected agree very well with the description given by *Miquel* (l. c.) ; it differs from *O. alismoides* (L.) Pers. in the smaller shape, the few-nerved and short stalked leaves, the not-crispate, narrow wing of the spathe etc. (C. H. Ostenfeld). Growing in water at Nong Koh Tomyæ (No. 57) ; flowers white.

Nota. The same species has also been collected by Dr. Johs. Schmidt in the island of Koh Chang, Gulf of Siam.

BURMANNIACEÆ

Hook. f., Fl. Brit. Ind., V. 664.

60. **Burmannia candida** Griffith, Hook. f., l. c., 665.
Near Tapotsah, open woods (No. 23).

SCITAMINEÆ

Hook. f., Fl. Brit. Ind., VI. 198.

61. **Zingiber panduratum** Roxb. ; Hook. f., l. c., 245.
Between Long Isom and Nong Boa, common in Yang forest (No. 48).

XYRIDACEÆ

Hook. f., Fl. Brit. Ind., VI. 364.

62. **Xyris pauciflora** Willd. ; Hook. f., l. c , 365.
Near Tapotsah (No. 20).

62*a*. **X. pauciflora** Willd., *forma* Benth., = X. pusilla C. Brown vel huic proxima (C. B. Clarke).

Near Tapotsah (No. 17).

COMMELINACEÆ

Hook. f., Fl. Brit. Ind., VI. 366.

63. **Aneilema spicatum** (L.) R. Br.; Hook. f., l. c. 377.

Near Tapotsah (No. 25).

64. **Cyanotis cristata** (L.) Rœm. et Sch.; Hook. f., l. c. 385.

Near Tapotsah, open woods; common (No. 25).

ERIOCAULACEÆ

Hook. f., Fl. Brit. Ind., VI. 571.

65. **Eriocaulon truncatum** Ham.; Hook. f., l. c. 578.

Near Tapotsah, open places; common (No. 1, 20).

CYPERACEÆ

Hook. f., Fl. Brit. Ind., VI. 585.

66. **Fimbristylis tenera** Rœm. et Sch.; Hook. f., l. c. 642.

Near Tapotsah (No. 20).

67. **FIMBRISTYLIS FUSCOIDES** (C. B. Clarke ms. [1888] in hb. Kew); culmo foliisque setaceis; panicula composita; spiculis 6-12, solitariis, pauciforis; glumis (sect. Abildgaardiæ) subdistichis; stylo longo, trifido, basi parva triquetra, pilosula, a nuce mox caduca, a villis brevibus pendentibus (more Pogonostylidis i. e. Fimbristylidis squarrosæ, Vahl) ornata.

F. fuscæ Benth., affinis, ob teneritatem imprimis diversa. — Culmi 1-2 dm. longi. Folia 1 dm. longa. Spiculæ 8 mm. longæ, 2 mm. latæ, brunneæ; rhachilla proventu elongata persistens glumis a basi sensim caducæ.

Borneo; Barber n. 356. Labuan; Ridley n. 9042. Cochinchina; Lebœuf n. 891. [Siam; Raheng, near Tapotsah (n. 205) *Lindhard*].

The Raheng material you have sent me has no flower or nut; I cannot be sure therefore that it is Fimbr. fuscoides (C. B. Clarke).

68. **Rynchospora longisetis** (Poir.) R. Br.; Hook. f., l. c. 669.

Near Tapotsah.

GRAMINEÆ

Hook. f., Fl. Brit. Ind., VIII.

69. **Panicum sanguinale** Lam.; Hook. f., l. c. 13.

Near Tapotsah (No. 25).

70. **P. myosuroides** R. Br. ; Hook. f., l. c. 42 (determ. O. Stapf).
Near Tapotsah.

71. **P. indicum** L. ; Hook. f., l. c. 41.
Near Tapotsah (No. 20).

72. **P. patens** L. ; Hook. f., l. c. 57.
Long Isom, river-bank ; common (No. 35).

73. **Arundinella setosa** Trin. ; Hook. f., l. c. 70 (determ. O. Stapf).
Near Tapotsah.

74. **Setaria glauca** (L.) Beauv. ; Hook. f., l. c. 78.
Long Isom, river-bank ; common (No. 39).

75. **Cenchrus viridis** Spreng.
« There is a good deal of this plant from Malaya, Philippines etc. and it is marked in Kew Cenchrus viridis Spreng., which it appears to match. It differs very little from C. echinatus L. » (C. B. Clarke).
River-bank ; from Long Isom to Nong Boa, in shaddy places (No. 56).

76. **Pollinia articulata** Trin. ; Hook. f., l. c. 109 ; var. *concinna* Hackel (determ. O. Stapf).
Near Tapotsah ; common (No. 20, 24).

77. **Apocopis** sp. vel *Lophopogon* sp. (determ. O. Stapf).
Only fragments. Near Tapotsah (No. 20).

78. **Ophiurus perforatus** (Roxb) Trin. ; *Rottbœllia perforata* Roxb. ; Hook. f., l. c. 158 (determ. O. Stapf).
Near Tapotsah.

79. **Andropogon brevifolius** Sw. ; Hook. f., l. c. 165.
Near Tapotsah (No. 19).

80. **A. pseudograyia** Steud. ; *A. hirtiflorus* Kunth ; Hook. f., l. c. 167 (determ. O. Stapf).
Near Tapotsah.

81. **A. caricosus** L. ; Hook. f., l. c. 196 (determ. O. Stapf).
Near Tapotsah.

82. **A. contortus** L. ; Hook. f., l. c. 199.
Near Tapotsah ; common (No. 31).

83. **A.** sp. (determ. O. Stapf).
Near Tapotsah.

84. **Anthistiria imberbis** Willd. ; Hook. f., l. c. 211.
Near Tapotsah ; common (No. 30).

85. **Aristida Cumingiana** Trin. et Rupr. ; Hook. f., l. c. 224.
Near Tapotsah ; common (No. 10, 11, 19).

86. **Chloris delicatula** Clarke ; Hook. f., l. c. 290 (determ. O. Stapf).
Near Tapotsah.

87. **Ch. incompleta** Roth ; Hook. f., l. c. 290 (determ. O. Stapf).
Near Tapotsah.

88. **Eleusine indica** Gærtn.; Hook. f., l. c. 293.
Long Isom; common in open places (No. 34).
89. **Eragrostis tenella** Rœm. et Sch., var. *tenella* Stapf; Hook. f., l. c. 315.
Near Tapotsah, very common in open places (No. 12, 29).
90. **E. interrupta** Beauv., var. *tenuissima* Stapf, Hook. f., l. c. 316 (determ. O. Stapf).
Near Tapotsah.
91. **E. amabilis** Wight et Arn.; Hook. f., l. c. 317 (determ. O. Stapf).
Near Tapotsah.
92. **E. elongata** Jacq.; Hook. f., l. c. 319 (determ. O. Stapf)
Near Tapotsah.

FILICES

93. **Lygodium dichotomum** Swartz.
Near Tapotsah (No. 15); common.
94. **Nephrodium variolosum** Baker.
Between Long Isom and Nong Boa, along the river (No. 46); common.
95. **N. pteroides** F. Smith.
Between Long Isom and Nong Boa, along the river (No. 44); very common.
96. **Pteris cretica** L.
Between Long Isom and Nong Boa, along the river (No. 50).

SELAGINELLACEÆ

(Auctore *G. Hieronymus*).

97. **Selaginella fulcrata** (Ham.) Spring, Monogr. II, p. 171, n. 112, ex descriptione et e fragmentis speciminis authentici (Wallich n. 125) ab Herbario Kewensi misso.

Species ab affini *S. pubescente* Wall., quod nomen cl. Baker (Hand. of the Fern-Allies p. 98) incaute ut synonymum citat, differt ramis ramulisque omnibus lævibus (nec pubescentibus), foliis rigidioribus, lateralibus acutioribus margine superiore et basi marginis inferioris grosse ciliatis, foliis intermediis margine parce ciliato-dentatis etc.

Habitat in regno Siam, distr. Raheng, c. 16° 30′ lat. bor. in silva Wang Chow ad fluvium prope Long Isom et Nong Boa frequens (E. Lindhard n. 45; 9 m. Jan. 1904).

98. **Selaginella Ostenfeldii** Hieron. n. sp.

Heterophyllum e turma *Selaginellæ Pervillei* Spring; rhizomatibus late repentibus, subterraneis (?), c. 2 mm. crassis, bracteis paleaceis enerviis ovato-deltoideis peltatis fuscescentibus margine ubique irregulariter lacerato-ciliatis c.

1 1/2 mm. longis 1 mm. basi latis parce ornatis, tristelicis (stelis collateralibus); caulibus e basi ascendente suberectis, usque ad 4 1/2 dm. altis; parte inferiore simplici, longiore quam superior, usque ad 3 1/4 dm. longa, usque ad 1 3/4 mm. crassa, compresso-hexagona, sulcato-striata, tristelica (stelis valde inter se approximatis, sæpe anastomosantibus), sordide straminea; foliis ejus subbracteiformibus, subhomomorphis, alternis, e basi peltata truncata parce ciliato-dentata elongato-deltoideis, acutis, margine crebre piloso-dentatis (pilis usque ad 0,15 mm. longis, rigidis), viridibus; foliis maximis partis simplicis caulis c. 3 mm. longis, c. 1 mm. supra basin latis; parte superiore caulium frondosa ramosa ambitu obdeltoidea vel subrotundata usque ad 1 1/2 dm. longa, 2 dm. lata, basi semper furcata; ramis pinnatim vel subdichotome ramulosis; ramulis primi ordinis pinnatim ramulosis, ramulis secundi ordinis superioribus simplicibus vel furcatis; inferioribus repetito furcatio vel dichotomis vel pinnatim ramulosis; partibus inferioribus ramorum primariorum simplicibus parti inferiori caulis similibus, partibus superioribus ubique heterophyllis; foliis lateralibus e basi superiore cuneato-rotundata et e basi inferiore decurrente et breviter truncato-rotundata falcato-ovato-oblongis, parte inferiore inæquilateris, parte superiore subæquilateris, acutis, margine superiore ciliis rigidis (maximis usque ad 0,4 mm. longis) c. 7-10 ornatis, margine inferiore piloso-denticulatis (pilis dentiformibus c. 7-10, basalibus c. 0,1 mm. longis superioribus valde decrescentibus); foliis lateralibus maximis c. 3 mm. longis, 1 mm. supra basin latis; nervo infra apicem evanescente; foliis axillaribus lanceolatis, omnino æquilateris, utroque margine ciliatis (ciliis rigidis vix ultra 0,2 mm. longis), ceterum foliis lateralibus ceteris similibus; foliis intermediis e basi exteriore longe decurrente et e basi interiore breviter decurrente lanceolatis in cuspidem brevem pilo terminatum acuminatis, margine utroque ciliatis (ciliis rigidis usque ad 0,15 mm. longis c. 8-12); foliis intermediis maximis c. 1 1/2 mm. longis, 1/2 mm. basi latis; floribus (spicis) apice ramulorum ultimorum terminalibus solitariis c. 3-12 mm. longis, 1 1/2 mm. crassis, tetrastichis; sporophyllis homomorphis, ovato-cymbiformibus in cuspidem brevem acuminatis, margine utroque crebre ciliatis (ciliis rigidis usque ad 0,25 mm. longis, usque ad 0,04 mm. basi latis sensim ad apicem versus attenuatis, acutissimis), dorso ad apicem versus carinatis (carina usque c. 0,1 mm. alta, lævi); sporophyllis maximis c. 2 mm. longis, 1 1/3 mm. supra basin latis; macrosporangiis raris in sporophyllis partis superioris florum sitis, sæpe omnino deficientibus; microsporangiis in axillis sporophyllorum plurimorum vel omnium sitis; macrosporis (vix satis maturis) in speciminibus usque ad 0,3 mm. crassis ferrugineis, latere verticali costis commissuralibus crassiusculis scabriusculis sæpe subflexuosis, latere rotundato gibbis verruciformibus crebris ornatis; microsporis usque ad 0,04 mm. crassis, lutescenti-hyalinis, ubique cristis aliformibus hyalinis flexuosis sæpe anastomosantibus, latere verticali costis commissuralibus quoque tenuibus cristisque similibus ornatio.

Species *Selaginellæ Braunii* Bak. et *S. pubescenti* affinis, differt ramis ramu-

lisque glabris foliis lateralibus acutioribus margine superiore ciliatis margine inferiore piloso-denticulatis, foliis intermediis et sporophyllis ubique ciliatis, partibus frondosis caulium furcatis ambitu obdeltoideis vel rotundatis etc.; a *S. fulcrata* (Ham.) Spring, cui quoque proxime affinis et simillima est, differt statura minore ramis primariis partis frondosæ brevioribus ambitu late ovatis, bracteis rhizomatis grossius lacerato-ciliatis, foliis lateralibus margine superiore crebrius ad apicem quoque versus ciliatis margine inferiore ubique piloso-denticulatis, foliis intermediis ubique (nec solum basi exteriore) ciliatis etc.

Habitat in regno Siam, distr. Raheng c. 16° 30′ lat. bor. prope Tapotsah in silva Wang Chow (E. Lindhard n. 16; 8. m. Jan. 1904).

99. **Selaginella Lindhardii** Hieron. n. sp.

Heterophyllum e turma *Selaginellæ suberosæ* Spring; caulibus e basi ascendente vel breviter repente rhizophoros vix ultra 0,2 mm. crassos usque ad 1 cm. longos compresso-teretes sordide stramineos gerente ascendentibus vel suberectis, sordide stramineis, compresso-teretibus, vix ultra $^1/_2$ mm. crassis, vix ultra 12 cm. longis, e basi ramosis; ramis simplicibus vel furcatis vel repetito furcatis vel dichotomis, raro subpinnatim ramulosis, usque ad 3 cm. longis; foliis ubique heteromorphis, pallide viridibus; plano in caule primario vix ultra 3 mm. lato (foliis lateralibus inclusis), in ramulis ultimis angustiore, c. 2-2$^1/_2$ mm. lato; foliis lateralibus ligula e basi bulbosa subulata præditis, subæquilateris vel parum inæquilateris, e basi inferiore breviter truncata et superiore rotundata suboblique ovato-ellipticis, breviter acuminatis, ima basi ubique minute piloso-denticulatis (pilis vix 0,03 mm. longis, dentiformibus) et vitta angustissima cellularum subscleroticarum scabriuscularum prosenchymaticarum seriebus 1-2 formata marginatis, fibris scleroticis in epidermide aligulari omnino carentibus; foliis lateralibus caulis vel ramorum primariorum maximis c. 2 mm. longis, 1 mm. supra basin latis; foliis axillaribus e basi utraque rotundata ovato-ellipticis vel ellipticis, æquilateris, vix vel parum minoribus, ceterum lateralibus ceteris similibus; foliis intermediis e basi exteriore rotundata et interiore rotundato-cuneata ovato-deltoideis longiuscule acuminatis, æquilateris, fibris scleroticis in epidermide aligulari carentibus, vitta angustissima cellularum scleroticarum scabriuscularum seriebus 1-2 formata ubique marginatis, margine basi excepta parce et minute piloso-denticulatis, quam folia lateralia minoribus, ceterum iis similibus; foliis intermediis maximis c. 1 mm. longis, $^1/_2$ mm. supra basin latis; floribus (spicis) c. 5-7 mm. longis, c. 3 mm. latis, valde platystichis, apice ramulorum terminalibus, solitariis; sporophyllis heteromorphis; dorsalibus oblique ovato-cymbiformibus, acutis, inæquilateris (semifacie in lumen inclinata latiore, usque ad 0,4 mm. lata, longiore, viridi, vitta cellularum subscleroticarum prosenchymaticarum seriebus 1-2 formata marginata, margine parce et minute piloso-denticulata [pilis dentiformibus vix 0,02 mm. longis]; semifacie altera angustiore et breviore, c. $^3/_4$ latitudinis in lumen inclinatæ æquante, subhyalino-pellucida, cellulis subscleroticis scabriusculis prosenchymaticis ubique formata, margine

parce et minute piloso-denticulata), dorso late carinatis (carina viridi, usque ad 0,3 mm. alta, ad basin versus sensim humiliore apice acuminata), basi auricula truncato-rotundata ornatis; sporophyllis dorsalibus maximis c. 2 mm. longis, c. 0,70-0,75 mm. latis; sporophyllis ventralibus æquilateris, e basi dorso auriculata (auricula truncato-biloba) ovato-deltoideo-cymbiformibus, longiuscule acuminatis, subhyalino-pellucidis, ubique cellulis subscleroticis scabriusculis prosenchymaticis, margine piloso-denticulatis (pilis dentiformibus usque ad 0,03 mm. longis), dorso carinatis (carina viridi, vix ultra 0,1 mm. alta ad basin versus humiliore, apice acuta, ad apicem versus parce piloso-denticulata); sporophyllis ventralibus maximis c. 1 1/2 mm. longis, c. 0,7 mm. supra basin latis; macrosporangiis in axillis sporophyllorum ventralium plurimorum; microsporangiis in axillis sporophyllorum ventralium superiorum et dorsalium omnium sitis; macrosporis usque c. 0,27 mm. crassis, sulphureo- vel subaurantiaco-albidis, latere verticali costis commissuralibus obscurius sulphureis vel aurantiacis ornatis, ceterum fere lævibus, obsolete et minutissima foveolatis; microsporis c. 0,035 mm. crassis, croceis, ubique minute verrucoso-granulatis, costis commissuralibus tenuibus parum perspicuis rectis præditis.

Species *Selaginellæ heterostachydi* Bak. proxime affinis habituque similis, differt foliis lateralibus subæquilateris vel parum solum inæquilateris, foliis intermediis sensim acuminatis sed non in cuspidem aristiformem contractis, sporophyllis dorsalibus carina altiore præditis minus inæquilateris et longioribus, microsporis minus crebre verrucoso-granulatis, macrosporis sublævibus latere rotundato obsolete et minutissime solum foveolatis.

Habitat id regno Siam, distr. Raheng, c. 16° 30′ lat. bor., in silva aperta Wang Chow prope Tapotsah (E. Lindhard n. 17; 18. m. Jan. 1904).

APPENDIX

100. **Ustilago Arundinellæ** Brefeld.

The spikelets of *Arundinella setosa* Trin. (No. 73) are attacked by a fungus which Prof. Dr. *E. Rostrup* has been kind to name as *Ustilago Arundinellæ* Bref.

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SOMMAIRE DU N° 10. — OCTOBRE 1901.

PLANCHE CONTENUE DANS CETTE LIVRAISON:

PLANCHE 13. — *Rhodoplax Schinzii* Schmidle et Wellheim.

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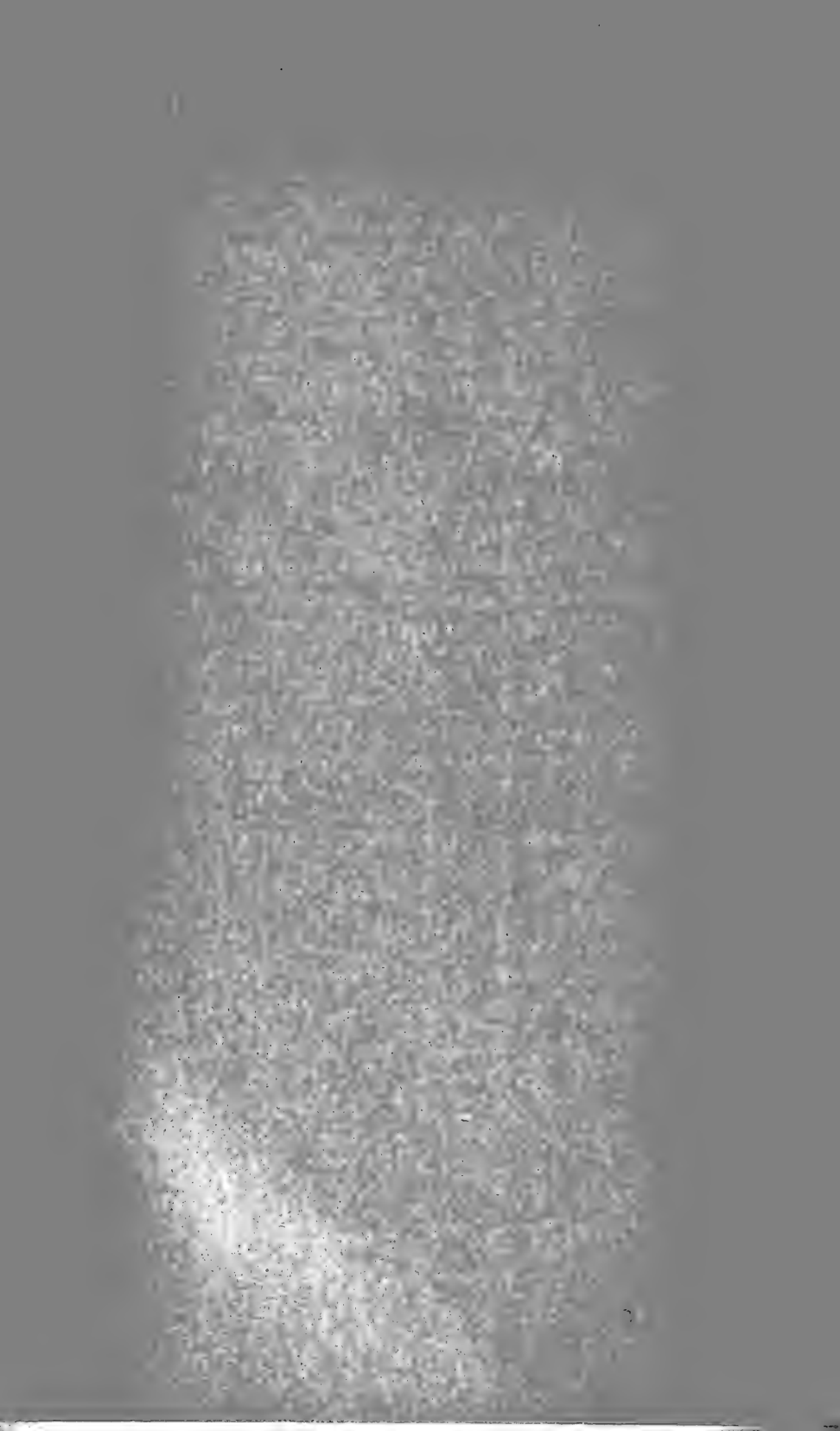

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(EXTRAIT)

b) **Cryptogames.**

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(Særtryk af Vidensk. Meddel. fra den naturh. Foren. i Kbhvn. 1906.)

Arbejder fra den Botaniske Have i København. Nr. 226.

Sciaphila nana Bl.

Et Bidrag til Støvvejens Udvikling hos Triuridaceerne.

[Hertil Tab. VI.]

Af

V. A. Poulsen.

(Meddelt i Mødet i bot. Foren. d. 7de Maj 1904.)

En af de Opgaver, jeg havde sat mig under mit Studieophold i Buitenzorg paa Java i Vinteren 1894—95, var Indsamling af Studiemateriale af og om muligt blomsterbiologiske Iagttagelser af klorofylløse Muldjordssaprofyter; ogsaa udviklingshistoriske Studier vilde over flere af disse, der næsten slet ikke ere undersøgte i saa Henseende, være ønskelige, saa meget mere som vi, trods tidligere Forskeres, f. Ex. Johows[1]), Beccaris[2]), Ules[3]) og mine egne[4]) Arbejder, endnu savne Oplysning om mange vigtige Punkter i disse saa interessante Væxters Naturhistorie. Ved de større, systematiske, monografiske Behandlinger af Beccari (l. c.) og K. Schumann[5]) have vi nu faaet en god Oversigt over og Beskrivelser af de hidtil kendte Arter af Familien *Triuridaceae*, hvis morfologiske og anatomiske Forhold nu ere ganske godt kendte; dens Ægudvikling, Støvdannelse, Kimsæk- og Kimudvikling ere imidlertid ukendte, og

[1]) Die chlorophyllfreien Humuspflanzen ect. [Pringsheims Jahrb., XX; pag. 475].

[2]) Malesia, Bd. III, 1889.

[3]) Berichte d. deutschen bot. Ges., Bd. 18, 1900; pag. 254 [*Triuris mycenoides*].

[4]) Vidensk. Medd. fra den nat. Foren., 1886, pag. 162. Botanisk Tidsskr., Bd. XVII, 1890; pag. 293.

[5]) Flora Brasiliensis, Vol. III, pars 3, 1894.

af Blomstens Ontogeni foreligger der kun en Undersøgelse af Hanblomstens Udvikling hos *Triuris* af Baillon[1]), der mærkelig nok ikke angiver hvilken Art, han har undersøgt; det kan tilföjes, at denne Udviklingshistorie ikke frembød noget som helst mærkeligt. I efterfølgende Linjer skal jeg forelægge mine Undersøgelser over Støvvejens Udvikling og Morfologi hos en anden *Triuridacé* samt knytte nogle Bemærkninger om dens Blomsterbiologi dertil.

Den af mig undersøgte Triuridacé har jeg bestemt til *Sciaphila nana* Bl.; det er den samme Plante, som Janse[2]) har omtalt under Navn af *Sc. tenella*; hans saa vel som mit Materiale er indsamlet af mig paa et Par Exkursjoner til Voxesteder i Buitenzorgs Omegn, særlig i Kampong Tjomas, hvor Arten voxede i Muldjord under et tæt Dække af nedfaldne *Bambusa*-Blade: Landsbyens palmedækkede Hytter vare omgivne af en hel Lund af kæmpestore Bambusaceer med enkelte Duriantræer imellem, og Jordbunden mellem Husene og Bambusagrupperne frembragte *Tacca palmata*, Caladier, *Pothomorphe subpeltata* o. a.[3]) *Sciaphila*'en danner ved sin Lidenhed og saare skjulte Tilværelse en stærk Modsætning til de nævnte, store Urter, og kun den ledsagende, meget skarpsynede Malajs Kendskab til Planter og Voxestederne skylder jeg, at jeg kunde skaffe mig saa rigeligt Materiale.

Artens Anatomi skal jeg her ikke komme ind paa; den afviger ikke fra den Skildring, jeg tidligere har givet af *Sc. caudata* fra Brasilien, kun at *Sc. nana* er langt spinklere.

Hanblomsternes og Støvdragernes Udvikling frembyder ikke nævneværdige Ejendommeligheder og vil blive forbigaaet her; derimod har Bygningen og Udviklingen af Hunblomstens apokarpe Støvvej vist sig saa ejendommelig, at en Skildring ikke synes mig overflødig.

---

[1]) Bulletin mensuel de Soc. Linnéene de Paris, No. 132; 1892, p. 1049.

[2]) Les endophytes radicaux de quelques plantes Javanaises [Annales du jardin de Buitenzorg, Vol. XIV, 1896].

[3]) Cfr. Massarts Skildring af Vegetationen i Buitenzorg og nærmeste Omegn: Un botaniste en Malaisie [Bull. de la soc. Roy. de bot. de Belgique, t. XXXIV, 1895; p. 151].

Blomsterne ere samlede i Spidsen af de svagt grenede eller ugrenede, med skælformede Lavblade sparsomt besatte, glatte, trinde, blege Stængler i centripetale Stande bestaaende øverst af 3—5 Hanblomster, underneden hvilke et lignende eller lidt ringere Antal Hunblomster, som i aaben Tilstand ere tre à fire Millimetre i Diameter, befinde sig.

I de yngste af mig undersøgte Hunblomster var Perigonet forlængst færdig dannet, medens Blomsteraxens lavt kuppelformede Spids endnu ikke var dækket af Karpelanlæg; rudimentære Støvdragere har jeg ikke fundet. Frugtbladene anlægges ligesom hos *Ranunculus* og *Myosurus* i Skruelinie, medens Perigonbladene danne to tretallige, alternerende Kranse. Ved Delinger i Periblemlagene skydes Karpelanlægets Spids frem, ganske som vi se det andre Steder, og det antager snart Form af en tyk, buttet Skespids, idet det krummer sig noget opad og udhules; Ventraldelen skyder sig frem lidt senere; den repræsenterer den af tyske Organogenetikere saakaldte „Saal", og Længdesnittet gennem dette Udviklingstrin frembyder (Tab. VI Fig. 11) en vis Lighed med Anlæget af en med sit Støtteblad noget sammenvoxen Axelknop. Den videre Udvikling forløber nu paa den Maade, at Frugtbladets Dorsalspids (*a* i Fig. 11) böjer sig mere og mere ind over Saalen, hvis øverste Del lidt efter lidt bliver til Æganlæget; i Stedet for at voxe lige ud eller op, krummer Spidsen sig tværtimod nedad og voxer ned tæt langs Ryggen af det efterhaanden sig mere og mere udviklende Æg (Figg. 13, 15, 16, 17, 18). Naar Dorsalspidsen (*a* i de nævnte Figurer) har naaet næsten helt ned til Æganlæggets Basis, begynde Saalens Epidermisceller at voxe noget ud, saa at der dannes et lidet, papilløst. hælformet Fremspring (*b* i Figg. 12, 13, 16, 18); naar Frugtbladsspidsen har naaet dette, stanser dens Vækst, men den voxer i k k e sammen med Saalen; der vedbliver at være, selv i den helt udviklede Støvvej, en snæver Aabning ind i Frugtknudehulheden, og meget ofte blive de Celler, der indramme denne Munding, temmelig papilløse, saa at de uvilkaarlig kunne minde om et basalt, noget rudimentært Støvfang (Figg. 2 *a*, *b* og 6);

saavel optiske Længdesnit af udvoxne Støvveje, der vare klarede i Klornatron, som Mikrotomsnit gennem Medianplanen vise altid ved nöjagtigt Eftersyn denne aabne, om end meget snævre Kanal ind i Frugtknudehulheden (Figg. 3, 4 og 5 samt 7 og 8 (af *Triuris*)), der i dette Stadium komplet udfyldes af Ægget. Den helt udviklede Støvvej bærer jo, som bekendt og tidt beskrevet, en „Griffel", der hos denne Art er lateral, medens den hos flere andre er stærkt gynobasisk. Den er her stærkt papilløs, d. v. s., den udgör (i det mindste tilsyneladende) et relativt stort Støvfang næsten lige til sin Grund (Figg. 1, 2 og 10). Den frembyder ikke nogen Griffelkanal og er lige saa lidt i Besiddelse af noget ledende Cellevæv, ligesom det ogsaa kan anføres, at der heller ikke i Frugtknudehulheden findes papilløst Overfladevæv, der kunde tjene til at lede Pollenrørene ned til Ægmunden. Denne „Griffel" er, som det fremgaar af den nys skildrede Udviklingshistorie, ikke dannet af Frugtbladets organiske Spids, i det mindste ikke saaledes, som vi se Griffeldannelsen foregaa hos de fleste angiosperme Planter. Den opstaar som en Nydannelse, en emergensagtig Tap, paa Frugtbladets dorsale Yderside lidt ovenfor Karpellets egentlige Spids; paa et Stadium, som fremstillet i Længdesnit i Fig. 13 [der set forfra er afbildet i Fig. 14], er „Griffelen" endnu ikke anlagt, medens Ægget allerede har anlagt sin Kimsæk. Fig. 16 og endnu mere Fig. 15 viser Griffelanlæggets Begyndelse; Frugtbladspidsen antager en ejendommelig, affladet Form, og medens nu den egenlige Spids voxer nedad mod Saalen, udarbejdes (cfr. Figg. 17 og 18) Griffelen stedse mere som en i Begyndelsen ganske horizontal, senere mere og mere opadrettet, trind Tap; et Længdesnit af en saadan, noget ældre end i Fig. 17 ses i Fig. 19. Lidt senere anlægges den meget spinkle, kun af faa Skruetracheïder bestaaende, mediane Ledningsstræng, som kun naar op i Höjde med Æggets Chalazaregion. Den endelige Form af den hele Støvvej ses i Længdesnit i Fig. 2, hvor det tillige kan iagttages, at Griffelens Epidermis hos denne *Sciaphila*-Art omsider voxer ud til talrige Papiller [cfr. ogsaa Fig. 10]. Et Par Gange har jeg mellem de mange af mig undersøgte Støvveje truffet en

saadan, som ikke besad „Griffelen"; alle de andre i Blomsten vare udstyrede dermed, og vedkommende Støvvejs Æg var ogsaa saa vidt udviklet, at „Griffelen" burde have været der. Dette forekommer mig at være et Tegn paa dens appendikulære Natur.

Den nys skildrede „Griffel"-Udvikling er, som ovenfor bemærket, afvigende i det mindste fra den sædvanlig forekommende. Hvad enten vi særlig betragte den eenbladede, eenrummede, eenæggede [den monokarpellære, uniovulate] Støvvej eller den flerbladede, vil det for den almindelige morfologiske Opfattelse, saaledes som den kommer til Orde i de sædvanlig anvendte Haand- og Lærebøger, være den øverste, smallere Del af Frugtbladet, der danner Griflen; i alle unge Grifler er der en, ganske vist ofte kun snæver, Griffelkanal, som udgöres af Rummet mellem de sammenböjede eller sammenvoxende Frugtbladflader, og Cellevævet her uddannes til det ledende Cellevæv, der kan være mere eller mindre løst, men dog altid rigt paa Intercellularrum, som ere mere eller mindre luft- eller slimfyldte. Støvfanget defineres som bekendt som den (i Regelen papilløse eller haarede, ofte slimede) støvopfangende Spids eller Flade af Griffelen (hvor en saadan er tilstede; ellers af Frugtknudens øverste Del); Linné siger[1]): „Stigma est apex Germinis roridus"; Goebel[2]) skriver: „Beim monomeren Fruchtknoten bildet der obere samenlose Theil des Fruchtknotens den Griffel, dessen Ende als Narbe ausgebildet ist"; fremdeles: „Beim polymeren Fruchtknoten kommt der Griffel durch Verlängerung des oberen, nicht mit Samenknospen versehenen Theiles des Fruchtknotenbechers zu Stande"; et andet Sted[3]) siger han (nemlig om *Oxalis*) „Die Narben werden gebildet durch den oberen, nach innen eingebogenen Theil jedes Fruchtblattes". Behrens[4]) siger: „Der

[1]) Philosophia botanica, ed. II, 1763, p. 60.

[2]) Vergl. Entwickelungsgeschichte der Pflanzenorgane [Schenks Handb., Bd. III, 1, p. 329; 1884].

[3]) Die kleistogamen Blüthen und die Anpassungstheorien [Biolog. Centralblatt, Bd. 24; 1904, pag. 745]

[4]) Unters. über den anat. Bau d. Griffels u. d. Narbe [Dissertation, Göttingen, 1875, p. 8].

einfachste Fall der Griffelbildung findet sich bei monomeren Fruchtknoten, wo der Griffel gebildet wird aus der über den Locularteil des Carpells verlängerten, an den Rändern involuten oder zusammengewachsenen Spitze des Fruchtblattes, dergestalt, dass in seinem inneren Raume entweder eine hohle Rinne oder eine vollständig geschlossene Röhre (Canal) gebildet wird. (Ranunculaceen)". Sachs[1]) siger: „Obgleich der Stylus aus dem Scheitel des jungen Carpells entsteht"; Engler[2]) skriver: „Der oberste, die Spitze des Frb. einnehmende, mit kleinen, papillenförmigen Zellen besetzte, häufig eine süsze oder klebrige Flüssigkeit aussondernde Teil ist die Narbe (Stigma), der darunter befindliche, fadenförmige der Griffel (Stylus);" det vil føre for vidt at anføre flere Citater; det anførte viser den almindelige Opfattelse af Griffelens morfologiske Natur: den er en Frugtbladspids.

Denne Opfattelse göres ogsaa gældende i alle ældre Lære- og Haandbøger lige fra St. Hilaires Morphologie végétale (1841, p. 519) til senere Tiders, saasom Duchartres, Grays, Reinkes o. a.

I Misdannelsestilfælde se vi ligeledes, at Griffel og Støvfang udgöre Spidsen af det omdannede Frugtblad [cfr. Delphinium-antholyser hos Cramer[3])]; men dette fremgaar ogsaa med største Tydelighed af en Mængde forskellige, udviklingshistoriske Skildringer, saa vel af apocarpe som af syn- og paracarpe Støvveje. Et meget rigt Udvalg af Figurer fremfører saaledes Payer[4]) for os [cfr. tab. 61, figg. 14, 16, 17, 19 (*Ficus Carica*); figg. 30—36 (*Cannabis*); tab. 90, figg. 7, 8, 10, 13 (*Chloranthus*); tab. 100, figg. 10—18 (*Geum*); tab. 103, figg. 23, 45—48 (*Poterium*); tab. 52, figg. 27, 28, 30, 32, 34 (*Epimedium*) o. m. a.]; Bornet[5]), som har undersøgt *Phucagrostis* [tab. 9, figg. 8, 11, 15, 20],

[1]) Lehrbuch d. Bot., IV Aufl., 1874, pag. 550. (Cfr. ogsaa: Vorlesungen über Pflanzenphysiologie, 1882, pag. 929; fig. 441 B.)
[2]) Die natürl. Pflanzenfamilien, Bd. II, Abth. I, p. 156.
[3]) Bildungsabweichungen, I; 1864; f. ex. tab. X, figg. 8 og 9.
[4]) Organogénie de la fleur, 1857.
[5]) Annales des sc. nat., Vième série, vol. I; 1864.

Schmitz[1]), som har studeret Piperaceerne [tab. II, figg. 9 og 10 (af *Peperomia*)], Hieronymus[2]) [cfr. hans tab. IV, fig. 38 (af *Brizula*) og 43 (*Alepyrum*)], Magnus[3]) [*Najas*, tab. II, figg. 3—6], Rendle[4]) [*Najas*, tab. 39, figg. 1—4], Campbell [*Najas* og *Zanichellia*[5]), cfr. tab. II, figg. 37 og 40, tab. IV., figg. 96, 99, 103 sammenholdte med tab. V, fig. 104; *Lilaea*[6]), tab. I, fig. 4, tab. II, fig. 25], Baillon[7]) [*Nelumbo*, tab. III, figg. 8—16], Strasburger[8]) [*Ceratophyllum*, tab. IX, figg. 4, 6, 7, 15 a], Buchenau[9]) [*Alisma* og *Butomus*, cfr. tab. IX. figg. 6, 8 og 10], — hos alle disse Forfattere og flere til vil man finde, at Griffelen dannes, som nævnt. Man kunde hertil föje Payers Figurer af *Ranunculus* [tab. 57, figg. 10—15], som ere gengivne hos Luerssen[10]), dersom disse vare rigtige; men her komme vi til et for vore sammenlignende Studier over *Sciaphila* meget vigtigt og interessant Punkt: der findes andre Forfattere, der have undersøgt *Ranunculus* (og andre af samme Famlilie), og som gengive Frugtknudeudviklingen noget anderledes, omtrent som jeg ovenfor har skildret *Sciaphila*. [Jeg har selv undersøgt *Ranunculus lanuginosus* og *trachycarpus* og fundet de nedenstaaende Forfatteres Angivelser korrekte; Payers Figurer kan jeg ikke godkende]. Her maa for det første Goebel[11]) omtales; det fremgaar af hans Figur, at han rigtig har iagttaget Udviklingen hos *Ranunculus*,

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[1]) Hansteins botan. Abhandl., Bd. II, 1872.

[2]) Beitr. zur Kenntniss de Centrolepidaceen [Abhdl. d. naturf. Ges. zu Halle, Bd. XII, 1873].

[3]) Beitr. zur Kenntniss der Gattung *Najas*, Berlin 1870.

[4]) Transactions of the Linn. Soc., 2 Ser., vol. V, 1899.

[5]) Morphol. Study of *Najas* and *Zanichellia* [Proceed. of the California Acad. science, 3d ser., Vol. I, 1897].

[6]) Development of the flower and embryo of *Lilaea sub.* [Ann. of Bot., vol. 12, 1898 (Griffelkanalen er her tydelig paa yngre Stadier; senere oblitererer den ganske)].

[7]) Adansonia, vol. X.

[8]) Pringsheims Jahrb., Bd. 37, 1902.

[9]) Flora, 1857; p. 241.

[10]) Medicin.-pharm. Botanik, Bd. II, p. 167.

[11]) Schenks Handbuch, Bd. III, 1, pag. 310, fig. 66. 4.

men han har blot ikke bemærket og omtaler som Følge heraf heller ikke den ejendommelige Griffeldannelse. Arthur Meyer[1]) kan dernæst anføres; han har givet *Ranunculus*-Støvvejens Ontogenese i sin store, farmakognostiske Lærebog, hvor man ganske vist ikke skulde finde paa at søge sligt, og af hvilken Grund hans Fremstilling synes at være undgaaet senere Forskeres Opmærksomhed; herved har han baade opdaget, at Griffelen er en Nydannelse, som ikke udgöres af Frugtbladets Spids, samt at der hos *Ranunculus*, ligesom vi saa hos *Sciaphila*, bliver en lille Aabning tilbage mellem Karpelspidsen og Saalen; denne Aabning kalder han „Fachmündung", og han finder en ganske lignende hos *Malva* og *Foeniculum*. Paa udviklede Støvveje er denne „Fachmündung" aldeles sammenklemt og næsten ikke til at opdage. Som den tredje Forfatter, der hos Ranunculaceer har iagttaget det samme, som jeg hos *Sciaphila*, maa nævnes Lonay[2]); han kender ikke A. Meyers Studier, men kommer ved sine egne Undersøgelser ganske uafhængig af ham til det samme Resultat; han har særlig studeret Ovariets Udvikling hos *Ranunculus arvensis* og *Thalictrum flavum* [cfr. Tab. I, figg. 1 og 2; tab. II, fig. 17; forøvrigt se hans tab. VI, fig. 71; tab. XVI, fig. 235; tab. XVIII, fig. 264]; den lille, sammenklemte „Fachmündung" betegner han med den Baillonske Benævnelse „**Akropyle**", et Udtryk[3]), som ikke synes kendt i den nyere Morfologi, men

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[1]) Wissenschaftliche Drogenkunde, Bd. II, 1892; pag. 245.

[2]) Contribution à l'anatomie des Renonculacées [Archives de l'inst. botan. de l'Université de Liège; vol. III, 1901].

[3]) Baillon har i et Arbejde, som er publiceret i Bulletin du congrès international de Botanique et d'Horticulture à St. Pétersbourg 1884 (Recherches sur les ovaires acropylés, med Tavle) gjort opmærksom paa, at vi hos visse Planter finde en Pore eller Aabning foroven i Frugtknuden mellem Griflernes Basis; han nævner særlig Polygonaceer og *Passiflora*; hos Arter af denne sidste Slægt er Akropylen ofte papilløs som et Støvfang, ja han har endog set Pollenkorn afsatte der, som spirede; „ayant un jour vu un pied de *Passiflora coerulea* tout couvert de fruits mûrs, je demandait à l'horticulteur qui me le montrait s'il avait fecondé les fleurs. Oui, me repondit-il, mais en déposant le pollen sur le sommet de l'ovaire, et non à l'extrémité des styles. Il parait que cette pratique est connue de longtemps des jardiniers ..."

som jeg her vil anvende om den homologe Aabning hos *Sciaphila* og *Triuris*. En saadan sammenklemt Akropyle kendes nu ogsaa enkelte andre Steder. Udviklingen af Frugtbladet hos *Malva*, *Althaea* o. a. Malvaceer med lignende Frugt er ogsaa studeret af A. Meyer[1]); han finder, at Æggene anlægges afvexlende med Griflerne, idet Karpelmedianerne ligge imellem disse; disse Midtpartier, altsaa de egentlige Frugtbladsspidser, voxe „über die Samenknospenanlagen hinüber, so dass nur kleine Kanälchen oberhalb der Samenknospenanlagen erhalten bleiben." Hvorvidt dette nu er rigtigt, maa fornyede Undersøgelser afgöre; Schaeffer[2]) finder, at de ovenover Saalen (hvorfra Ægget dannes) sig sammensluttende Frugtbladrande danne Griflen, men mellem disse Randes nedre Del og Saalen selv bliver der en lille Pore; den er ikke opfattet som „Fachmündung" eller Akropyle; men findes rigtig afbildet paa hans tab. IV, fig. 4 a; hverken Baillons eller Meyers Arbejder ere ham bekendte. Endelig kan det bemærkes,

[cfr. hans tab. 3, figg. 7, 12 og 13]. Dette mærkelige Forhold fortjener fornyet Undersøgelse; det nævnes i Baillons Histoire des pl., vol. VIII (1886), p. 471, Anm., samt i Slægtsdiagnosen („Germen .... apice perforatum circaque acropylen plus minus dite papillosum"), men omtales ikke hos Engler & Prantl; hos Thury (Organogénie florale des Passifl., i Bull. de l'Herbier Boissier, vol. 5, 1897, pag. 501) afbildes og nævnes Hullet foroven i den endnu unge Frugtknude, men om nogen persisterende Akropyle tales ikke, og Forf. kender aabenbart ikke Baillons Arbejde [cfr. hans fig. 10 d paa tab. XX]. I Botan. Centralblatt, XXI, 1885, pag. 191, findes et kort Referat af Baillons Foredrag i St. Petersburg; heri omtales *Plantago Coronopus* som havende en meget aaben „Griffelkanal"; dette nævner Baillon end ikke i sit citerede Arbejde, og Referatet af Passiflora-Undersøgelserne er sikkert galt, ti her tales om en aaben Griffelkanal (der er tre Grifler), men Akropylen nævnes ikke, ligesaa lidt som det sekundære Støvfang. Baillons Arbejde synes i det hele taget at være temmelig upaaagtet; Paul Knuth o. a., der have beskæftiget sig med Bestøvningsforholdene hos Passionsblomsterne, omtale det heller ikke. Lige saa ubemærket er Forholdet forblevet for Polygonaceernes Vedkommende; det nævnes ingen Steder i Beskrivelserne, til trods for at det er lykkedes Baillon at danne *Rheum*-Bastarder ved akropylær Krydsbestøvning efter bortopererede Grifler!

[1]) Wiss. Drogenkunde, II, pag. 246 f.

[2]) Flora, 1890, p. 63.

at vi muligvis hos *Triglochin* finde en lignende Griffeldannelse som hos *Sciaphila* at dömme efter Figurer hos Hill[1]), samt hos *Cynocrambe*, over hvis mærkelige Blomsterudvikling vi have et lille Studie af Balicka-Iwanowska[2]), hvis Figurer dog ere for smaa og ufuldstændige og ikke give de histologiske Détails.

I den udviklede Blomst af *Sciaphila nana* er Griffelen en (som det fremgaar af figg. 1, 2 og 10) noget sidestillet, relativt tyk, cylindrisk Dannelse, hvis Epidermis i sin störste Udstrækning voxer ud til klare Papiller; disse ere, som alle Støvvejens Celler, fyldte med Plasma og temmelig store Cellekærner. Et ledende Cellevæv findes ikke lige saa lidt som Intercellularrum [cfr. fig. 9], og det følger af ovenstaaende Udviklingshistorie, at en Griffelkanal heller ikke forekommer. Ledende Cellevæv samt den løse Sammenhæng af Cellerne i Støvfangets Flade ere imidlertid karakteristiske Ejendommeligheder for virkelige Grifler; Griffelkanal kan derimod mangle, om den end vel næsten altid findes i det mindste antydningsvis i Anlægget. Mine egne Studier over mange Grifler have vist mig det ledende Cellevæv overalt, og dets Tilstedeværelse er ogsaa fastslaaet ved Reinkes[3]), Capus's[4]), Dalmers[5]), Behrens's[6]) o. a. Undersøgelser, bl. a. Albaneses[7]) for ikke at nævne adskillige ældre Forfattere. Hvorvidt Støvfangets Papiller ere klæbrige paa den levende *Sciaphila*-Blomst, kan jeg ikke med Bestemthed angive; men da jeg i sin Tid indsamlede disse spæde Planter forekom det mig netop, at „Støvfangene" vare törre. Der er dernæst paafaldende, at der aldrig fandtes Støvkorn fasthæftede til Papillerne;

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[1]) Structure and development of *Trigl. marit.*, [Annals of Botany, Vol. 14, 1900; tab. VII, især fig. 26].

[2]) Zur Morphologie des *Thelygonum Cynocrambe* [Flora 1897, pag. 364; cfr. især fig. 8, 6, 8, 10[b]].

[3]) Göttinger Nachrichten, 1874, p. 467.

[4]) Anatomie du tissu conducteur [Ann. des sc. nat., VI[ième] sér., Vol. VII; 1879].

[5]) Jenaische Zeitschr. für Naturwiss., Bd. XIV, 1880.

[6]) Griffel u. Narbe, l. c.

[7]) Endotropismus d. Pollenschlauches bei *Sibbaldia procumbens* [Sitzungsberichte d. Wiener-Akad., Bd. CXIII, Abth. 1; 1904, p. 653].

jeg har i den Henseende undersøgt et meget stort Antal Blomster i de Stadier, hvor en Bestøvning maatte finde Sted, og om end hist og her et enkelt Pollenkorn var at finde i Vinklerne mellem Papillerne, laa de dog ganske løse, saa at de let faldt af, og ingensinde har jeg set dem spire. Hos talrige andre Planter er det netop et Tegn paa, at Støvet har spiret, at det ved det indtrængende Støvrør er fasthæftet til den stigmatøse Overflade. Jeg kan her passende minde om, at Forholdet er et ganske lignende hos *Taraxacum*, om hvilken vi i gennem Raunkiærs[1]) smukke Undersøgelser vide, at den er parthenogenetisk; jeg har netop for at prøve, om Støvkornene hos denne Plante aldrig spirede, for et Par Aar siden undersøgt en to- trehundrede fra forskellige Voxesteder stammende Kurve med Hensyn til Støvkornenes Fasthængen ved Støvfangene, men aldrig nogensinde fundet Støvrørsdannelse, selv om Griffelgrenene vare nok saa overpudrede; derimod kan man ikke tage én Griffelgren af f. Ex. *Crocus*, *Malva*, *Althaea*, *Agrostemma*, *Datura* o. a. uden med Lethed at kunne konstatere Pollenets Fastsidden paa Grund af Støvrørsdannelsen. Det er dernæst værd at betragte „Griffel"-Dannelsen hos andre *Sciaphila*-Arter; *S. crinita* Becc. og *Andajensis* Becc. have meget lange, tynde Grifler uden Spor af Papiller[2]); de samme glatte Grifler finde vi hos *S. caudata* V. A. P.[3]) og hos *Triuris hyalina* og *brevistilis* Schumann[4]). Her kunne Støvkornene næppe hænge paa, saa meget mere, som de er glatte og uden Oliedraaber udvendig. Hos *S. major* Becc. og *sumatrana* Becc.[5]) samt hos *Soridium Spruceanum*[6]) ere de stærkt gynobasiske Grifler særdeles korte, saa korte, at de endog ikke rage op over Frugtknuderne og saaledes aldeles ikke frembyde sig for Støvet. Dette kunde nu

[1]) Kimdannelse uden Befrugtning hos Mælkebøtte (*Taraxacum*) [Botanisk Tidsskrift, Bd. 25; 1903, p. 109].
[2]) Malesia, III.
[3]) Vidensk. Meddel. fra naturh. Forening, 1886.
[4]) Flora Brasiliensis, l. c., tab. 117, figg. II og III.
[5]) l. c., tab. XL.
[6]) l. c., tab. 116, fig. I.

tænkes at falde ned imellem Støvvejene og for *Sc. nanas* og lignende Arters Vedkommende at spire paa Akropylen; der er hertil kun at sige, at jeg aldrig har truffet Støvkornene dernede, og Akropylerne ere ogsaa ganske skjulte, eftersom Frugtknuderne i fuldt udviklet Tilstand ikke lade noget Rum imellem sig. Jeg maa saaledes efter alt det foregaaende formode, at *Sciaphila nana* og i det mindste nogle andre Triuridaceer ikke blive bestøvede.

Om Blomstens Biologi er hidtil lidet eller intet oplyst[1]), og det var med nogen Spænding, at jeg paa et Par Exkursjoner til den her omhandlede *Sciaphila*-Arts Voxested søgte at erfare noget om Bestøvningen. Om end muligvis flere af de fodhöje eller höjere Arter kunne tænkes at være anemofile, kan dette ikke gælde vor Art. Den voxer gruppevis eller i spredte Exemplarer aldeles dækket af nedfaldent Bambusaløv; man maa rage dette tilside og sé nöje efter for overhovedet at finde denne spinkle, rødviolette Saprofyt, og under det dækkende Løv gaar der næppe nogen Vind. Jeg har aldrig truffet Dyr paa eller i Blomsterne, ikke engang Spor efter Snegle, og Blomsterne holde sig kun saare kort Tid. Støvets Overførelse ved fremmed Agens turde være mere end tvivlsomt; derimod kunde det af sig selv falde ned paa Støvvejene, Blomsterne kunde være geitonogame, men herimod taler atter den ovenfor fremhævede Pollenmangel paa Støvfangene.

Angaaende Triuridaceernes Ægbygning vide vi ikke meget; selv har jeg tidligere givet nogle Bidrag [l. c.], og Schumann, (der dog muligvis udelukkende støtter sig paa mine Iagttagelser) skriver[2]): „micropyle extera et infera a stilo aversa", „integumentum solitarium strato cellulario unico vel gemino hoc vestit", samt „cellulae nuclei ovuli summae elongatae hoc organum efficiunt quod in Monocotyledoneis solum Germanice nomen „Fadenapparat" salutatur". Hertil maa jeg dog bemærke, dels at jeg ikke har angivet noget om et „Fadenapparat", dels, at et saadant ogsaa er paavist udenfor Monokotyledonernes Afdeling, og endelig, at Ægget,

[1]) Knuth: Handbuch der Blüthenbiol., Vol. III, 1, pag. 49.
[2]) Flora Bras., l c.

hvis Bygning og Udvikling jeg har kunnet studere bedre paa *Sciaphila nana* end tidligere, har en lidt anden Bygning, end Schumann angiver. Som det med stor Tydelighed fremgaar allerede af mine Figurer 1 og 2, er Ægget omvendt, men udstyret med to Hinder; den ydre er saa kort, at Inderhinden bliver ene om at danne Mikropylen, som i det helt udviklede Æg er saa fast sammenklemt, at dens Beliggenhed som oftest kun med Vanskelighed kan fastslaas. Følger man Figurerne 12, 13, 20, 22 og 21, vil man let sé Udviklingsgangen; den er ganske normal. Om Synergider, Antipoder, Kærneforhold, Kromosometal o. lign. kan jeg ikke udtale mig; jeg har ikke haft tilstrækkelig gode Præparater hertil; men af Figur 23 fremgaar det, og jeg har haft mange lignende Billeder for mig, at Kimen udvikles normalt af Ægcellen. Da jeg aldrig i saadanne Æg eller i lidt yngre Stadier har fundet Spor af Pollenrør, da jeg ikke engang har truffet spirende Pollen paa „Støvfanget", som ovenfor bemærket, og endelig, da „Griflen" synes at mangle ledende Cellevæv, formoder jeg, at denne i saa mange andre Henseender reducerede Saprofyt danner Kim uden Befrugtning.

Frugtspredningen omtales af Beccari [Malesia, III; l. c.] i et meget interessant Kapitel; han mener, at „il veicolo delle corrente aeree", som kan virke hos Planter, der leve paa aabne Steder, paa Bjergene og som Epifyter, ikke kan komme i Betragtning her, hvor det gælder saadanne, „che vivono sul suolo di una umida e densa boscaglia"; her antager han, at Regnormene spille Hovedrollen; om Bestøvningen har han heller ingen Iagttagelser.

Efterat jeg var bleven opmærksom paa Støvvejens ejendommelige Udvikling hos *Sciaphila*, har jeg efterset mine gamle Præparater af *Triuris major* og fundet, at der her ligeledes er en Akropyle tilstede [Figg. 7 og 8]; den ligger meget langt nede, ofte umiddelbart ved Blomsterbunden. En fornyet Undersøgelse af denne interessante Slægt paa vel opbevaret Materiale vil være i höj Grad ønskelig; dens Hun-Blomster frembyde foruden de mærkelige, anatomiske Forhold i Blomsterbunden med dens System af (Slim?-)

Gange, et i udviklingshistorisk Henseende vistnok enestaaende Forhold, som ikke tidligere er omtalt, nemlig Frugtbladenes (Støvvejenes) i det mindste tilsyneladende basipetale Anlæg: de yngste findes lige indenfor Perigonet. Jeg besidder intet mere Materiale til Studium. Om Ægget har jeg tidligere[1]) anført, at det kun har een Hinde; Schumann siger det samme i sin Monografi; efterat det nu er vist, at *Sciaphila nana* har to Æghinder, bør ogsaa dette Punkt genoptages til Undersøgelse; det kan dog bemærkes, at Antallet af Æghinder ikke behøver at være konstant i en Familie, hvad man ser f. Ex. hos *Ranunculaceae*.

Det stedse svævende Spörgsmaal om Triuridaceernes Slægtskab er ved ovenstaaende, udviklingshistoriske Bidrag mulig bragt sin Løsning noget nærmere; vi kende for Tiden ingen anden apokarp Plantefamilie end Ranunculaceerne med Akropyledannelse og sekundært dannet Griffel; den med Ranunklerne utvivlsomt mest beslægtede Familie er sikkert Alismaceerne, og med disse tvende naturlige Familier vilde jeg anse Triuridaceerne for nærmest i Slægt; saaledes forekommer Blomsten af *Limnophyton* [„flores inferiores hermaphroditi (interdum abortu feminei?). superiores masculi"; „stylus ex angulo interno infra apicem ortus, brevis"; „ovulum basilare, apotropum, ..."] *obtusifolium* (L.) Miq. fra tropisk Africa, Forindien og Ceylon at have Lighedspunkter[2]). Støvvejens Udvikling hos *Alisma* er undersøgt af Buchenau[3]) og Payer[4]); den skildres som vi ogsaa have henpeget paa ovenfor, overensstemmende af begge Forskere; Griffelen dannes af Frugtbladets smallere Spids, hvis Rande lægge sig sammen[5]), altsaa ganske paa normal Vis,

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[1]) Botan. Tidsskr., 17de Bd., 1890; pag. 303.

[2]) *Alismataceae* i Englers Das Pflanzenreich, regni vegetab. conspectus, Bd. IV, Heft 16, p. 22; fig. 10 A og C.

[3]) Flora 1857, p. 241.

[4]) Organogénie de la fleur, 1857.

[5]) Forfatteren anfører rigtignok, at Griffelen er en „sekundær Vegetationspunktsdannelse" „an der Spitze des Carpellarblattes", men han föjer til „ligesom hos Solaneer og Scrophularineer", saa at han, hvad der ogsaa tilstrækkelig tydelig fremgaar af hans Figurer paa Tab. IX, i Virkeligheden aldeles ikke opfatter det, som Forholdet er hos *Ranunculus*.

og dette er, hvis Iagttagelsen er rigtig, en ganske væsenlig Forskel fra *Ranunculus*; at det imidlertid ikke er alle eenæggede Ranunculacéstøvveje, der under Udviklingen lukker sig saaledes, som A. Meyer og Lonay skildrer det for den sidstnævnte Slægts Vedkommende, have egne Undersøgelser over *Myosurus* belært mig om; denne Slægt danner sin Griffel, saaledes som Goebel[1]) og Schäfer[2]) skildre det hos *Ailanthus*, og som Payer[3]) og Warming[4]) angive for *Geums* Vedkommende.

Hvorledes Udviklingen af Støvvej og Æg forløber hos andre *Sciaphila*-Arter, maa fremtidige Studier vise; det vil for Kimsækkærnedelingernes og for Reduktionsdelingernes Vedkommende være af Vigtighed, at Indsamlerne strax paa Stedet sörge for, at Materialet fixeres i passende Vædske; för et saadant Studiemateriale bringes til Veje, faa vi intet af Vigtighed at vide om disse interessante Planter.

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[1]) Organographie d. Pflanzen, Jena 1898—1901, p. 737.
[2]) Flora, Bd. 73; 1900.
[3]) Organogénie de la fleur, 1857.
[4]) De l'ovule [Ann. des sc. nat., 6ième sér., t. V, p. 182].

Universitetets botaniske Laboratorium, Juni 1905.

Explanation of tab. VI.

All figures were drawn with Abbe's camera clara and a microscope of Zeiss and afterwards reduced; they represent the structure and development of the monocarpellary ovary and ovulum of *Sciaphila nana* Bl., with exception of figg. 7 and 8, which are from *Triuris major* V. A. P.

Fig. 1: A single pistil, the lower half part of which is seen in longitudinal section; the ovary is completely filled with the single ovulum; in the lowermost part the „acropyle" exbibits itself to the right. Allthough the ovulum is quite ready for impregnation, no pollengrains whatever can be found on the papillae of the „stigma". Obj. A, ocul. compens. 4].

» 2: Another pistil in longitudinal section; the „acropyle" is rather prominent and papillated. [Obj. A; ocul. 2].

» 3: Median section of „acropyle" [Obj. D D; ocul. 1].

» 4, 5, 6, 7 and 8: Similar sections; 7 and 8 are microtome sections of *Triuris major* V. A. P. [4, 5 & 6: Obj. D D, ocul. 1; 7 & 8: Obj. D D, ocul. compens. 4].

Fig. 9: Upper part of ovary and base of „stylus“ in median, longitudinal section; no conducting tissue is to be found. [Obj. D D, ocul 1].

» 10: Papillated end of „stylus“, representing a sort of stigma, but without pollengrains [Obj. D D, ocul. 1].

» 11: Very young pistil in median, longitudinal section; the ovulum has just been formed; the apex of the carpel is growing forward to overwhelm it. [Obj. D D, ocul. 1].

» 12: The same, in somewhat older stage [Obj. D D, ocul. 1].

» 13: The same, a little older; the ovulum is beginning to bend, the embryosac-mothercell is now distinct, the somewhat projecting lower edge of the „acropyle“ is being formed, but no „stylus“, the morphological end of the carpel bending over the dorsal surface of the ovulum. [Obj. D D, ocul. 1].

» 14: Young pistil, front view; the „acropyle“ is not yet closed, and no „stylus“ is formed [Obj. D D, ocul. 1].

» 15: Median, longitudinal section of a young pistil being only in a little more advanced stage than fig. 13; the „stylus“ and integumentum interius of the ovule is just being formed.

» 16: Median, longitudinal section of a young pistil, whose morphological apex is growing downwards to meet the projecting lower edge of the „acropyle“; the „stylus“ is just growing out, the mothercell of the embryosac is very distinct.

» 17: Median, longitudinal section of a young pistil, being considerably older than fig. 16; the „acropyle“ is nos yet closed, the „stylus“ is a distinct, horizontal outgrow, and the two integuments of the ovule are being formed.
[Figg. 15, 16 & 17: Obj. D D, ocul. 1].

» 18: Similar section of another young pistil in the same stage of development [Obj. D D, ocul. 1].

» 19: Axial section of a young, nearly finished „stylus“, the stigmatic papils of which are not yet formed. [Obj. D D, ocul. compens. 4].

» 20: Young ovule, median section; two integuments are formed. [Obj. D D, ocul. compen. 4].

» 21: Ripened ovulum, median section. The micropyle, formed only of the inner integument, is totally closed. [Obj. D D, ocul. 1].

» 22: Median section of an ovule a little older than fig. 20 in the cavity of the ovary. [Obj. D D: ocul. compens. 4].

» 23: Threecelled embryo in the upper end of the embryosac. [Obj. apochrom. 3mm, ocul. compens. 4].

In all figures the letters indicate:

a: morphological end of the carpel.

b: ventral base of carpel [„Sohle“ of the german botanists] forming the lower lip of „acropyle“.

c: carpel.

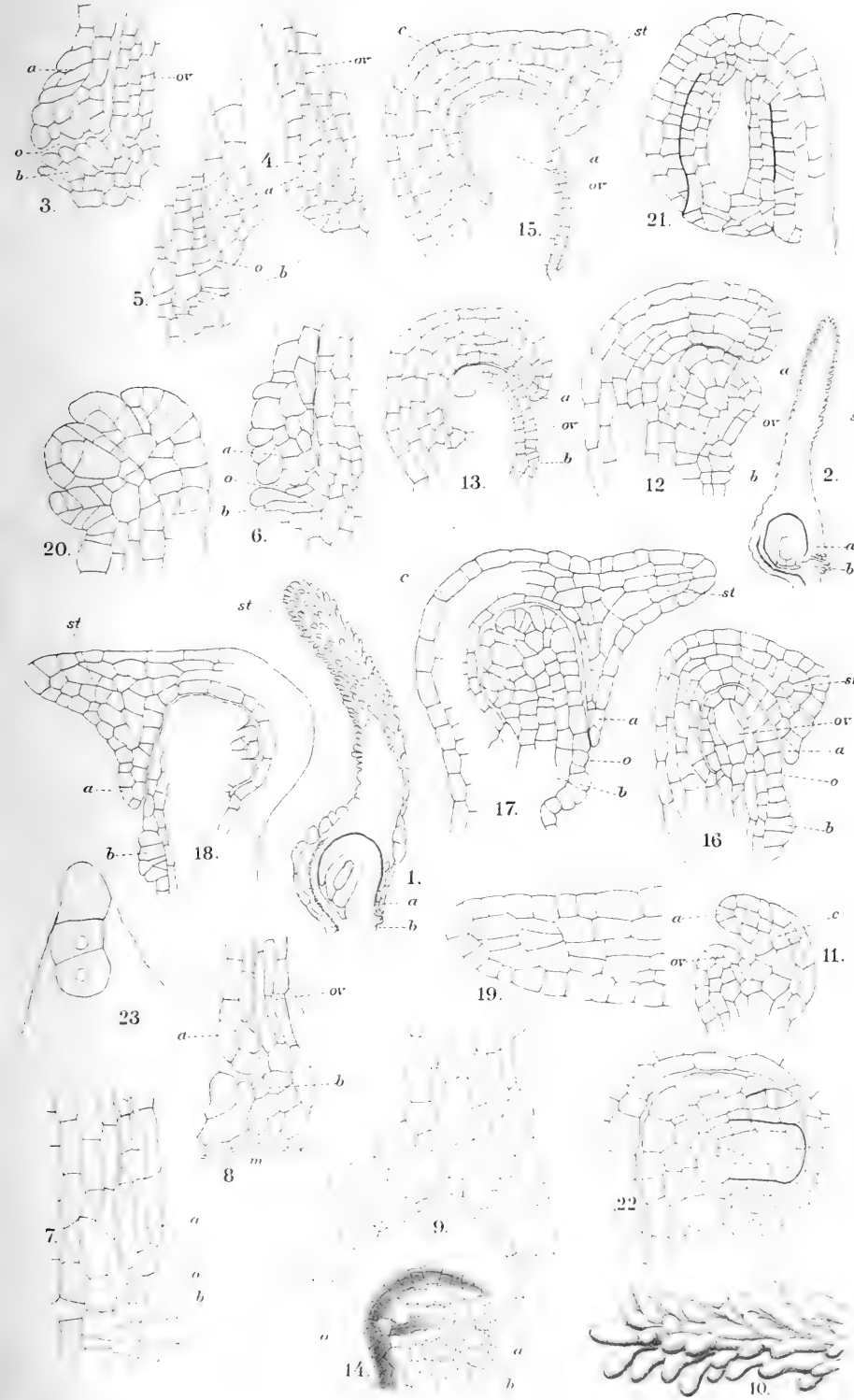
o: orificium or mouth of the ovarial cavity, called „acropyle“ by the french botanists.

ov: ovulum.

st: „stylus“.

27.—6.—1905.

EBHVN. BIANCO LUNO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Arbejder fra den Botaniske Have i København. Nr. 27.

A List

of

Flowering Plants from Cape York and Melville-Bay (NW.-Greenland),

collected by the Rev. **Knud Balle** and Mr. **L. Mylius-Erichsen** in 1903–05,

determined by

C. H. Ostenfeld.

Reprinted from „MEDDELELSER OM GRÖNLAND" Vol. XXXIII.

Copenhagen.
Printed by Bianco Luno.
1905.

From the arctic explorer L. Mylius-Erichsen the Botanical Museum of Copenhagen has received a small collection of plants from NW.-Greenland. Some of the plants have been collected by Mylius-Erichsen in 1903 partly north of Cape York, partly in Melville-Bay, but the main part is due to the Rev. Knud Balle, who accompanied a Danish expedition to Cape York in 1905.

The collection of Mylius-Erichsen from Granville-Bay (c. 76° 50′ Lat. N.) north of Cape York contains 6 species, that from Melville-Bay (J. A. D. Jensen's-Islands and Garde's-Islands) only 2 species. The collection of Knud Balle from Umanak and Agpat (Saunders-Island) in Wolstenholme-Sound (c. 76° 30′ Lat. N.) is richer, containing 23 species of phanerogams.

The flora of NW.-Greenland is rather well known; the numerous expeditions have brought home smaller or larger collections. Of the earlier contributions to the flora we find a good review in the paper by A. G. Nathorst [1]) published in 1884 and containing also the results of his explorations at Ivsugigsok near Cape York (c. 76° 8′ Lat. N.) in 1883. Later contributions to the flora are 1) a list of the Peary Auxiliary

[1]) Nathorst, A. G.: Botaniska anteckningar från nordvestra Grönland, Öfv. af K. Sv. Vet. Akad. Förh. 1884, No. 1, Stockholm. — Abstracts of this paper are published in Engler's Bot. Jahrb., vol. 6 & 7.

Expedition of 1894 [1]) and 2) the preliminary report of H. G. Simmons (2nd Norwegian Polar Expedition 1898-1902)[2]). If we consult these publications, we will find, that all the species collected by Mylius Erichsen and Knud Balle have been earlier recorded from NW.-Greenland, not all from the part between 76° Lat. N. and 77° Lat. N., but at least from 78°—79° Lat. N. (Foulke-Fjord etc.).

Therefore the following list is not of great value, but as Cape York and Wolstenholme-Sound are not so well investigated as Foulke-Fjord, it seems appropriate to publish it. The two plants from the new-discovered islands in Melville-Bay are naturally of special interest, as nothing was known with regard to the flora of this connecting stretch of land.

Among the plants there are some interesting species. The following remarks are the most noteworth:

1. *Saxifraga flagellaris* had hitherto not been found as far South in W.-Greenland.
2. *Salix arctica* Pallas, f. *groenlandica* Anders. In NW.-Greenland mostly the typical *S. arctica* with broad-obovate leaves is recorded, but the specimens collected by Balle agree well with the more broad-leaved specimens of f. *groenlandica*, such as this form occurs in Danish Greenland.
3. The collection contains some specimens of an interesting *Potentilla*, which perhaps is identic with *P. rubricaulis* Lehm.; but as I know that Mr. H. G. Simmons, while working with his rich collections from the 2. Norwegian Polar Expedition is studying this form, I do not enter more into the question.

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[1]) List of Plants obtained on the Peary Auxiliary Expedition of 1894. Collected by Dr. H. Emerson Wetherill. Determined at the Herbarium of Harvard University. — Bull. Nr. 5 of the Geographical Club of Philadelphia.

[2]) Simmons, Herman G. Preliminary report on the botanical work of the second Norwegian polar expedition 1898—1902. — Nyt Magazin f. Naturv., vol. 41. 1903. Christiania.

4. The *Dryas* from Wolstenholme-Sound is, as known from other places in NW.-Greenland, a *D. integrifolia* approaching *D. octopetala.*
5. We find no record of *Glyceria distans* (in its many forms) from NW.-Greenland untill the preliminary report of H. G. Simmons; some well developed broad-leaved specimens from Wolstenholme-Sound affirm now his statement.

A. Granville-Bay (Iterdlagssuak), c. 76° 50′ Lat. N. (L. Mylius-Erichsen, 1903).

Cassiope tetragona (L.) Don.
Saxifraga oppositifolia L.
Potentilla emarginata Pursh.
Dryas integrifolia M. Vahl, ad f. *intermediam* Nathorst.
Papaver radicatum Rottb.
Stellaria longipes Goldie.

B. Melville-Bay (L. Mylius-Erichsen, 1903).

Luzula arcuata (Whbg.) Sw., *β*, *confusa* Lindeb.
J. A. D. Jensen's-Islands.
Potentilla emarginata Pursh.
Garde's-Islands.

C. Umanak and Agpat (Saunders-Island) in Wolstenholme-Sound, c. 76° 30′ Lat. N. (Knud Balle, 1905).

Pirola rotundifolia L. var. *grandiflora* (Radius) DC.

The arctic P. grandiflora Radius is beyond doubt only a form of P. rotundifolia. It is an analogon to the f. *microphylla* of *Vaccinium uliginosum*, to the var. *decumbens* of *Ledum palustre* and to many other arctic forms of northern species.

It differs from the main species in the lower growth, the smaller leaves, the few, but mostly larger flowers, the much shorter style and the obtuse calyx-lobes. With regard to the most of these characters it agrees with the var. *arenaria* Koch,

growing in wet sandy places, mostly in downs in NW.-Europe. This form is not so extrem as *P. grandiflora* and there is evidently a continuous series of forms from the typical *P. rotundifolia* of Sphagnum-bogs, through the var. *arenaria* of wet sandy places, to the arctic *grandiflora*.

The specimens collected were in full flower. It has been recorded by Kane and Haye from Smith-Sound (Nathorst, l. c. p. 17, has some doubt as to the correctness of this statement), further by the Peary Auxiliary Expedition of 1894 from Cape York and from Inglefield-Gulf («*P. rotundifolia*, var. *pumila* Hook.»), but not earlier from Wolstenholme-Souud.

Cassiope tetragona (L.) Don.

Saxifraga oppositifolia L.

S. flagellaris Willd. f. *setosa* (Pursh) Engler.

Found by Kane in three places between 78° 18′ Lat. N. and 78° 37′ Lat. N., not earlier recorded from Wolstenholme Sound.

S. tricuspidata Rottb.

S. nivalis L.

S. cernua L.

S. cæspitosa L.

A low form with 1-flowered stalks corresponds with *S. groenlandica* L., a taller form is more like *S. decipiens* Ehrh.

Salix arctica Pallas, f. *groenlandica* Anders.

The specimens collected are in ripe fruit; they correspond with the more broad-leaved forms of *S. groenlandica* (Anders.) Lundst., but do not reach the typical *S. arctica*; cfr. Nathorst l. c. p. 48.

Potentilla Vahliana Lehm.

P. emarginata Pursh (*P. fragiformis*, f. *parviflora* Trautv.; *P. nana* Willd.).

P. aff. (nivea vel) rubricaulis.

Nathorst (l. c. p. 23) mentions that the *Potentilla nivea* from Cape York differs from the typical *P. nivea* in the often two-paired root-leaves, the two lowest leaflets being very small, but

placed in some distance from the others; consequently the form is not identic with *P. nivea*, var. *subquinata* Lange (Syn. *P. subquinata* (Lange) Rydb.) of which the root-leaves mostly are digitately 5-foliate; it comes nearer to *P. rubricaulis* Lehm, from which it differs in the rudimentary development of the lowest pair of leaflets.

Dryas integrifolia M. Vahl. et f. *intermedia* Nathorst. The specimens collected belong partly to the typical *D. integrifolia*, partly to the intermediate form described by Nathorst (l. c. p. 24) as *D. octopetala* f. *intermedia*. Our specimens are not quite intermediate, but somewhat nearer to *D. integrifolia* having its habit and shining leaves.

Polygonum viviparum L.

Papaver radicatum Rottb.

Epilobium latifolium L. (*Chamænerium latifolium* (L.) Sweet).

Found in Foulke-Fjord by Hart, not earlier recorded from Wolstenholme-Sound.

Draba alpina L. et var. *glacialis* (Adams) Kjellm. Besides larger specimens a dense tuf of a very low plant has been collected. The leaves are densely covered with stellate hairs and bear a much prominent rib on the underside; the scape and the flower stalks are also densely cowered with stellate hairs. I think that the late Gelert (Notes on Arctic Plants, Köbenhavn, Botan. Tidsskr., vol. 21, 1898) has done a mistake in placing *D. glacialis* Adams as a species of the section *Aizopsis*, remote from *D. alpina*; no doubt the two species are very near to each other and I should prefer to take them as one, placing the form with densely covering of stellate hairs and prominent middlevein of the rather narrow leaves as a var. *glacialis*, such as done by Kjellman.

Melandrium involucratum (Cham. & Schld.), *β*, *affine* (J. Vahl) Rohrb.

Cerastium alpinum.

Alsine verna (L.) Bartl. f. *rubella* (Whbg.).

Glyceria angustata (R. Br.) Fr.

G. distans (L.) Whbg., f. *arctica* (Hook.) Gelert, in Flora Arctica I, p. 127.

Recorded from Foulke-Fjord by H. G. Simmons, otherwise not known as far North in W.-Greenland.

Festuca ovina L.

(Separately issued 30. XII. 1905.)

Særtryk af Botanisk Tidsskrift. 27. Bind. 2. Hæfte. København 1906.

Arbejder fra den Botaniske Have i København. Nr. 28.

Lieutenant Olufsen's second Pamir-Expedition.

Plants collected in Asia-Media and Persia. III.

By

Ove Paulsen.

Amarantaceæ.

1. *Amarantus Blitum* L. var. *graecizans* (L.). *A. Blitum* var. *angustifolius* Moq. Tand.; Ldb. fl. ros. III p. 858.

Chiwa: N. 1942, in cultivated land. July 9. 1899.

2. *Amarantus paniculatus* L.; Ldb. fl. ros. III p. 856; Bois. fl. or. IV p. 989.

Pamir: N. 1359, prov. Wakhan, quasi-spontaneous at Langarkisht. Alt. 3000^{m}. Sept. 13. 1898.

Phytolaccaceæ.

Phytolacca decandra L.; Ldb. fl. ros. III, p. 688, Bois. fl. or. IV, p. 895.

Persia: N. 2152, prov. Gilan, at Resht. Sept. 13. 1899.

Berberidaceæ.

Leontice Leontopodium L. var. *Ewersmanni* (Bunge). *L. Ewersmanni* Bunge reliq. Lehman. p. 190; Bois. fl. or. I, p. 100.

Ferghana: N. 1653, on a mountain near Osh. April 18. 1899 (with young fruits); Nr. 1666, in the steppe at Chodshent. April 5. 1899 (with ripe fruits).

As Boissier says *L. Ewersmanni* is very like *L. Leontopodium*, and I think the first named species is a mere form of the latter and that its peculiarities are to be referred to the dry climate of Turkestan.

Ceratophyllaceæ.

(det. C. H. Ostenfeld.)

Ceratophyllum demersum L.; Ldb. fl. ros. II p. 123; Bois. fl. or. IV p. 1202; O. Fedtschenko fl. du Pamir, Acta H. Petrop. XXI p. 99.

Pamir: N. 1139, in the lake Jashil Kul. Alt. 3800^{m}. Aug. 20. 1898. N. 1411, prov. Wakhan, in marshes at Sermut. Alt. 2900^{m}. Sept. 22. 1898.

Papaveraceæ.

1. *Glaucium elegans* Fisch. et Mey.; Ldb. fl. ros. I p. 93; Bois. fl. or. I p. 120.

Alai mountains: N. 403, at Sufi Kurgan. Alt. 2100m. June 18. 1898.

2. *Glaucium squamigerum* Kar. Kir. Enum. pl. songor., Bul. soc. nat. Moscou 1842, I p. 141; Bois. fl. or. I, p. 121. (I have seen the original specimen.)

Alai mountains: N. 402, at Sufi Kurgan. Alt. 2100m. June 18. 1898.

3. *Glaucium vitellinum* Bois. et Buhse; Bois. fl. or. I p. 123.

Alai mountains: N. 401, at Sufi Kurgan. Alt. 2100m. June 18. 1898.

The young fruit of this plant is glabrous, the flower is rather big. Perhaps it is a form of *Glaucium flavum* Crantz.

4. *Papaver arenarium* Bieb.; Ldb. fl. ros. I p. 89; Bois. fl. or. I p. 112.

Transcaspia: N. 55, in the steppe at Bami. April 24, 1898.

5. *Papaver radicatum* Rottb. in Kiöbenh. Selsk. Skrifter 1770, p. 455, tab. VIII, fig. 24; Sv. Murbeck Acta H. Bergiani II, 5, p. 7; *P. nudicaule* auct. plur. non Lin.; *P. alpinum* Ldb. fl. ros. I p. 87, ex p.; O. Fedtschenko Flore du Pamir, Acta H. Petrop. XXI p. 28, non Lin.

Pamir: N. 783, at Tshatir Tash, near the snow. Alt. 4200m. July 15. 1898; N. 1235, in the Chargush-pass, on moist slopes. Alt. 4300m. Sept. 3. 1898 (flowers brimstone-coloured); N. 1236 ibid. (flowers yellow).

As Murbeck states this plant differs from *P. nudicaule* L. (*P. croceum* Ldb.) by narrower petals, shorter stamina, and the whole plant is more hairy, by patent hairs. The colour of the corolla is greenish yellow or brimstone-coloured (see e. g. Andersson and Hesselmann, Bih. K. Svenska Akad. Handl. XXVI). *P. alpinum* L. is another plant (see e. g. Sv. Murbeck l. c.; Jacquin fl. austr. I, tab. 83, Sagorski u. Schneider fl. der Centralkarpathen) which is not to be found in Asia-Media.

6. *Papaver somniferum* L.

Pamir: N. 1422, prov. Wakhan, cultivated at Dershai. Alt. 2700m. Sept. 24. 1898.

7. *Roemeria rhoeadiflora* Bois. fl. or. I p. 119.

Transcaspia: N. 49, in the steppe at Bami. April 24. 1898.

Samarkand: N. 1668, in the steppe at Rostowsewo. May 6. 1899.

8. *Hypecoum pendulum* L.; Bois. fl. or. I p. 125; *H. caucasicum* Koch, Ldb. fl. ros. I p. 94.

Transcaspia: N. 32, in the steppe at Kailiu. April 23. 1898.

Ferghana: N. 1621, on a mountain near Osh. April 10. 1899.

9. *Hypecoum trilobum* Trautv. Increm. flor. fan. ros., Acta H. Petrop. IX p. 366.

Transcaspia: N. 43, in the steppe at Balan Hur. April 24. 1898.

Fumariaceæ.

1. *Fumaria Vaillantii* Loisel.; Ldb. fl. ros. I p. 105; Bois. fl. or. I p. 135.

Samarkand: N. 72, in cultivated land. May 3. 1898.

Alai mountains: N. 498, at Olgin Lug. Alt. 2700m. June 22. 1898 (a small form).

2. *Corydalis Ledebouriana* Kar. Kir., Enum. pl. alt., Bul. soc. nat. Moscou 1841; Ldb. fl. ros. I p. 745; Rgl. Supplem. II ad Rgl. et Herd. enum. pl. Semenow., Bull. soc. nat. Moscou 1870 p. 16; Bois. fl. or. I p. 127.

Ferghana: N. 1644, on a mountain near Osh. April 17. 1899.

Resedaceæ.

1. *Reseda bracteata* Bois. fl. or. I, p. 433.

Persia: N. 2210, in mountains near Teheran. Sept. 28. 1899.

Violaceæ.

1. *Viola uniflora* L.; Ldb. fl. ros. I p. 255; O. Fedtschenko fl. du Pamir, Acta H. Petrop. XXI 1903, p. 55.

Alai mountains: N. 429, in the juniper forests at Olgin Lug. Alt. 2600m. June 20. 1898.

2. *Viola silvestris* Rchb. Pl. crit. Cent. I p. 80; Ldb. fl. ros. I p. 253. — *V. sylvatica* Fries, Bois. fl. or. I p. 459.

Ferghana: N. 360, Issik Bulak near Osh. June 16. 1898.

Frankeniaceæ.

1. *Frankenia hirsuta* L.; Bois. fl. or. I p. 780; *F. hispida* DC.; Ldb. fl. ros. I p. 267.

Chiva: N. 2017, near Chodsheli, on saline spots. July 24. 1899.

2. *Frankenia pulverulenta* L.; Ldb. fl. ros. I p. 267; Bois. fl. or. I p. 779.

Buchara: N. 1673, on saline spots. May 13. 1899.

Tamaricaceæ.

1. *Myricaria squamosa* Desv. Ann. sc. nat. IV p. 350; *M. germanica* Desv. var. *squamosa* (Desv.) Maxim.; O. Fedtschenko fl. Pamir p. 100; *M. davurica* Ehbg.; Ldb. fl. ros. II p. 132.

Pamir: N. 736, Jaman Tal near Murghab (Pamirski Post). Alt. 3800 m. July 12. 1898.

2. *Myricaria germanica* Desv. v. *alopecuroides* (Schrenk) O. Fedtschenko fl. Pamir p. 100; *M. alopecuroides* Schrenk; Ldb. fl. ros. II p. 131.

Ferghana: N. 391, Gultsha, in the bed of the Kurshab-river. June 17. 1898.

3. *Tamarix hispida* Willd.; Ldb. fl. ros. II p. 135; Bois. fl. or. I p. 776.

Amu Daria: N. 1872, in sandy desert at Kis Kalá between Tshardshui and Chiwa. June 23. 1899; Chiwa; N. 2100, on moist ground at Chasar-asp. (flowering). Aug. 18. 1898.

4. *Tamarix laxa* Willd.; Ldb. fl. ros. II p. 133; Bunge reliq. Lehman. p. 291; Bois. fl. or. I p. 770.

Buchara: N. 190, in sandy desert at Chodsha Davlet. May 13. 1898.

5. *Reaumuria oxiana* (Ldb.) Bois fl. or. I p. 759; *Eichwaldia oxiana* Ldb. in Eichw. pl. casp. cauc. p. 38 t. 34; Ldb. fl. ros. II p. 138.

Buchara: N. 1833, in desert at Ustyk. June 19. 1899. — Chiwa: N. 1904, in desert at Ak-jar at the river Amu Daria. June 28. 1899.

Euphorbiaceæ.

1. *Andrachne telephioides* L.; Ldb. fl. ros. III p. 582; Bois. fl. or. IV p. 1138.

— — f. *rotundifolia* (C. A. M.) Bois. l. c.; *A. rotundifolia* C. A. M. in Eichw. pl. casp. cauc.

Samarkand: N. 241, in the steppe at Ujimawut. May 22. 1898. — Persia: N. 2198, prov. Gilan, in the mountains near Batshinar. Sept. 18. 1899.

2. *Buxus sempervirens* L.; Ldb. fl. ros. III p. 583; Bois. fl. or. IV p. 1144.

Persia: prov. Gilan N. 2156, in forests near Resht. Sept. 14. 1899.

3. ***Crozophora tinctoria*** L.; Ldb. fl. ros. III p. 581; Bois. fl. or. IV p. 1140.

Persia: N. 2193, prov. Gilan, in the Elburs mountains. Sept. 17. 1899.

4. ***Crozophora gracilis*** F. et M.; Ldb. fl. ros. III p. 581; Bois. fl. or. IV p. 1140. *C. sabulosa* Kar. Kir. Enum. Song. l. c. p. 446.

Chiwa: N. 1952, in sandy desert at Chiwa, on moist spots. July 11. 1899.

5. ***Euphorbia pygmæa*** F. et M.; Bois. fl. or. IV p. 1091; *E. Inderiensis* Less.; Ldb. fl. ros. III p. 559.

Samarkand: N. 174, in the steppe at Balan Hur. May 12. 1898.

6. ***Euphorbia carnosa*** n. sp.

E. annua glaberrima exstipulata. Caulis iteratim dichotoma vel trichotoma, internodia brevia, folia carnosa opposita sessilia integra margine minutissime scabrida e basi obliqua cordato-ovata acuta plurinervia. Involucri glabri in foliorum angulis solitarii campanulati lobis obtusis ciliatis, glandulæ latæ exappendiculatæ, styli ad medium bifidi. Capsulæ stipitatæ coccis rotundatis, semina verrucis magnis instructa apice truncato-umbilicata basi acuta ecarunculata continentes.

Planta ca. 10^{cm} alta. Folia 0,7—2^{cm} longa, 0,5—1,2^{cm} lata. Internodia 1—1,5^{cm} longa.

Buchara: N. 1863: on moist spots in sandy deserts near Kís-Kalá, at the river Amu Daria between Tshardshui and Chiwa. June 23. 1899.

Allied to *E. Turczaninowii* or perhaps a variety of this species from which it differs by the form of the leaves.

7. ***Euphorbia cheirolepis*** F. et M.; Ldb. fl. ros. III p. 558; Bois. fl. or. IV p. 1089.

Chiwa: N. 1953, in sandy deserts near the city of Chiwa. July 11. 1899.

8. ***Euphorbia subcordata*** C. A. M.; Ldb. fl. alt. IV p. 184; Ldb. fl. ros. III p. 577.

The leaves are rather broad as in *E. agraria* Bieb., but without serrature. No sterile shoots. These two species are perhaps not different from each other.

Ferghana: N. 350, Issik Bulak at the river Langar. June 16. 1898.

9. ***Euphorbia pachyrhiza*** Kar. Kir. Enum. pl. Alt. Bull. nat. Moscou 1841 p. 745; Ldb. fl. ros. III p. 562.

Ferghana: N. 280, near Margelan. May 27. 1898.

10. *Euphorbia Esula* L.; Ldb. fl. ros. III p. 575; Bois. fl. or. IV p. 1125.

Pamir: N. 1427, prov. Ishkashim, at Namatgut. Alt. 2700m. Sept. 27. 1898.

11. *Euphorbia lanata* Sieb.; Bois. fl. or. IV p. 1092.

Persia: N. 2218, in mountains near Teheran. Sept. 28. 1899.

12. *Euphorbia Helioscopia* L.; Ldb. fl. ros. III p. 562; Bois. fl. or. IV p. 1107.

Tashkent: N. 142, in cultivated land at Tshinas. May 10. 1898.

Oxalidaceæ.

1. *Oxalis corniculata* L.; Ldb. fl. ros. I p. 483; Bois. fl. or. I p. 866.

Persia: N. 2147, prov. Gilan, near Resht. Sept. 13. 1899.

Linaceæ.

1. *Linum heterosepalum* Rgl. Acta H. Petrop. II 1873 p. 433.

Alai mountains: N. 571, near Olgin Lug. Alt. 2900m. June 25. 1898.

2. *Linum perenne* L.; Ldb. fl. ros. I p. 426; Bois. fl. or. I p. 865.

Alai mountains: N. 570, near Olgin Lug. Alt. 3000m. June 25. 1898.

3. *Linum usitatissimum* L.; Ldb. fl. ros. I p. 425; Bois. fl. or. I p. 860.

Pamir: N. 1290, prov. Wakhan, in cultivated land at Langarkisht. Alt. 3000m. Sept. 8. 1898. — N. 1425, prov. Iskhashim, cultivated at Namatgut. Alt. 2300m. Sept. 27. 1898. — Chiwa: N. 1985, in cultivated land. July 15. 1899.

Geraniaceæ.

1. *Geranium collinum* Steph.; Ldb. fl. ros. I p. 467; Bois. fl. or. I p. 874; Rgl. pl. turk., Acta H. Petrop. V p. 252; Komarow Mater. po fl. turk. nagorja, Bassein Serawsch., Trav. soc. Nat. St. Pétersb. Sect. de Bot. 26. 1896, p. 149.

Of this polymorphous species which according to Maximowitch (cited by Komarow) is in the state of evolution, I have collected the following forms:

var. ***glandulosum*** Ldb. l. c.

Pamir, N. 1046, near the lake Jashil Kul, at a stream. Alt. 3800^{m}. Aug. 8. 1898.

var. ***saxatile*** (Kar. Kir.) Rgl. l. c. *G. saxatile* Kar. Kir. Enum. Song. Bul. nat. Moscou 1842, p. 177.

Pamir: N. 1082, on moist slopes near the lake Jashil Kul. Alt. 4000^{m}. Aug. 11. 1898.

These two forms are resembling each other, and perhaps N. 1046 too ought to be referred to var. *saxatile*, (of which I have seen the original specimens,) but the peduncles are rather short.

var. ***alpinum*** Rgl. l. c., Komarow l. c.

Ferghana: N. 358, on hills at Issik Bulak near the river Langar. June 16. 1898.

My specimen is not the true var. *alpinum* Rgl. being rather big and abundant, nor are the leaves „pagina superiore pilosa, inferiore subglabra canescente“ (Komarow), but on both sides slightly pilose. The plant is almost stemless, and the flowers are large.

var. ***candidum*** Komarow l. c.

Alai mountains: N. 420, at Sufi Kurgan. Alt. 2100^{m}. June 18. 1898, — Pamir: N. 1182, near the lake Jashil Kul. Alt. 3900^{m}. Aug. 29. 1898.

The latter is a small caespitose form, nearly stemless. The sepals are tinged with red. I have no doubt that it is to be referred to this variety although it differs in some degree from Mr. Komarow's specimens, which I have seen in Petersburg.

var. ***wakhanicum*** n. var.

Caules flexuosi, internodia longa (usque ad 15^{cm}) pilis sparsis albis retrorsis vestita, folia praecipue in nervis sparse pilosa, inferiora longe-petiolata superiora brevepetiolata vel sessilia, quinquepartita segmentis cuneatis apice sæpius trilobatis, lobis acutis. Pedunculi sæpius longissimi (3—15^{cm}) biflori, pedicelli breves (2—3^{cm}) glanduloso-hirti vel (rarius) depresso-pilosi. Sepala præcipue in nervis adpresse setulosa, petala rosea.

Pamir: Prov. Wakhan, n. 1275, in cultivated land at Langarkisht, alt. 3000^{m}. Sept. 8. 1898; N. 1391, in a ravine at Torgus, alt. 2800^{m}. Sept. 19. 1898; prov. Garan: N. 1501, at a stream near Darmaraght, alt. 2400^{m}. Oct. 10. 1898.

This seems to be a form growing on moist ground. In habitus it is very characteristic.

2. *Geranium tuberosum* L.; Ldb. fl. ros. I p. 460; Bois. fl. or. I p. 872.

— — var. *linearifolium* Bois l. c.

Ferghana: N. 1619, on a mountain near Osh. April 10. 1899.

3. *Erodium cicutarium* L.; Ldb. fl. ros. I p. 476; Bois. fl. or. I p. 890.

Alai mountains: N. 485, in the Olgin Lug-steppe. Alt. 2600 m. June 21. 1898.

Balsaminaceæ.

1. *Impatiens parviflora* DC.; Ldb. fl. ros. I p. 481; Bois. fl. or. I p. 868.

Alai mountains: N. 396, at Kisil Kurgan. Alt. 1700 m. June 18. 1898.

Pamir: Nr. 1472, prov. Garan, at Darmaraght. Alt. 2400 m. Oct. 10. 1898.

Malvaceæ.

1. *Malva mauritiana* L.; Ldb. fl. ros. I p. 434; *M. sylvestris* β. *Mauritiana* Bois. fl. or. I p. 819.

Pamir: N. 1423, prov. Ishkashim, cultivated in gardens at Namatgut. Alt. 2700 m. Sept. 26. 1898.

2. *Malva borealis* Wallm.; Ldb. fl. ros. I p. 436; Bois. fl. or. I p. 820.

Ferghana: N. 344, at Osh. June 11. 1898.

3. *Malva verticillata* L.; Hook. fl. brit. Ind. I p. 320.

Pamir: N. 1286, prov. Wakhan, in cultivated land at Langarkisht. Alt. 3000 m. Sept. 8. 1898.

4. *Althæa cannabina* L.; Ldb. fl. ros. I p. 432; Bois. fl. or. I p. 825.

Chiwa: N. 1943, in cultivated land. July 9. 1899.

5. *Althæa ficifolia* L.; Ldb. fl. ros. I, p. 432; *Alcea ficifolia* Bois. fl. or. I p. 833.

Pamir: N. 1513, prov. Shugnan, in the mountains at Chorock. Alt. 2300 m. Oct. 11. 1898. (Cultivated in the botanical garden at Copenhagen.)

6. *Abutilon Avicennæ* Gärtn.; Ldb. fl. ros. I p. 439; Bois. fl. or. I p. 836.

Persia: N. 2148, prov. Gilan, at Resht. Sept. 13. 1899.

7. *Gossypium herbaceum* L. cultivated in many places. The most elevated place for cultivation seen by me is at Pies in Shugnan, at an altitude of about 2300^{m}.

Rutaceæ.

1. *Haplophyllum lasianthum* Bunge Reliq. Lehman. p. 239; Bunge Ic. pl. Lehman. Riga 1851, t. 11; Bois. fl. or. I, p. 936.

Samarkand: N. 239. May 21. 1898.

2. *Haplophyllum obtusifolium* Ldb. fl. ros. I p. 490; Bunge reliq. Lehman. p. 238; Bois. fl. or. I p. 934. *Ruta obtusifolia* Ldb. in Eichwald Pl. casp. cauc. p. 37 t. 32.

— — var. *ramosissima* n. nom.; var. β. Bunge l. c.

Chiwa: N. 2070, in sandy desert near Nukus. Aug. 8. 1898.

3. *Haplophyllum acutifolium* (DC.) Bois. fl. or. I p. 942; *H. Sieversii* Fisch.; Kar. Kir. Enum. pl. Song., Bull. Moscou 1842, p. 180; Ldb. fl. ros. I p. 491. — *Aplophyllum perforatum* Kar. Kir. Enum. pl. Alt.. Bull. Moscou 1841 p. 397.

Samarkand in steppes: N. 155, at Ujimavut, may 11. 1898; N. 246 ibid., may 22. 1898; N. 283, at Chawast, may. 23. 1898.

4. *Haplophyllum hirsutum* Rgl. et Schmalh. Descr. pl. nov. Fedtschenk., Isvest. Imp. Obs. Liub. Est. Antrop. Etnogr. XXXIV 1882 p. 17.

Samarkand: N. 262, in the steppe at Kerki. May 23. 1898.

Zygophyllaceæ.

1. *Zygophyllum Eichwaldi* C. A. Meyer in Eichw. pl. casp. cauc. p. 15, tab. 14, Bunge reliq. Lehman. p. 235; Ldb. fl. ros. I p. 485; Bois. fl. or. I p. 914.

Buchara: N. 1697, May 23. 1899; Chiwa: N. 1915, July 1. 1899. A very common species.

2. *Zygophyllum Fabago* L.; Bunge reliq. Lehman. p. 235; Ldb. fl. ros. I p. 485; Bois. fl. or. I p. 913.

Pamir: N. 693, on dry plains at Sary Mullah. Alt. 4100^{m}. June 5. 1898. — N. 1140, near the lake Bulung Kul. Alt. 3800^{m}. Aug. 20. 1898.

Comparison with specimens in St. Petersburg has learned me that this plant is not *Z. brachypterum* Kar. Kir. which Mrs. Fedtschenko names from Pamir.

3. *Zygophyllum miniatum* Cham.; Bunge reliq. Lehman. p. 237; Bois. fl. or. I p. 912.

Transcaspia: N. 63, at Murguk, April 25. 1898 — Buchara: N. 180, at Kujumasar. May 13. 1898.

4. *Zygophyllum Rosowii* Bunge, Linnaea XVII p. 5; Bunge reliq. Lehman. p. 536; O. Fedtschenko fl. Pamir Acta H. Petrop. XXI p. 68.

Pamir: N. 729, at Shatshan. Alt. 3800m. July 11. 1898.

5. *Peganum Harmala* L.; Ldb. fl. ros. I p. 489; Bois. fl. or. I p. 917.

Transcaspia: N. 188, in sandy desert at Jakatut. May 13. 1898.

Buchara: N. 1711, May 25. 1899 (very common everywhere).

Pamir: N. 1852, prov. Wakhan, on dry mountains at Sunk. Alt. 3000m. Sept. 10. 1898.

6. *Tetradiclis salsa* Stev.; Ldb. fl. ros. I p. 492; Bois. fl. or. I p. 918.

Transcaspia: N. 18, at Krasnowodsk. April 23. 1898.

7. *Tribulus terrestris* L.; Ldb. fl. ros. I p. 486; Bois. fl. or. I p. 902.

Transcaspia: N. 1777, near Merw. June 5. 1899.

Polygalaceæ.

Polygala vulgare L. var. *comosa* (Schk.) Chodat; *P. comosa* Schkur; Ldb. fl. ros. I p. 271; Bois. fl. or. I p. 475.

Alai mountains: N. 526, in the Juniper forests at Olgin Lug. Alt. 2800m. June 24. 1898. With blue and rose flowers.

Ampelidaceæ.

Cissus ægirophylla Bunge Reliq. Lehman. p. 55; *Vitis aegirophylla* Bois. fl. or. I p. 956.

Pamir: N. 1464, prov. Garan, in the Anderab-pass, at Badjan. Alt. 3700m. Oct. 6. 1898.

Rhamnaceæ.

1. *Paliurus aculeatus* Lam.; Ldb. fl. ros. I p. 500; Bois. fl. or. II p. 12.

Persia: N. 2194, prov. Gilan, in the Elburs mountains near Batshinar. Sept. 7. 1899.

2. *Zizyphus vulgaris* Lam.; Ldb. fl. ros. I p. 501; Bois. fl. or. II p. 12.

Buchara: Nr. 1727, in the town. May 28. 1899. — Persia: N. 2155, prov. Gilan, at Resht. Sept. 13. 1899.

Thymelæaceæ.

Stellera Lessertii (Wickstr.) C. A. Meyer, Bemerk. Daphnac., Bull. phys.-math. Ac. Imp. sc. St. Pb. I, 1843 p. 9; Bois. fl. or. IV p. 1051; *Passerina Lessertii* Wickstr. Granskn. Thym., K. Sv. Vet. Ak. Handl. 1818 p. 341.

— — var. *stachyoides* (Schrenk), *S. stachyoides* Schrenk; Jaub. Sp. Ill. pl. or. tab. 302.

Chiwa: N. 2079, on dry plains at Giaur Kalá. Aug. 11. 1899.

Elæagnaceæ.

1. *Hippophaë rhamnoides* L.; Ldb. fl. ros. III p. 552; Bois. fl. or. IV p. 1055.

Pamir: N. 1047, at the west-end of the lake Jashil Kul, alt. 3800 m. Aug. 8. 1898 (a shrub, not half a meter high); N. 1264, in forest at Djangarlik at the river Pamir Daria. Alt. 3600 m. Sept. 6. 1898. (A shrub 1—2 m high.)

2. *Elæagnus hortensis* M. Bieb.; Ldb. fl. ros. III p. 551; Bois. fl. or. IV p. 1056.

Pamir: N. 1469, prov. Shugnan, between Darmaraght and Chorock, alt. 2200 m. Oct. 6. 1898. (A tree 4—6 m high). — Amu Daria: N. 1820, on the island Shatman Togai near Tshardshui, june 19. 1899, and common at more places at the river. Near Kunja Urgentsh (Chiwa) I have found this tree with three generations of shoots of the year, all bearing leaves.

Crassulaceæ.

1. *Umbilicus Lieveni* Ldb. fl. ros. II p. 173; Bois. fl. or. II p. 775.

Ferghana: N. 317, on a mountain near Osh. May 30. 1898. — Pamir: N. 1024, near the lake Jashil Kul. Alt. 3800 m. Aug. 2. 1898.

2. *Sedum gelidum* (Schrenk) Ldb. fl. ros. II p. 177; O. Fedtschenko Flore du Pamir l. c. p. 101; *Rhodiola gelida* Schrenk.

Pamir: N. 1090, on moist slopes near the lake Jashil Kul. Alt. 4000 m. Aug. 11. 1898.

3. *Sedum Rhodiola* DC.; Ldb. fl. ros. II p. 179; O. Fedtschenko flore du Pamir p. 102.

Pamir: N. 1054, near the lake Jashil Kul. Alt. 3800 m. Aug. 5. 1898.

Saxifragaceæ.

1. *Saxifraga flagellaris* Willd.: Ldb. fl. ros. II, p. 209; Bois. fl. or. II p. 809; O. Fedtschenko fl. Pamir p. 102.

Pamir: N. 1091, on moist slopes near the lake Jashil Kul. Alt. 4100 m. Aug. 11. 1898.

2. *Saxifraga cernua* L.; Ldb. fl. ros. II p. 219; O. Fedtschenko fl. Pamir p. 104.

Alai mountains: N. 431, in the Juniper forest at Olgin Lug. Alt. 2700 m. June 20. 1898. — Pamir: N. 1087, on moist slopes near the lake Jashil Kul. Alt. 4100 m. Aug. 11. 1898.

3. *Saxifraga Hirculus* L.; Ldb. fl. ros. II p. 210; Bois. fl. or. II p. 808; O. Fedtschenko fl. Pamir p. 103.

Pamir: N. 951, in marshes at the lake Jashil Kul. Alt. 3800 m. July 25. 1898.

4. *Adoxa Moschatellina* L.; Ldb. fl. ros. II p. 382; Bois fl. or. III p. 2.

Alai mountains: N. 461, in the Juniper forests at Olgin Lug. Alt. 2800 m. June 21. 1898.

5. *Parnassia subacaulis* Kar. Kir. Enum. Song. l. c. p. 164; Ldb. fl. ros. I, p. 773; Drude Parnassia, Linnæa 39, 1875, p. 319. *P. ovata* Ldb., Hook. fl. brit. Ind. II p. 403; ?*P. Laxmanni* Pall; Ldb. fl. ros. I p. 264; O. Fedtschenko fl. Pamir l. c. p. 56.

Alai mountains: N. 556, at Olgin Lug. Alt. 3000 m. June 25. 1898.

Pamir: Nr. 753, in a dry river-bed, at Kara-Su. Alt. 3800 m. July 12. 1898.

The specimens are quite congruent with Karelin's and Kirilow's description. With Drude I think, that the name *P. Laxmanni* is not to be sustained, this species being insufficiently described and figured (by Laxmann in nov. Act. Petrop. VII, t. 5).

Ribesiaceæ.

1. *Ribes heterotrichum* C. A. Meyer in Ldb. fl. alt. I p. 270; Ldb. fl. ros. II p. 197. (Spec. orig. vidi.)

Pamir: N. 997, on stony slopes near the lake Jashil Kul. Alt. 4000 m. July 29. 1898.

2. *Ribes triste* Pallas, Nov. Act. Petrop. X p. 373; Turczaninow fl. baic.-dahur. I p. 444; Hedlund, om Ribes rubrum L., Botan. Notiser, Lund 1901 p. 104; *R. atropurpureum* C. A. M. in Ldb. fl. alt. I p. 268 (ex p.); *R. petræum* Ldb., non Wulf.

Alai mountains: N. 462, in the Juniper forests at Olgin Lug. Alt. 2700m. June 21. 1898. A shrub 2m high.

The true *R. petræum* (see e. g. Guimpel Holzgew. I tab. 20, Sturm Flora I. Abth. 13., Hft. 56, Lam. Encycl. 146) is different from *R. triste* by the more acuminate lobes and the strict racemes.

3. *Ribes nigrum* L.; Ldb. fl. alt. I p. 269; fl. ros. II p. 200; Turcz. fl. baic.-dahur. p. 445; Bois. fl. or. II p. 815.

Pamir: N. 1273, in forest at Djangarlik at the river Pamir Daria. Alt. 3200m. Sept. 6. 1898.

Hamamelidaceæ.

Parrotia persica Fisch.; Ldb. fl. ros. II p. 376; Bois. fl. or. II p. 818.

Persia: N. 2188, prov. Gilan, common in the forests at Imam Sadé Hashim. Sept. 16. 1899.

Rosaceæ.

1. *Prunus prostrata* Labill.; Ldb. fl. ros. II p. 7; Bois. fl. or. II p. 648.

Ferghana: N. 1629, 1655, in mountains near Osh. May 1899.

2. *Spiræa crenata* L.; Ldb. fl. ros. II p. 11; Bois. fl. or. II, p. 689.

Alai mountains; N. 447. in the Juniper forests at Olgin Lug. Alt. 2600m. June 20. 1898.

3. My species of *Alchemilla* are forwarded to Mr. Buser for determination.

4. *Agrimonia Eupatoria* L.; Ldb. fl. ros. II p. 31; Bois. fl. or. II p. 727.

Persia: N. 2170, prov. Gilan, at Resht. Sept. 44. 1899.

Potentilla L.

(det. Hans Siegfried, Bulach, Suisse.)

5. *Potentilla bifurca* L.

Ferghana: N. 300, near Margelan. May 27. 1898; N. 382, at Gultsha. June 17. 1898. — Alai mountains: N. 499, near Olgin Lug, alt. 2600m. June 22. 1898. — Pamir: N. 1174, at a stream near the lake Bulung Kul. Alt. 3800m. Aug. 25. 1898.

6. *Potentilla sericea* L., non auct.

Alai mountains: N. 522, in the Juniper forest near Olgin Lug. Alt. 2600m. Juni 24. 1898. — Pamir: N. 1007, on moist slopes near the lake Jashil Kul. Alt. 3900m. Aug. 8. 1898.

7. *Potentilla polyschista* Bois.; *P. sericea* L. var. *polyschista* Lehmann.

Pamir: N. 657, at Muskol. Alt. 4100m. July 2. 1898; N. 776, Tshatir Tash, on saline steppe. Alt. 4000m. July 14. 1898; N. 1095, near the lake Jashil Kul. Alt. 4100m. Aug. 11. 1898.

8. *Potentilla hypoleuca* Turczaninow.

Alai mountains: N. 523, in the Juniper forests at Olgin Lug. Alt. 2600m. June 24. 1898. — Pamir: N. 647, on the saline shore of the lake Kara Kul. Alt. 4000m. July 1. 1898; N. 821, at a stream near the lake Jashil Kul. Alt. 3800m. July 18. 1898 (forma robusta).

9. *Potentilla radiata* Lehmann.

Alai mountains: N. 459, in the Juniper forests at Olgin Lug. Alt. 2600m. June 21. 1898.

10. *Potentilla reptans* L., non auct.

Ferghana: N. 286, near Margelan. May 27. 1898.

11. *Potentilla dealbata* Bunge in Ledebour, non Douglas.

Pamir: N. 714, in saline marshes at Pamirski Post near the Murghab river. Alt. 3800m. July 9. 1898; N. 742, in the ravine Jaman Tal near the Karasu river. Alt. 3800m. July 12. 1898; N. 1133, in saline marshes at the lake Bulung Kul. Alt. 3800m. Aug. 19. 1898; N. 1347, prov. Wakhan, on saline spots near Sunk. Alt. 3000m. Sept. 10. 1898.

12. *Potentilla nivea* L. var. *incisa* Lehmann, Turczaninow. *P. nivea* L. var., Lindb.

Alai mountains: N. 521, in the Juniper forests at Olgin Lug. Alt. 2600m. June 24. 1898.

13. *Potentilla supina* L., non Michaux. *P. supina α. vulgaris* Spenner, *P. Ruthenica* herb. Hamilton non Willd., *P. prostrata* Haencke non auct. al., *P. Amurensis* Maximowitsch.

Samarkand: N. 105. May 6. 1898. — Amu Daria: N. 1848, on the shore at Akrabat, between Tshardshui and Chiwa. June 21. 1899.

14. *Potentilla Salessowii* Stephan. *P. discolor* Jacquemont non auct. al. *Comarum Salessowii* Bunge.

Pamir: N. 760, in a dry river-bed at Kara-Su. Alt. 3800m. July 12. 1898.

15. ***Rubus cæsius*** L.; Ldb. fl. ros. II p. 66; Bois. fl. or. II p. 692.
Persia: N. 2161, prov. Gilan, in forest at Resht. Sept. 14. 1899.

16. ***Hulthemia berberifolia*** (Pall.) Dumort.; Ldb. fl. ros. II p. 72; Bois. fl. or. II p. 668. *Rosa berberifolia* Pall. Nov. Act. Petrop. X p. 379, t. 10.

Chodshent: N. 279, in dry stony steppe between Chodshent and Chawast. May 23. 1898; N. 1667, in the steppe. May 2. 1899.

17. ***Cratægus pinnatifida*** Bunge, Enum. pl. chin., Mém. Ac. sc. St. Pétersb. II 1835; Rgl. Gartenflora 1862 t. 366; Lange Consp. sp. gen. Crataegi, Köbenhavn 1897 p. 36, t. 3. *C. oxyacantha* L. var. *pinnatifida* Rgl. Act. H. Petrop. I p. 118; *Mespilus pinnatifida* Koch Dendr. I p. 152; Wenzig, Linnæa 43 p. 77; Wenzig Jahrb. bot. Gart. Berlin II p. 303.

— — var. ***garanica*** n. var. *Folia 3—5^{cm} longa, petiolo 2—3^{cm} longo suffulta, circumscriptione rhomboidea, basi cuneata, profunde 5-fida grosse serrata, seniora glabra vel in nervis et nervorum angulis villosula.* (Fig. 1, natural size.) *Stipulæ semilunatæ sæpius lineares interdum latiores, margine convexo serratæ, 0,75—1,5^{cm} longæ. Corymbi pauciflori (?), pedicelli fructiferi 2—4^{cm} longi, fructus maturi 1—1,5^{cm} longi nigro-rubri (in sicco nigri) bipyrenei pyrenis semiglobatis, sepala non depressa. Arbor parva.*

Fig. 1. *Cratægus pinnatifida* Bunge var. *garanica*.

Pamir: N. 1463, prov. Garan, at Darmaraght. Alt. 2400^{m}. Oct. 6. 1898.

The plant in question is perhaps different from *C. pinnatifida* which has finely serrate leaves, semicordate stipules and red fruits with 3—5 pyrenes. But as the habit of the two plants agrees and as my material is rather scarce I do not risk to describe my plant as a new species.

18. ***Cotoneaster multiflora*** Bunge in Ldb. fl. alt. II p. 220; Ldb. fl. ros. II p. 93; Koch Dendr. I p. 169; Rgl. Acta H. Petrop. II p. 315; Hooker fl. brit. Ind. II p. 386.

Pamir: N. 1466, prov. Garan, near Anderab. Alt. 2600 m. Oct. 6. 1898.

19. *Mespilus germanica* L.; Ldb. fl. ros. II p. 94: Bois. fl. or. II p. 659.

Persia: N. 2157, prov. Gilan, in forest at Resht. Sept. 14. 1899.

Lythraceæ.

Lythrum Salicaria L.; Ldb. fl. ros. II p. 127; Bois. fl. or. II p. 738.

Persia: N. 2143, prov. Gilan, at Enseli. Sept. 12. 1899.

Oenotheraceæ.

1. *Epilobium angustifolium* L.; Ldb. fl. ros. II p. 105; *E. spicatum* Lam.; Bois. fl. or. II p. 745.

Pamir: N. 1046, near the lake Jashil Kul. Alt. 3800 m. Aug. 5. 1898.

2. *Epilobium hirsutum* L.; Ldb. fl. ros. II p. 107; Bois. fl. or. II p. 746.

Transcaspia: N. 1768, near Merw. June 3. 1899.

3. *Epilobium roseum* L.; Ldb. fl. ros. II p. 110; Bois. fl. or. II p. 749.

Pamir: N. 1366, prov. Wakhan, at Langarkisht. Alt. 3000 m. Sept. 13. 1898.

4. *Epilobium thermophilum* n. sp. (fig. 2, nat. size).

Planta omnibus partibus glaberrimis. Rhizoma subterraneum arcuatum longe fibrillosum. Caulis fistulosus erectus 12—40 cm altus in parte inferiore sæpe ramos elongatos arcuato-ascendentes florigeros gerens, teretiusculus lineis glabris parum manifestis vel nullis munitus. Folia inferiora opposita ovato-oblonga, ovato-lanceolata vel lanceolato-oblonga, basi rotundata petiolis brevibus vel brevissimis suffulta, superiora sparsa ovato- vel elliptico-lanceolata, in petiolum brevem breviter attenuata, — folia omnia irregulariter serrato-denticulata, læte viridia 2—4 cm longa 5—15 mm lata. — Alabastra parva (vix 2 mm longa) rubra elliptico-ovata, flores parvi (c. 5 cm longi) erecti. Calycis petalis brevioris lacinia ovata acuta. Stigma clavato-globosum. Capsulæ glaberrimæ tenerœ maturitate erectæ 4—5 cm longæ pedicellis 2—3 cm longis suffultæ. Semina c. 1 mm longa obovoidea apice rotundata pallide fusca testa tenuiter papillosa.

Pamir: N. 1062, 1179, at a hot spring near the lake Jashil Kul. Alt. 3900 m. Aug. 7 and 29. 1898.

The bigger specimens were collected at the head of the spring, on the border of the little stream issuing from it. Here the water had a

Fig. 2. *Epilobium thermophilum.*

temperature of 32° C. The smaller specimens were to be found farther from the head. In 1901 I forwarded a specimen of this plant to the late Professor Haussknecht in Weimar, and he admitted the species to be new and remarked that it has the nearest relation to *E. minutiflorum* Hausskn. (see his Monogr. Epilob. p. 212, t. 4). In habit it resembles certain forms of *E. lactiflorum* Hausskn., from which it is easily distinguished e. g. by the absense of thin stolons.

Haloragidaceæ.

1. *Hippuris vulgaris* L.; Ldb. fl. ros. II p. 119; Bois. fl. or. II p. 754; O. Fedtschenko fl. du Pamir p. 98.

Pamir: N. 710, in marshes at Pamirski Post. Alt. 3800 m. July 8. 1898.

2. *Myriophyllum spicatum* L.; Ldb. fl. ros. II p. 118; Bois. fl. or. II p. 755; O. Fedtschenko fl. du Pamir p. 98.

Pamir: N. 1037, 1114, in the lake Jashil Kul. Alt. 3800 m. Aug. 1898.

Myrtaceæ.

Myrtus communis L.; Bois. fl. or. II p. 736.

Persia: N. 2224, prov. Gilan, in stony plains at Mendjil in the Elburs mountains. Oct. 15. 1899.

Loranthaceæ.

Viscum album L.; Ldb. fl. ros. II p. 380; Bois. fl. or. IV p. 1068.

Persia: N. 2226, prov. Gilan, common in the forests. Oct. 17. 1899.

Primulaceæ.

1. *Anagallis arvensis* L.; Ldb. fl. ros. III p. 29; Bois. fl. or. IV p. 6.

Samarkand: N. 177. May 12. 1898.

2. *Glaux maritima* L.; Ldb. fl. ros. III p. 23; Bois. fl. or. IV p. 7.

Ferghana: N. 289, in cultivated land at Margelan. May 27. 1898; Pamir: N. 768, near the river Karasu. Alt. 3800 m. July 12. 1898.

3. *Androsace maxima* L.; Ldb. fl. ros. III p. 30: Bois. fl. or. IV p. 18.

Transcaspia: N. 12, at Krasnowodsk. April 23. 1898.

4. *Androsace septentrionalis* L.; Ldb. fl. ros. III p. 19; Bois. fl. or. IV p. 17.

Alai mountains: N. 525, in the Juniper forests at Olgin Lug. Alt. 2800 m. June 24. 1898.

5. ***Androsace villosa*** L.; Ldb. fl. ros. III p. 17; Bois. fl. or. IV p. 13; O. Fedtschenko fl. Pamir p. 141.

Alai mountains: N. 448, 537, in the Juniper forests at Olgin Lug. Alt. 2600m. June 1898.

— — var. ***dasyphylla*** (Bunge) Kar. Kir. Enum. Song., Bull. nat. Moscou 1842 p. 429; O. Fedtschenko fl. Pamir p. 142; *A. dasyphylla* Bunge, Ldb. fl. ros. III p. 16; *A. villosa* var. *congesta* Bois. fl. or. IV p. 14.

Pamir: N. 636. on dry plains at Kisil Kul. Alt. 4000m. June 29. 1898.

6. ***Primula sibirica*** Jacq.; Ldb. fl. ros. III p. 14; O. Fedtschenko fl. Pamir p. 140.

Alai mountains: N. 419, in marshes at Sufi Kurgan. Alt. 2100m. June 18. 1898. — Pamir: N. 622, in marshes at Kisil Kul. Alt. 4000m. June 29. 1898; N. 661, at Muskol. Alt. 4300m. July 3. 1898; N. 705, in marshes at Pamirski Post. Alt. 3800m. July 8. 1898; N. 963, in marshes at the lake Jashil Kul. Alt. 3800m. July 26. 1898.

7. ***Primula algida*** Adams; Ldb. fl. ros. III p. 11; Bois. fl. or. IV p. 29; Herb. fl. ros. N. 979. *P. farinosa* L. v. *algida* Trautv., Acta H. Petrop. IV p. 391; O. Fedtschenko fl. Pamir p. 138.

Alai mountains: N. 433, in the Juniper forests at Olgin Lug. Alt. 2700m. June 20. 1888; N. 585, in the Alai steppe at Sary Tash. Alt. 3300m. June 27. 1898. The latter having more farinose and less denticulate leaves perhaps is to be called: var. *armena* Koch.

8. ***Primula nivalis*** Pall.; Ldb. fl. ros. III p. 10; Regel Botan. Issled. in Iswest. Imp. obs. Liub. Jest. Antrop. Etnogr. XXI, 1876, p. 7, tab. 5a; Bois. fl. or. IV p. 27; O. Fedtschenko fl. Pamir p. 141.

Pamir: N. 1084, near the lake Jashil Kul. Alt. 4000m. Aug. 11. 2898.

9. ***Primula Stuartii*** Wall. in Roxb. fl. Ind. 1824 II p. 20; Hook. fl. arit. Ind. III p. 490.

— — var. ***purpurea*** (Royle) Hook. l. c. *P. purpurea* Royle Ill. 1839, p. 311, tab. 77; *P. nivalis* Pall. var. *purpurea* Rgl. Acta H. Petrop. III p. 137; O. Fedtschenko fl. Pamir p. 141.

Pamir: N. 1237, near the snow in the Chargush-pass. Alt. 4300m. Sept. 3. 1898.

10. ***Cortusa Matthioli*** L.; Ldb. fl. ros. III p. 22.

Alai mountains: N. 437, in the Juniper forests at Olgin Lug. Alt. 2600m. June 20. 1898.

Plumbaginaceæ.

1. *Acantholimon alatavicum* Bunge in Mém. Ac. Imp. Sc. St. Pétersb. 1872; Rgl. Acta H. Petrop. VI p. 390; O. Fedtschenko fl. Pamir p. 174.

Pamir: N. 816, 852a, near the lake Jashil Kul, on dry plains and slopes. Alt. 3800m. July 1898; N. 1584a: Djangarlik at the river Pamir Daria. Alt. 3700m. March 10. 1899.

2. *Acantholimon diapensioides* Bois.; Bois. fl. or. IV p. 830; O. Fedtschenko l. c.

Pamir: N. 652, on a peninsula in the lake Kara Kul. Alt. 4200m. July 1. 1898; N. 852, on dry plains at the lake Jashil Kul. Alt. 3800m. July 21. 1898.

3. *Statice leptostachya* Bois. fl. or. IV p. 872.

Buchara: N. 209, on saline spots. May 15. 1898; N. 1683, ibid. May 20. 1898.

4. *Statice spicata* Willd.; Ldb. fl. ros. III p. 467; Bois. fl. or. IV p. 871.

Buchara: N. 214, May 15. 1898; N. 1682, in saline desert. May 20. 1899.

5. *Statice otolepis* Schrenk.; Ldb. fl. ros. III p. 467; Bois. fl. or. IV p. 866.

Buchara: N. 1670, in saline desert. May 13. 1899.

6. *Plumbago europæa* L.; Ldb. fl. ros. III p. 471; Bois. fl. or. IV p. 875.

Persia: N. 2202, in the Elburs mountains at Batshinar. Sept. 18. 1899.

Convolvulaceæ

(det. H. Hallier, Hamburg).

1. *Convolvulus fruticosus* Pall.

Ferghana: N. 303, in stony plains near Andidshan. May 27. 1898; Chiwa: in stony plains at Giaur Kala (at Amu Daria). Aug. 11. 1899.

2. *Convolvulus erinaceus* Ldb. in Eichw. pl. casp. cauc. p. 11, t. 7; Ldb. fl. ros. III p. 88; Bois. fl. or. IV p. 87. (det. O. P.)

Chiwa: N. 1957, 1969, in sandy desert near Chiwa. July 1899.

3. *Convolvulus eremophilus* Bois. et Buhse in: Buhse Aufzähl. transcauc. pers. Pfl. p. 148; Bois. fl. or. IV p. 90. (det. O. P.). Flowers white.

Chiwa: N. 1907, in stony desert at Pitnjak. June 28. 1899.

4. *Convolvulus lineatus* Pall.

Ferghana: N. 334, at Osh. June 8. 1898; N. 375, at Gultsha. June 17. 1898.

5. ?*Convolvulus pilosellifolius* Desr. in Lam. Encycl. III p. 551; Bois. fl. or. IV p. 103; *C. sogdianus* Bunge reliq. Lehman. p. 395. (det. O. P.)

Transcaspia: N. 1755, in desert at Udsh Adshi. June 2. 1899.

6. *Convolvulus arvensis* L.

Transcaspia: N. 1778, at Merw, June 5. 1898.

7. *Convolvulus* sp., allied to *C. eremophilus*. Flowers red, small. (O. P.)

Buchara: N. 1838, in desert at Ustyk. June 19. 1899.

8. *Calystegia sepium* aut., præ spec. ceteris flore albo bracteisque haud inflatis insignis.

Transcaspia: N. 1766, at Merw. June 6. 1899.

9. *Ipomæa purpurea* Lam.

Pamir: N. 1428, prov. Ishkashim, cultivated in gardens at Namatgut. Alt. 2700 M. Sept. 27. 1898.

10. *Cressa cretica* L.

Buchara: N. 2119, in desert at Farab. Sept. 3. 1899.

Cuscuta L.

(det. O. P.)

11. *C. planiflora* Ten. var. *approximata* (Bab.) Engelm. Syst. Arrang. Cuscuta, Transact. Ac. Sc. St. Louis I 1859 p. 465; Bois. fl. or. IV p. 116; Hook. fl. brit. Ind. IV p. 227.

Pamir: N. 1576, prov. Shugnan, found in hay at Chorock. Alt. 2200^{m}. Jan. 1899.

12. *C. europæa* L.; Engelm. l. c. p. 468; Bois. fl. or. IV p. 117; Hook. fl. brit. Ind. IV p. 225.

Pamir: N. 1511, prov. Garan, at Darmaraght, on Urtica dioica. Alt. 2400^{m}. Oct. 10. 1898.

13. *C. Kotschyana* Bois.; Engelm. l. c. p. 471; Bois. fl. or. IV p. 119.

Pamir: N. 1123, near the lake Jashil Kul, on Hyoscyamus pusillus. Alt. 3800^{m}. Aug. 18. 1898.

14. *C. chinensis* Lam.; Engelm. l. c. p. 479; Bois. fl. or. IV p. 120; Hook. fl. brit. Ind. IV p. 226.

Persia: N. 2156, prov. Gilan, in forests at Resht. Sept. 14. 1899.

15. *C. Lehmanniana* Bunge reliq. Lehman. p. 397; Engelm. l. c. p. 515; Bois. fl. or. IV p. 122.

Chiwa: N. 2113, at Chasar-asp. Aug. 21. 1899.

16. *C. reflexa* Roxb. fl. ind. I p. 446; Hook. fl. brit. Ind. IV p. 225.

— — var. *grandiflora* (Wall.) Engelm. l. c. p. 518.

Flowers odorous, pink-coloured with darker dots.

Pamir: N. 1440, 1441, prov. Ishkashim, on Hippophaë, Salix, Grasses a. o., at Namatgut. Alt. 2700 m. Sept. 27. 1898.

Solanaceæ.

1. *Solanum nigrum* L.; Ldb. fl. ros. III p. 188; Bois. fl. or. IV p. 284.

Pamir: N. 1433, prov. Ishkashim, in gardens at Namatgut. Alt. 2700 m. Sept. 27. 1898.

2. *Lycium ruthenicum* Murr.; Ldb. fl. ros. III p. 190; Bois. fl. or. IV p. 290.

Buchara: N. 227, in saline desert. May 10. 1898; N. 1672, may 13. 1899. — Chiwa: N. 2039, in a grove at Kunja Urgentsh. July 30. 1899.

3. *Datura Stramonium* L.; Ldb. fl. ros. III p. 182; Bois. fl. or. IV p. 292.

Pamir: N. 1435, prov. Ishkashim, in gardens at Namatgut. Alt. 2700 m. Sept. 27. 1898. — Persia: N. 2181, prov. Gilan, at Resht. Sept. 16. 1899.

4. *Hyoscyamus pusillus* L.; Ldb. fl. ros. III p. 184; Bois. fl. or IV p. 294.

Pamir: N. 1122, near the lake Jashil Kul. Alt. 3800 m. Aug. 18. 1898; N. 1365, prov. Wakhan, at Langarkisht. Alt. 3000 m. Sept. 13. 1898.

Plantaginaceæ.

1. *Plantago gentianoides* Sm.; Bois. fl. or. IV p. 879; J. Bornmüller in Mitth. Thür. Bot. Ver., N. F., XI, 1897, p. 65; *P. Griffithii* Decn.; Bois. l. c.; O. Fedtschenko fl. Pamir p. 175.

Pamir: N. 827, near the Alitshur-river. Alt. c. 4000 m. June 18. 1898 (with flowers); N. 1166, at a stream near the lake Bulung Kul. Alt. 3800 m. Aug. 25. 1898.

I am indebted to Mr. Bornmüller for specimens of Plantago from Persia, and with him I unite *P. gentianoides* and *P. Griffithii*. — Nr. 827 contains flowering specimens approaching the var. *scardica* Griseb. (according to Bornmüller the same as var. *alpina* Bornm., = var. *pamirica* O. Fedtsch. l. c.), some of the spikes being almost capitate. The anthers are bigger (more than 1^{cm} long) than those of *P. major*. — N. 1166 is a beautiful form with oblique ascendent scapes only a little pubescent above, and with 1—2^{cm} long spikes which are rounded at the top. The ripe capsule contains (4—)6 seeds, a little bigger than those of *P. major* and often curvate. — Perhaps this form ought to have its own name.

2. ***Plantago major*** L.; Ldb. fl. ros. III p. 476; Bois. fl. or. IV p. 878.

Chiwa: N. 2083, at Kisil-yi at the river Amu Daria. Aug. 12. 1899.

3. ***Plantago lanceolata*** L.; Ldb. fl. ros. III p. 481; Bois. fl. or. IV p. 881.

Transcaspia: N. 1761, in cultivated land at Merw. July 3. 1899.

4. ***Plantago lachnantha*** Bunge reliq. Lehman. p. 446; Bois. fl. or. IV p. 887.

Samarkand: N. 187, at Kujumasar. May 13. 1898.

Bignoniaceæ.

Incarvillea Olgæ Rgl. Gartenflora 1880, p. 3, tab. 1001; Rgl. Descript. pl. nov. Fedtschenko p. 62.

Pamir: N. 1458, prov. Garan, at Seïs. Alt. 2600^{m}. Oct. 5. 1898.

Apocynaceæ.

Apocynum venetum L.; Ldb. fl. ros. III p. 43; Bois. fl. or. IV p. 48.

Chiwa in river forests: N. 1911, at Chasar-asp. June 29. 1899; N. 2014, at Kiptshak, July 24. 1899.

Asclepiadaceæ.

Cynanchum acutum L.; Ldb. fl. ros. III p. 47; Bois. fl. or. IV p. 60.

Pamir: N. 1471, prov. Garan, at the Pandsh-river at Pies. Alt. 3200^{m}. Oct. 6. 1898. — Buchara: in the town. May 25. 1899.

Rubiaceæ.

1. ***Rubia tibetica*** Hook. fl. brit. Ind. III p. 204.

Pamir: N. 1003, on slopes near Jashil Kul. Aug. 1. 1898; N. 1050 ibid., in chinks of the rock. Aug. 5. 1898. Alt. 3800^{m}.

The latter contains small forms with broad leaves like specimens from Tibet. The first attains a height of 30^{cm} and was forming big tufts.

2. *Rubia tinctorum* L.; Ldb. fl. ros. II p. 405; Bois. fl. or. III p. 17.
Chiwa: N. 1945, in cultivated land, cultivated and wild. July 9. 1899.

3. *Asperula humifusa* Besser; Ldb. fl. ros. II p. 401; Bois. fl. or. III p. 44.
Ferghana: N. 299, at Margelan. May 27. 1898. — Transcaspia: N. 1782, at Merw. June 6. 1899.

4. *Galium tricorne* With.; Ldb. fl. ros. II p. 419; Bois. fl. or. III p. 67.
Samarkand: N. 119, in the steppe at Chawast. May 7. 1898.

5. *Galium spurium* L.; Bois. fl. or. III p. 69; *G. Aparine* L. var. *spurium* Ldb. fl. ros. II p. 420.
Alai mountains: N. 496, in the Juniper forests at Olgin Lug. Alt. 2600^{m}. June 22. 1898.

— — var. *Vaillantii* (Gr. et Godr.) Bois. l. c.; *G. Aparine* L. var. *Vaillantii* Ldb. l. c.
Transcaspia: N. 19, at Krasnowodsk. May 23. 1898.

6. *Galium songoricum* Schrenk; Ldb. fl. ros. II p. 421.
Alai mountains: N. 495, in the Juniper forests at Olgin Lug. Alt. 2600^{m}. June 22. 1898.

7. *Callipeltis cucullaria* (L.) Stev.; Ldb. fl. ros. II p. 422; Bois. fl. or. III p. 83.
Alai mountains: N. 413, at Sufi Kurgan. Alt. 2100^{m}. June 18. 1898.

Caprifoliaceæ.

1. *Sambucus Ebulus* L; Ldb. fl. ros. II p. 382; Bois. fl. or. III p. 2.
Persia: N. 2142, prov. Gilan, at Piribasar near Resht. Sept. 12. 1899.

2. *Lonicera coerulea* L.; Ldb. fl. ros. II p. 390; Kirilow: Die Lonic. d. rus. Reiches. Dorpat 1849, p. 51; Bois. fl. or. III p. 9.
Pamir: N. 972, on the shore of the lake Jashil Kul, Alt. 3800^{m}. July 28. 1898.

3. *Lonicera Karelini* Bge. in Kirilow l. c. p. 33.
Alai mountains: N. 568, near Olgin Lug. Alt. 3000^{m}. June 25. 1898.

4. *Lonicera microphylla* Willd.; Ldb. fl. ros. II p. 391; Hook. fl. brit. Ind. II p. 15; *L. Bungeana* Ldb. l. c., Kirilow l. c. p. 60; *L. Sieversiana* Bge.; Kirilow l. c. p. 56.

I cannot refer my specimens to *L. Bungeana* or *L. Sieversiana* as these species are described by Kirilow. The berries are perfectly connate, the filaments glabrous, the peduncles longer than the obtuse leaves. A shrub 2—3^{m} high.

Alai mountains: N. 468, in the Juniper forests at Olgin Lug. Alt. 2600^{m}. June 21. 1898.

5. *Lonicera hispida* Pall.; Ldb. fl. ros. II p. 389; Kirilow l. c. p. 30; Hook. fl. brit. Ind. III p. 11.

Alai mountains: N. 452, in the Juniper forests at Olgin Lug. Alt. 2600^{m}. June 21. 1898.

6. *Lonicera Olgæ* Rgl. et Schmalh. in Rgl. Descript. pl. nov. Fedsch., Iswest. Imp. Obs. Liub. Jest. Antrop. Etnogr. 34. 1882. p. 41; E. Wolff: Materiali d. isut. russkich vid skimolost. Iswest. S. Petersb. liesnoi Inst. III. 1899 tab. IV. fig. 1—5. A shrub 20—30^{cm} high.

Alai mountains: N. 529, in the Juniper forests at Olgin Lug. Alt. 2800^{m}. June 24. 1898.

7. *Lonicera Xylosteum* L.; Ldb. fl. ros. II p. 388; Bois. fl. or. III p. 6.

Pamir: N. 1457 A, prov. Garan, at Seïs. Alt. 2600^{m}. Oct. 5. 1898.

Dipsacaceæ.

Scabiosa Olivieri Coulter; Ldb. fl. ros. II p. 455: Bois. fl. or. III p. 141.

Pamir: N. 1530, prov. Garan, near Kuh-i-lal. Alt. 2700^{m}. Oct. 18. 1898.

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Lieutenant Olufsen's second Pamir-Expedition.

Musci.

By

V. F. Brotherus.

Dicranaceae.

Distichium Bryol. eur.

D. capillaceum (Sw.) Bryol. eur. fasc. $^{29}/_{30}$.

Alai mountains: N. 454, near Olgin-Lug, alt. c. 3000 m, June 21. 1898; N. 577, near Olgin-Lug, alt. c. 2900 m, June 24. 1898.

Area: Arctic and temperate Europe, Asia and northern America, mountains of Africa, Gerlache Strait, Tasmania and New Zealand.

Pottiaceae.

I. Tortella (C. Müll.) Limpr.

1. **T. fragilis** (Drumm.) Limpr.

Alai mountains: N. 541 ex p., in the juniper forests at Olgin-Lug, alt. c. 2700 m.

Area: Arctic and temperate Europe and Asia, northern countries of America.

II. Pottia Ehrh.

2. **P. Heimii** (Hedw.) Bryol. eur.

Pamir: N. 1197, near the lake Bulung Kul, alt. c. 3800 m. Sept. 30. 1898.

Area: Europe, Turkestan, northern countries of America and in arctic regions.

3. **P. latifolia** (Schwaegr.) C. Müll.

Pamir: N. 798, near Tshatir Tash, Alt. c. 4300 m. July 15. 1898.

Area: High mountains of Europe, Caucasus, Turkestan, Altai, Siberia, northern countries of America.

III. Pterygoneurum Jur.

4. **P. cavifolium** (Ehrh.) Jur.

Samarkand: Nr. 89, May 3. 1898.

Area: Temperate and southern Europe, Algiers, Caucasus, south-western Asia, northern America.

IV. Desmatodon Brid.

5. **D. systylius** Bryol eur.

Pamir: N. 1250, in the Chargush pass, alt. c. 4300 m. July 31. 1898.

Area: High mountains of Europe, Caucasus, Turkestan, Altai and northern countries of America.

6. **D. cernuus** (Hüb.) Bryol. eur.

Pamir: N. 1196, near the lake Bulung Kul, alt. c. 3800 m. Aug. 30. 1898.

Area: Mountains of Europe, Turkestan, northern countries of northern America.

V. Tortula Hedw.

7. **T. Paulsenii** Broth. n. sp.

Autoica; gracilis, caespitosa, caespitibus laxis, humilibus, mollissimis, laete viridibus, haud nitidis; *caulis* vix ultra 2 mm altus, inferne radiculis longissimis, fuscescentibus praeditus, superne laxe foliosus, simplex; *folia* flaccida, siccitate incurvo-flexuosa, humida erecto-patentia, carinato-concava, e basi elongate spathulata oblongo-elliptica, breviter acuminata, acuta, plerumque apiculata vel breviter mucronata, c. 3 mm longa, superne c. 0,4 mm lata, marginibus erectis, integerrimis, elimbata, nervo sat tenui, longe infra apicem folii evanido, cellulis superioribus rotundato-hexagonis, c. 0,020 mm, chlorophyllosis, grosse verrucosis, basilaribus rectangularibus, parce chlorophyllosis vel inanibus, laevissimis; *bracteae perichaetii* minores, obtusae; *seta* c. 5 mm alta, stricta, siccitate superne sinistrorsum torta, fusco-rubra, laevissima; *theca* erecta, cylindrica, regularis, brevicollis, c. 1,5 mm alta et c. 0,5 mm crassa, siccitate indistincte striatula, fusca, haud nitida; *annulus* longissime persistens; *peristomium* ad quintam partem tubulosum, tubo pallido, c. 0,10 mm alto, dentibus purpureis, papillosis, semel contortis; *spori* 0,010 mm, virides, laevissimi; *operculum* alte et anguste conicum, obliquulum, obtusum, c. 0,75 mm altum, cellulis in spiram dextram ordinatis; *calyptra* brunneola, ad dimidiam, partem supremam thecae dependens.

Alai steppe: N. 606, at the river Kisil-su, Alt. c. 3300 m. June 27. 1898.

Species ob folia angusta, mucronata, nervo longe infra apicem folii evanido valde peculiaris, cum nulla alia commutanda.

8. **T. desertorum** Broth.

Ferghana: N. 321 ex p., on the mountain Tacht-i-Soliman near Osh. May 30. 1898.

Area: Transcaspia and Turkestan.

9. **T. ruralis** (L.) Ehrh.

Alai mountains: N. 472, near Olgin-Lug, alt. c. 2600 m. June 21. 1898.

Area: Europe very common, Algiers and Tunis, western, middle and northern Asia, northern America widely distributed, Magellans strait.

VI. **Encalypta** Schreb.

10. **E. rhabdocarpa** Schwaegr.

var. **leptodon** (Bruch.)

Pamir: N. 797, Tshatir Tash, alt. c. 4300 m. July 15. 1898.

Area: Mountains of Europe, western, middle and northern Asia, northern countries of America.

Orthotrichaceae.

Orthotrichum Hedw.

1. **O. anomalum** Hedw.

Alai mountains: N. 470, near Olgin-Lug, alt. c 2600 m. June 21. 1898.

Area: Temperate Europe common, Algiers, western, middle and northern Asia, northern America.

2. **O. cupulatum** Hoffm.

Ferghana: N. 321, Tacht-i-Soliman near Osh, May 30. 1898.

Area: Temperate Europe not uncommon, Algiers, western and middle Asia, northern America.

Funariaceae.

Funaria Schreb.

1. **F. hygrometrica** (L.) Sibth.

Samarkand: N. 88, May 3. 1898. — Ferghana: Nr. 326, Osh, June 3. 1898.

Area: All over the world.

2. **F. microstoma** Bryol. eur.

Alai mountains: N. 421, near Olgin-Lug, alt. c. 2600 m. June 22. 1898.

Area: Temperate Europe rare.

Bryaceae.

I. **Leptobryum** (Bryol. eur.) Schimp.

1. **L. pyriforme** (L.) Schimp.

Pamir: N. 1405 ex p., prov. Wakhan, near a rivulet at Sermut, Sept. 21. 1898.

Area: Widely distributed in Europe, western, middle and northern America, in southern America rare, in Tasmania and New Zealand.

II. **Bryum** Dill. [1]).

2. **B. leptoglyphodon** Philib.

Alai steppe: N. 607, Alt. c. 3300 m, June 27. 1898. — Pamir:

[1]) The *Bryums* have all been submitted to the late Prof. Philibert for determination and he has indicated the new species, the descriptions of which, however, have been drawn up by the author.

N. 666, in marshes at the Muskol river, Alt. c. 4300 m. July 2. 1898; N. 895, in marshes at the river Mardjanaj near the lake Jashil Kul, alt. c. 3800 m. July 25. 1898; N. 1255, in the Chargush pass at a lake, alt. c. 4300 m. Sept. 4. 1898.

Var. **hygrophilum** Philib.

Pamir: Nr. 1223, in Chargush pass, in marshes, alt. c. 4300 m. Sept. 3. 1898.

Area: Turkestan.

3. **B.** (**Anaglyphodon**) **pamirico-mucronatum** Philib. n. sp.

Polyoicum (heteroicum + dioicum); sat gracile, caespitosum, caespitibus densis, pallide lutescenti-viridibus, nitidiusculis; *caulis* vix ultra 2—3 mm altus, basi fusco-radiculosus, superne dense foliosus, innovando ramosus, innovationibus brevibus, erectis, strictis, dense et aequaliter foliosis, obtusis; *folia* siccitate vix mutata, suberecta, haud decurrentia, carinato-concava, oblongo-ovata, breviter acuminata, acuta, marginibus angustissime revolutis vel suberectis, integerrimis, angustissime limbata, nervo aetate fuscescente, plerumque continuo, rarius infra summum apicem folii evanido, cellulis firmis, parce chlorophyllosis, ovali-hexagonis, inferioribus oblongo-hexagonis, basilaribus oblongo-rectangularibus, infimis rubris, marginalibus elongatis, limbum angustissimum, uniseriatum efformantibus; *bracteae perichaetii* intimae minutae, ovatae, acutae, marginibus erectis, integerrimis, nervo infra apicem evanido; *seta* 2, 5 cm alta, e basi geniculata erecta, flexuosula, tenuis, rubra, siccitate haud torta; *theca* pendula, leptodermis, turgide obovata, brevicollis, cum collo, siccitate vix contracto c. 2, 3 mm longa et c. 1,15 mm crassa, pallida, haud nitida; *annulus* latus, revolubilis; *exostomii* dentes e fundo luteo lanceolato-subulati, c. 0,37 mm longi et c. 0,075 mm lati, haud limbati, lutei, dense papillosi, apice hyalini, papillosi, scutulis rectangularibus, linea media parum flexuosa, lamellis c. 20, septis obliquis hic illic conjunctis, more Hemisynapsiorum fere efformatis, haud perforatis; *endostomium* exostomio plus minusve adnatum, luteolum, papillosum, membrana sat humili, processibus plerumque liberis, anguste lanceolato-subulatis, anguste rimosis, ciliis brevibus, haud appendiculatis; *spori* 0,020—0,025 mm, olivacei, papillosi; *operculum* minutum, humile, conicum, breviter mamillatum.

Pamir: N. 813, at the river Alitschur, alt. 3700 m. July 18. 1898.

Species **B. maritimo** Bomans. et **B. paradoxo** Philib. admodum similis et forsan proxima, sed inflorescentia, foliis margine anguste revolutis nec non exostomii colore jam dignoscenda.

4. **B.** (**Cernuiformia**) **pamirense** Philib. n. sp.

Synoicum; caespitosum, caespitibus mollibus, laxis, viridibus, haud

nitidis; *caulis* usque ad 5 mm altus, basi fusco-radiculosus, superne comoso-foliosus, innovando ramosus; *folia* flaccida, sicca erecto-patentia, singula contorta, humida patentia, longe decurrentia, e basi angustata elongate oblongo-lanceolata, anguste-acuminata, nervo excedente aristata, marginibus erectis, summo apice minute denticulatis vel subintegris, limbata, limbo 2—3 seriato, aetate rufescente, nervo aetate rufescente, plus minusve longe in aristam recurvulam excedente, cellulis leptodermibus, chlorophyllosis, oblongo-hexagonis, basilaribus rectangularibus; *bracteae perichaetii* intimae minutae, ovato-triangulares, integrae, haud limbatae, nervo infra apicem evanido; *seta* 2,5—3,5 cm alta, tenuis, flexuosa, fusca, apicem late arcuatum versus vage torta; *theca* horizontalis—nutans, leptodermis, arcuato-clavato-pyriformis, cum collo elongato, defluente, siccitate valde contracto et plicato c. 4 mm longa at c. 1,5 mm crassa, pallide fusca, haud nitida; *exostomii* dentes e fundo luteo lanceolati, subulato-acuminati, c. 0,44 mm longi et c. 0,05 mm lati, angustissime limbati, lutei, glabri, apice hyalini, papillosi, scutulis humilibus, rectangularibus, linea mediana flexuosa, lamellis densis sat humilibus, hic illic septis singulis, obliquis, medianis conjunctis; *endostomium* liberum, luteolum, minutissime papillosum, membrana c. 0,12 mm alta, processibus carinatis, anguste rimosis, ciliis ternis, bene evolutis, longe appendiculatis; *spori* 0,020—0,025 mm, olivacei, minutissime papillosi. Caetera ignota.

Pamir: N. 1405 ex p., prov. Wakhan, near a rivulet at Sermut, Sept. 21. 1898.

Species distinctissima, **B. calcareo** Vent. ut videtur proxima, sed inflorescentia ciliisque bene evolutis, appendiculatis jam dignoscenda.

5. **B. Schleicheri** Schwaegr.

Alai mountains: N. 490, near Olgin-Lug, in water, alt. c. 2600 m. June 22. 1898.

Var. **latifolium** Schimp.

Alai mountains: N. 428, near Sufi Kurgan in a cold rivulet, alt. c. 2100 m. June 18. 1898.

Area: Mountains of Europe, Kaukasus, Himalaya, Central Asia, northern countries of America.

Bartramiaceae.

Philonotis Brid.

Ph. calcarea (Bryol. eur.) Schimp.

Alai mountains: N. 428 ex p., near Sufi Kurgan in a cold rivulet, alt. c. 2100 m. June 18. 1898.

Area: Europe, Caucasus, Himalaya, western and central Asia, northern America.

Timmiaceae.

Timmia Hedw.

T. bavarica Hessl.

Alai mountains: N. 484, in the juniper forests at Olgin-Lug, alt. c. 2600 m. June 21. 1898.

Area: Temperate and southern Europe, Algiers, Caucasus, Kashmir, Central Asia, northern America very rare.

Hypnaceae.

I. Amblystegium Bryol. eur.

1. **A. fallax** (Brid.) Mild.

Pamir: N. 1594, Jaman Tal at Pamirski Post, in a rivulet, alt. 4000 m. March 16. 1899.

Area: Europe, Algiers, Caucasus, Central Asia, Sibiria, northern America.

II. Limnobium Bryol. eur.

2. **L. palustre** (Huds.) Bryol. eur.

Var. **subsphaericarpon** (Schleich.).

Pamir: N. 1256 ex p., on rocks in a cold rivulet in the Chargush pass, alt. c. 4300 m. Sept. 4. 1898.

Area: Mountains of Europe, Caucasus, Central Asia.

III. Hypnum Dill., Mitt.

3. **H. euchloron** Bruch.

Persia: N. 2165, prov. Gilan at Resht. Sept. 14. 1899.

Area: Caucasus, Persia.

4. **H. rusciforme** Neck.

Pamir: N. 1256 ex p., on rocks in a cold rivulet in the Chargush pass, alt. c. 4300 m. Sept. 4. 1898.

Area: Europe, Canares, Algiers, western, middle, northern and eastern Asia, northern America.

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