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A Revision of Parapholis and Monerma in the Mediterranean

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Introduction

During a study of the cytology of Aegean grasses two different chromosome numbers (2n=14 and 2n=38) were found in *Parapholis incurva* (L.) Hubb. A morphologic analysis showed that plants with different caryotypes could be easily distinguished by morphologic characters. A revision was then undertaken of the species occurring in the Mediterranean, i.e., all species recognized within the genus. The monotypic Mediterranean genus *Monerma* was also included in this study as it is closely related to *Parapholis*.

Cytology

Cytologic observations have been made previously in three of the species treated.

The cytology of the three species occurring in the Central Aegean has been studied on material cultivated in the Botanical Garden in Lund. The material on which observations have been performed is preserved in the herbarium of the Botanical Museum in Lund, together with the parents of these plants (collected in the field).

The chromosomes have been studied in somatic plates in roots. Part of the material has been treated according to the paraffin method (fixed in a modification of Navashin-Karpeschenko and stained in crystal violet) while part of it has been squashed and stained in Feulgen. In this case roots have been treated with pectinase a few hours

before squashing in order to give less damaged cells (according to the method of Östergren and Heneen, 1962).

From the collections normally 4—6 specimens have been studied cytologically.

Parapholis marginata. Material of this species has not previously been investigated cytologically.

In the material from the Aegean 2n=14 has been found (fig. 1 A). Different types of chromosomes can be distinguished, viz., one pair having large satellites, one relatively long pair with submedian constrictions, 3 medium-sized pairs with submedian constrictions, and 2 relatively short pairs having subterminal constrictions.

Material studied. **Greece.** Kiklades. Voidonisos (cult. no. 3714); Folegandros, Adelfia Petra, W-islet (cult. no. 3810); Makares, Prasini (cult. no. 2378); Koufonisia, Kopria (cult. no. 2379); Keros: Plaki (cult. no. 2712), Gourgari (cult. no. 3810), Andreas (cult. no. 2711); Kinaros, Mavronisi (cult. no. 2718); Astipalea: Ag. Kiriaki (cult. no. 3811), small island near Ag. Kiriaki (cult. no. 3814); Kamila (cult. no. 2708); Sirina, Dio Adelfi, W-islet (cult. no. 3812).

Parapholis filiformis. The chromosome number 2n=14 has been recorded for *P. filiformis* s. lat. (incl. *P. strigosa*) by Avdulov (1931), Castro and Fontes (1946), Delay (1947), and Rodrigues (1953). On the basis of the information given it is impossible to decide with certainty whether the material belongs to *P. filiformis* s. str. or *P. strigosa*. However, in the area in which Castro and Fontes as well as Rodrigues have collected their material, *P. filiformis* is known to occur. This, together with the Mediterranean origin of Avdulov's material, makes it rather probable that *P. filiformis* s. str. has been studied. The referring of all this material to *P. strigosa* as made by Löve (1961), is not supported by any facts known.

According to the good drawing given by Rodrigues (1953) the idiogram is similar to that of *P. marginata*.

Monerma cylindrica. The chromosome number 2n=26 has been recorded by Avdulov (1931), Saura (1948), Rodrigues (1953), and Tateoka (1957). Also the number 2n=52 has been found by Hunter (1934). Whether this polyploid number occurs constantly in *Monerma* or is just an incidental finding needs to be verified.

In the single collection studied from the Aegean the number found was 2n=26 (fig. 1 B). The chromosomes are similar to those in *Para-*

pholis marginata. However, only one pair of satellited chromosomes occur and one pair of chromosomes with submedian constrictions is distinctly longer than any of those in *P. marginata*.

Material studied. **Greece.** Kiklades. Mikonos, Agrelos P:t (cult. no. 3809).

Parapholis incurva. The chromosome numbers previously recorded for this species are c. 32 (Castro and Fontes 1946), 36 (Avdulov 1931), 38 (Rodrigues 1953), and 42 (Gould 1958).

In the material from Central Aegean (13 collections studied) invariably the chromosome number 2n=38 has been found (fig. 1 C) both in squashed material and in material treated according to the paraffin method. The chromosomes are similar to those of *P. marginata*, but only one pair of satellited chromosomes is present, and two pairs of chromosomes are distinctly longer than the rest.

The same chromosome number has been recorded by Rodrigues from central Portugal both in somatic metaphase plates and in meiosis (n=19). Rodrigues also gives good drawings both of somatic and meiotic plates.

The number 2n=c. 32 recorded by Castro and Fontes from the same area as Rodrigues may be due to poorly prepared material.

Gould has studied the chromosomes in meiotic preparations on material adventitious in California and found n=21. However his drawing shows that at least the plate figured can hardly be counted with any certainty. Therefore the number given by Gould needs to be verified.

The number 2n=36 by Avdulov (1931) may well be a misinterpretation of a real number of 2n=38 as material fixed in Navashin-Karpeschenko may sometimes be difficult to count with certainty.

At present, therefore, the chromosome number for *P. incurva* has to be regarded as 2n=38.

Material studied. **Greece.** Euboea. Petalides, Megalo Nisos (cult. no. 2715) — Kiklades. Sifnos, Ormos Ornos (cult. no. 2709); Folegandros, Pelagia (cult. no. 3817); Skinousa, N of Psiliammos (cult. no. 3818); Keros, small island N of Plaki (cult. no. 2712); Denousa, N of Ormos Mateo (cult. no. 2710); Amorgos, W of Akr. Xodotos (cult. no. 2720), the island of Biokastro (cult. no. 2380); Kinaros, Laro (cult. no. 2719); Levitha, Porto di Levitha (cult. no. 2716); Santorin, Christiana (cult. no. 3819); Astipalea: Kondro Nisos (cult. no. 3816), Vriseu Punta (cult. no. 3820).

Parapholis strigosa. The species has not been cytologically investigated (cf. however under *P. filiformis*).

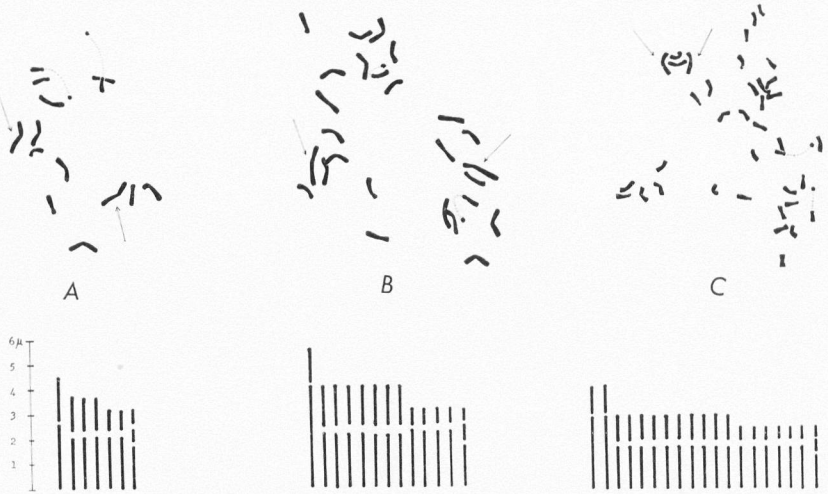

Fig. 1. Somatic plates (squashed) from roots together with an attempt to analyse the genomes, based on the Aegean material studied. — A. *Parapholis marginata,* B. *Monerma cylindrica,* C. *Parapholis incurva.* — The arrows indicate some of the long chromosomes.

Parapholis pycnantha. The species has not been cytologically investigated.

Discussion. The chromosomes in *Parapholis marginata, filiformis,* and *Monerma cylindrica* are of similar size. In *P. incurva* they are, however, distinctly smaller, probably depending on the high level of polyploidy.

The chromosome numbers known within the group are 14, 26, and 38, a series which at first glance does not fit into the polyploid scheme. However, in the whole material studied there occurs only one pair of similar chromosomes having large satellites, independent of the level of polyploidy. In the material with 2n=26 (*Monerma*) one pair of chromosomes is distinctly larger than the rest (and, too, larger than any chromosome in diploids). In material with 2n=38 (*Parapholis incurva*) two such pairs of large chromosomes occur.

It is therefore natural to suggest, that in tetraploids one pair of satellited chromosomes has been attached to another pair of chromosomes, resulting in a pair of very large chromosomes. In hexaploids such a fusion between two pairs of satellited chromosomes and two other pairs of chromosomes may have occurred, resulting in two pairs of long chromosomes. The satellites in such large chromosomes then either have aborted or the constriction separating the satellite has disappeared.

This interpretation is supported by the chromosome structure of the genomes in the different species. Thus chromosomes morphologically similar to those found in the diploid *P. marginata* occur both in the tetraploid *Monerma cylindrica,* and the hexaploid *Parapholis incurva.* Even the difference in size between the two types of submedian chromosomes found in *P. marginata* can be traced in *Monerma* and *P. incurva,* but has not been indicated in the idiograms as it has been difficult to demonstrate with certainty.

Similar cases of fusion of chromosomes seem to be rare but have been recorded, e.g., for *Holocarpha* by Clausen (1951) and *Alisma* by Björkqvist (1961).

Thus there are reasons to believe in a basic genome for the two genera occurring unaltered in *Parapholis marginata* and *filiformis,* and slightly transformed by fusions in polyploids as *Monerma cylindrica* and *Parapholis incurva.*

As the third genus in the tribe, *Pholiurus,* has 2n=14, the basic chromosome number of the tribe *Monermeae* is x=7.

Taxonomic Position of the Genera

Hubbard (1946 p. 10) made a short survey of the species formerly referred to *Lepturus* and showed that the genus s. lat. consists of wholly discordant elements. He thus restricted *Lepturus* to the perennial species related to *P. repens* (G. Forst.) R. Br., the type species for the genus. *Lepturus* s. str. was considered as the single genus in the tribe *Leptureae,* which on the basis of anatomic characters was placed in the vicinity of *Chlorideae.* Hubbard also established a new genus, *Henrardia,* for *Lepturus pubescens* (Bertol.) Boiss. and *L. persicus* Boiss., and showed that it has to be regarded as a highly reduced member in the tribe *Hordeae.* The rest was placed in a new tribe, *Monermeae,* possibly related to *Festuceae* (cf. Hubbard in Hutchinson 1948 p. 332). This tribe consists of the monotypic genera *Pholiurus* and *Monerma* and the new genus *Parapholis,* to which four species were referred.

Hubbard (1946 p. 14) considered *Monerma* and *Parapholis* as closely related. The genera differ only in the number of glumes in the spikelet, and because of that also in the orientation of the floret (fig. 2 B, C). As the close affinity between the genera is still more stressed by cytologic similarities, there are reasons to unite them. However, I have found it most appropriate to keep to Hubbard's classification, which seems to be generally accepted, as a uniting involves several nomencla-

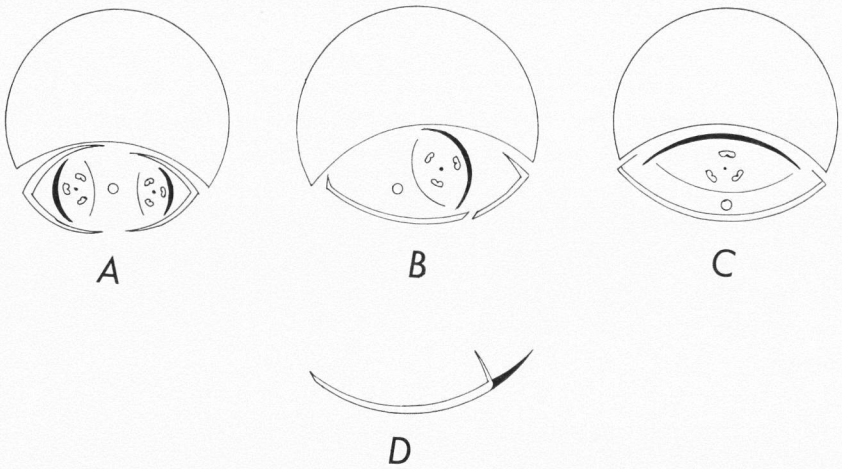

Fig. 2. A—C. Schematic diagrams of spikelets (after Holmberg 1926): A. *Pholiurus*, B. *Parapholis*, and C. *Monerma*. — D. Transversal sectioning of a glume, showing the winged keel (black) occurring in *Parapholis marginata* and *P. filiformis*.

tural changes (the name of the united genus would be *Monerma*) and would cause still more confusion in this group of plants, which has been treated so differently by botanists.

The monotypic genus *Pholiurus,* with the species *P. pannonicus* (Host) Trin., differs considerably from the two above discussed genera of *Monermeae,* e.g., in having two-flowered spikelets (fig 2 A), falling alone at maturity, and a caryopsis with a persistent, tipped style-base and broadly elliptic hilum.

Taxonomy of the Species

All species treated are small, basally branched annuals. They have short and narrow, often convolute leaves with a membranaceous, short, truncate ligula. They are glabrous excepting the ribs which on the upper side are covered by very large inflated, transparent cells and may be scabrid of small, stiff hairs. The epidermal cells of the lower surface of the leaves vary considerably. Thus in the same plant different leaves may have epidermal cells with undulate or straight walls, respectively.

The inflorescence is narrowly spikelike with the rhachis disarticulating at maturity (an internode and a spikelet falling together). The spikelets are solitary, sessile, alternate and have a single floret. They are sunk in hollows of the rhachis and are placed broadside on to it.

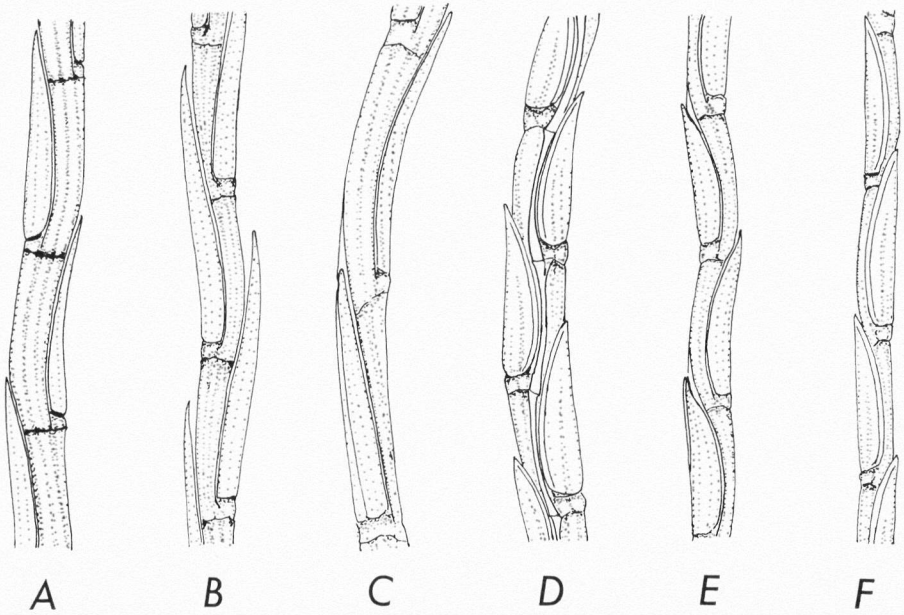

Fig. 3. The central portion of the spikes. — A. *Monerma cylindrica*, B. *Parapholis pycnantha*, C. *Parapholis incurva*, D. *Parapholis marginata*, E. *Parapholis strigosa*, F. *Parapholis filiformis* (×5).

The glumes (2 in *Parapholis*, 1 in *Monerma*) are thick, coriaceous, lanceolate to ovate, and have 3—5 ribs. The lemma is slightly shorter than the glume(s), membranaceous, and with 3 nerves, of which the lateral ones are short and ± indistinct. The palea is of the same size as the lemma, membranaceous, and with 2 not very distinct nerves. The floret has 2 lanceolate to oblong lodiculae, 3 anthers, the ovary somewhat lobed at the apex, and an obsolete style. The caryopsis has a dried-up appendage at the apex and a linear to oblong hilum.

Parapholis can be subdivided into two minor entities, of closely related species, viz., the *incurva*-group (*P. incurva, P. marginata*) having very short anthers and the *filiformis*-group (*P. filiformis, P. strigosa, P. pycnantha*) having long anthers.

Key to the Species of *Monerma* and *Parapholis*

1. Spikelets (excepting the apical one) with one glume. ..... *Monerma cylindrica*
1. Spikelets with two glumes.
   2. Keel of glumes distinctly winged (cf. fig. 2 D).
      3. Anthers less than 1 mm long; plants usually small and robust.
         Parapholis marginata

3. Anthers more than 2 mm long; plants often elongated and slender. *Parapholis filiformis*

2. Keel of glumes not winged.

4. Anthers less than 1 mm long; culms and spikes often strongly curved. *Parapholis incurva*

4. Anthers at least 2 mm long; culms and spikes straight to slightly curved.

5. Anthers 3.2—4 mm long, glumes 6—9 mm, narrowly lanceolate, acuminate, usually reaching beyond 1/2 of the following internode. *Parapholis pycnantha*

5. Anthers 2.0—2.5 mm long; glumes 4—6 mm, broadly lanceolate, ± cuspidate, not reaching beyond 1/4 of the following internode. .... *Parapholis strigosa*

Monerma cylindrica Coss. & Dur.

An almost strictly erect plant, 10—35 cm high, having relatively long and broad leaves with scabrid ribs, and uppermost sheath of the culms distinctly inflated. Spikes usually 3—8, stiff, relatively thick, normally 7—25 cm long, straight or slightly curved. Spikelets numerous, not reaching beyond 1/3 of the following internode. Lowermost spikelets often covered by the sheath, even in mature specimens. Only the upper glume developed (excepting in the apical spikelet), 5—8 mm long, broadly lanceolate, acuminate. Lemma with the back adjacent to the rhachis. Palea glabrous. Anthers 2.5—3.5 mm long. Caryopsis c. 3 mm. — Chromosome number 2n=26 (52).

Ecology. In saline soil, mainly in salt marshes along the sea. Also a weed in cultivated areas.

Distribution. Along the coasts of the Mediterranean (but not recorded for Egypt and Libya) and the Atlantic coast of Portugal. In non-maritime, saline soil in Syria and Iraq. Introduced in South Africa and California and probably naturalized there. Casual in many ports.

Parapholis marginata sp. nov.

Parapholi incurvae similis, sed minor et carina glumarum conspicue alata. A *P. filiformi* antheris 0.4—0.8 mm longis differt. Numerus chromosomatum 2n=14.

Holotype. Greece. Kiklades. Sirina. Dio Adelfi, the W-island 14.5 1960 Runemark and Nordenstam, Herb. Bot. Lund.

A ± erect plant, 5—15 cm high, having short, usually convolute leaves with smooth ribs, and strongly inflated, often reddish sheaths. Spikes usually 10—20, close together, relatively thick, normally 2—5 cm long, slightly curved. Spikelets less than 10 in a spike, not reaching beyond 1/3 of the following internode. Lowermost spikelets even in mature plants covered by the sheath. Both glumes developed, 4—6 mm long, broadly lanceolate to ovate, acute, and with a distinctly winged

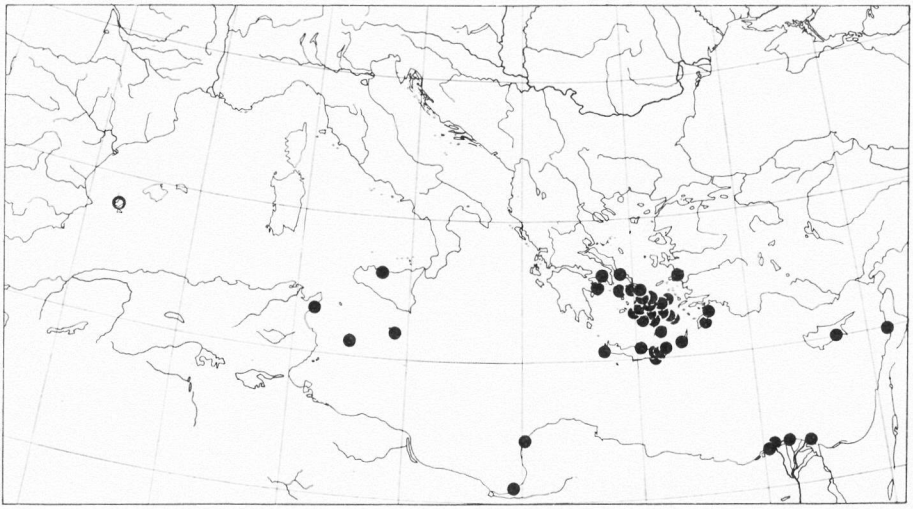

Fig. 4. The distribution of *Parapholis marginata*. The species is certainly not rare along the Turkish west and south coasts, but from this area few littoral plants have been collected. — The open ring indicates a doubtful locality.

keel. Lemma with one side adjacent to the rhachis. Palea glabrous. Anthers 0.4—0.8 mm long. Caryopsis 2—2.5 mm. — Chromosome number 2n=14.

Variability. *P. marginata* is not very variable. However, sometimes luxurious specimens occur with thick spikes and very broad glumes (especially in Egypt). Even forms (probably modifications) which are ± unbranched and relatively slender are seen.

Ecology. In sandy soil along the sea or in maritime rocks. Apparently not occurring as a weed in cultivated areas. Ecologic differences between *P. marginata* and *P. incurva* have not been observed in the Aegean. On the contrary, they seem to occur in exactly the same type of localities along the sea, not rarely mixed.

Distribution. Sicily, Southern and Central Aegean, Cyprus, Syria, Egypt, Cyrenaica, Tunisia; besides a doubtful record from the Balearic Islands (list of localities in the Appendix).

Remarks. *P. marginata* has been collected several times and has been distributed to many herbaria, e.g., by Heldreich, but always determined to *Lepturus* (*Pholiurus*) *incurvus*.

Parapholis incurva (L.) Hubb.

A ± stout, erect or decumbent plant, 5—25 cm high, having convolute

or flat leaves, with scabrid ribs, and uppermost sheath strongly inflated. Spikes ± numerous, relatively thick, usually 5—10 cm long, and often strongly curved (not rarely forming a circle or a semicircle). Spikelets usually 10—20 in a spike, not reaching beyond 1/3 of the following internode. Lowermost spikelets even in mature plants usually covered by the sheath. Both glumes developed, 6—8 mm long, lanceolate, acuminate, keel not winged. Lemma with one side adjacent to the rhachis. Palea scabrid at the apex. Anthers 0.5—1.0 mm. Caryopsis c. 3 mm. — Chromosome number 2n=38.

Variability. *P. incurva* is not very variable in the Mediterranean. However, material from England deviates considerably in habit and ecology as pointed out by Hubbard (personal communication).

Ecology. Sandy soil (rarely saline soil) near the sea and on maritime rocks. Also a weed in ports and cultivated areas.

Distribution. Common and apparently native all around the Mediterranean coasts, the Atlantic coasts of Morrocco, Portugal, Spain, France and southern England. Also occurring in the following areas and possibly native there: Macaronesian Island, Iraq, Trancaucasia (along the Black Sea coast), Persia and N.W. India. With certainty introduced and partly naturalized in North and South America, South Africa, and Australia. Casual in many ports.

Parapholis filiformis (Roth) Hubb.

An erect or decumbent plant, 5—25 cm high, often slender, having ± convolute leaves with scabrid ribs, and not or indistinctly inflated sheaths. Spikes usually 3—15, normally 5—10 cm long, slightly curved or straight. Spikelets usually 10—20 in a spike, not reaching beyond 1/3 of the following internode. Lowermost spikelets in mature plants not covered by the sheath. Both glumes developed, 4—6 mm long, ± narrowly lanceolate, acuminate, keel distinctly winged. Lemma with one side adjacent to the rhachis. Palea scabrid at the apex. Anthers (2—)2.5—3.5 mm long. Caryopsis c. 3 mm. — Chromosome number probably 2n=14.

Variability. The species varies mainly in habit. Strictly erect, very slender specimens with few spikes occur as well as low decumbent ones with many ascending spikes.

Ecology. In saline soil (mainly in salt marshes) along the sea. Probably never a weed in cultivated areas.

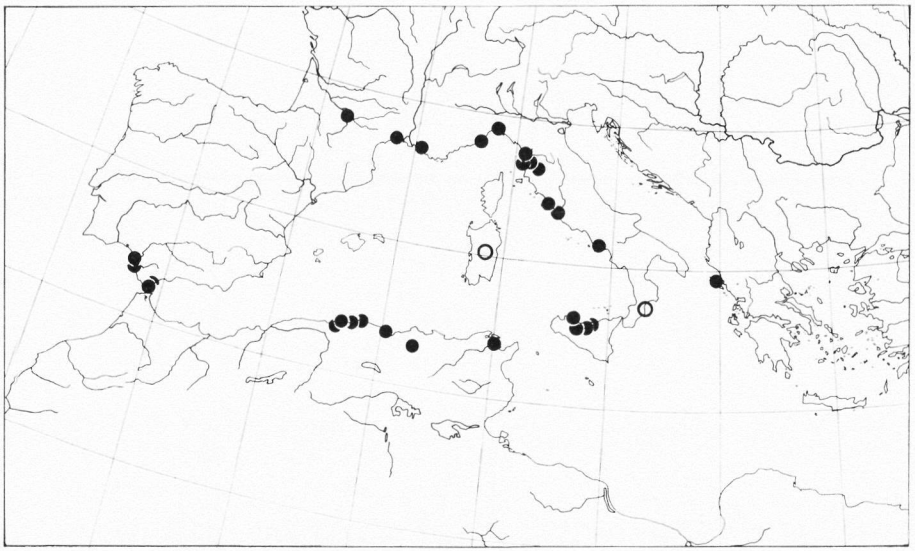

Fig. 5. The distribution of *Parapholis pycnantha*. The occurrence in southern France (Toulouse) is according to the herbarium label adventitious. — The open rings indicate findings which have not been exactly located.

Distribution. Not as common as *P. incurva* but all along the coasts of the Mediterranean, as well as along the Atlantic coast of Morrocco and Portugal, at least north to Lisboa (list of localities along the Atlantic coast in the Appendix).

Parapholis strigosa (Dum.) Hubb.

An often slender, erect or decumbent plant, 5—20 cm high, having ± convolute leaves with scabrid ribs, and sheaths not or indistinctly inflated. Spikes usually 5—15, normally 4—8 cm long, slightly curved or straight. Spikelets usually 10—20 in a spike, not reaching beyond 1/4 of the following internode. Lowermost spikelets in mature plants not covered by the sheath. Both glumes developed, 4—6 mm long, broadly lanceolate to ovate, cuspidate, keel not winged. Lemma with the side adjacent to the rhachis. Palea scabrid at the apex. Anthers 2.0—2.5 mm. Caryopsis c. 3 mm. — Chromosome number unknown.

Variability. *P. strigosa* varies in habit in the same way as *P. filiformis*. Thus slender specimens with few spikes, as well as low tufted ones with several ascending spikes, occur.

Ecology. In saline soil (mainly in salt marshes) along the sea.

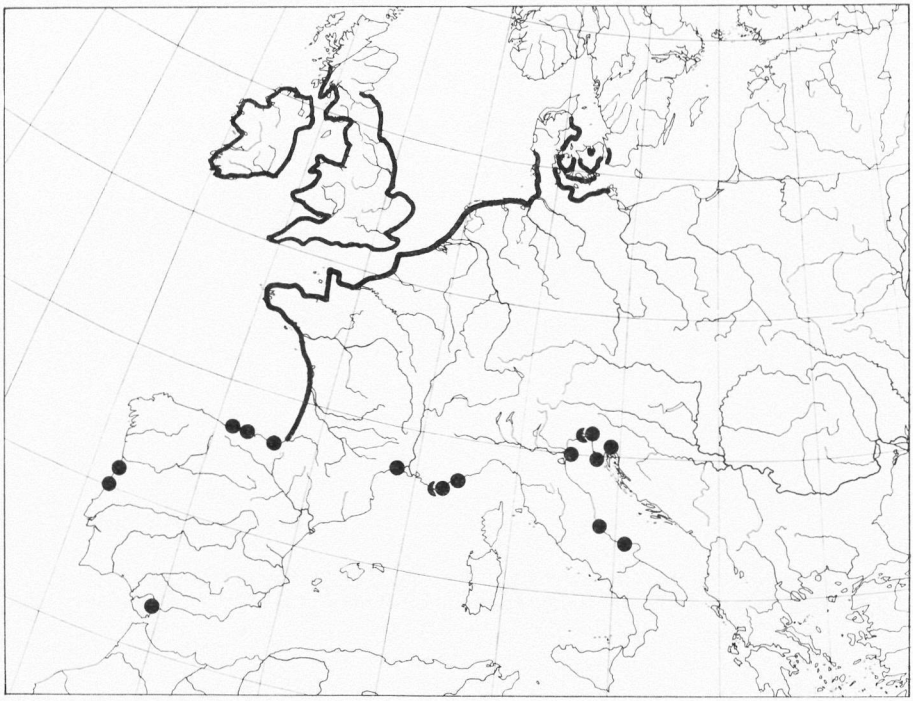

Fig. 6. The distribution of *Parapholis strigosa*. There are reasons to believe that the species is more common in the Iberian Peninsula as the material from this area studied by me is rather small. — The west-European distribution for the species has only been roughly indicated.

Distribution. Along the shores in western Europe from south-western part of the Baltic to southern Spain. Besides along the north coast of the Mediterranean eastwards to Istria and northern Dalmatia (for list of localities in the Mediterranean and on the Iberian Peninsula see Appendix).

Remark. Hylander (1953 p. 232) regards *P. strigosa* as adventitious along the coast of the Adriatic Sea. However, it may as well be indigenous in the Mediterranean, as similar areas are known for other littoral plants. Thus the distribution area of *P. strigosa* coincides almost exactly with that of *Agropyron pungens* (Pers.) R. et S.

Parapholis pycnantha (Hack.) Hubb.

A stout, ± erect plant, 15—35 cm high, having large ± flat leaves, with scabrid ribs, and uppermost sheath indistinctly inflated. Spikes usually 3—10, normally 8—20 cm long, straight to slightly curved. Spikelets

usually 15—30 in a spike, at least most of them reaching beyond 1/2 of the following internode. Lowermost spikelets covered by the sheath even in mature plants. Both glumes developed, 6—9 mm, lanceolate, acuminate (almost aristate), keel not winged. Lemma with the side adjacent to the rhachis. Palea with scabrid apex. Anthers 3.2—4.0 mm. Caryopsis c. 3 mm. — Chromosome number unknown.

Variability. The material seen is not very variable.

Ecology. Saline soil along the sea, clayey soil along rivers and channels, and clayey fields.

Distribution. West-Mediterranean species: southern Spain, southern France, Italy, western Greece, Algeria, Tunisia. Found once as a casual plant in England. (For list of localities see Appendix).

Remarks. *P. pycnantha* has not been properly described or discussed previously. Hackel (1904 p. 33) made an incomplete description when establishing *Lepturus filiformis* var. *pycnanthus*. The variety was described in connection with a finding of it as a casual plant near London. According to Hackel it occurs indigenously in Sicily and Egypt. However, the material in Hackel's herbarium from Egypt is luxurious specimens of *P. incurva*.

A type specimen has been selected on account of the diversity of the material in Hackel's herbarium [Italy. Sicilia. Palermo, Mondello coll. Parlatore, Herb. Mus. Nat. Wien (lectotype)].

The variety was wholly neglected until Hubbard (1946 p. 14) raised it to the rank of species, however without discussing morphology or distribution.

Appendix

Revised Herbarium Material

The study is based on the author's collection as well as on material from the following herbaria: British Museum (Natural History), London (BM), Royal Botanic Garden, Edinburgh (E), Instituto Botanico, Firenze (FI), Conservatoire et Jardin Botaniques, Genève (G), Royal Botanic Gardens, Kew (K), Universitetets Botaniska Museum, Lund (LD), Naturhistorisches Museum, Wien (W). — I am greatly indebted to the directors and curators of these institutions for having placed material at my disposal.

My own material is marked in following lists by the collecting numbers in brackets. R. 1—4468 is collected by Runemark in 1957, R. & S. 4500—12900 by Runemark and Snogerup in 1958, and R. & N. 13000—17001 by Runemark and Nordenstam in 1960 (for the situation of the localities see the maps in Runemark et al. 1960).

The collections seen of *Monerma cylindrica* and *Parapholis incurva* have not been listed as these species are very common all over the Mediterranean. Even collections seen of *Parapholis strigosa* as well as those of *P. filiformis* have not been listed from areas where they are very common.

Parapholis marginata

(All collections studied)

Spain. Baleares. Ibiza 1897 Gandoger (W) — The locality needs to be verified.

Italy. Sicily. Gussone (BM), Palermo Ross (BM), Mondello 1835 Parlatore (FI), Lampedusa 1905 s. coll. (FI).

Malta. Fournay (G)

Greece. Peloponnisos. Argolis, Methana Haussknecht (BM) — Attica. Athinai, Faliron Orphanides (BM) — Euboea. Karistos 1956 Rechinger (G, K) — Samos. Between Colonna and Tigani 1934 Rechinger (W) — Kiklades. "Archipel" 1820 d'Urville (G); Kithnos 1892 Heldreich (W) 1900 Tuntas (W); Siros 1919, 1920 Gandoger (G); Mikonos, Ormos Ornos (R. & N. 16078); Naxos: Akr. Ag. Ioannis (R. 1798), S of the town (R. 2176), 2 km N of Mitria (R. 3068), E of Apollona (R. 4109), SE of Akr. Axapsi (R. & S. 4880), Ormos Agiasou (R. & S. 10097); Makares, Prassini (R. & S. 9707); Denousa, 3 km ESE of Akr. Aspron (R. & S. 9629); Voidonisos (R. & S. 11021); Iraklia: the harbour (R. 4143), between the harbour and "Spilea Cove" (R. & N. 13249); Skinousa, Agrilousa (R. & N. 15576); Koufonisi: Ano K. (R. & N. 15625, 15687), Glaronisi (R. & N. 15746), Kopria (R. & S. 10318); Keros: Gourgari (R. & N. 15908), Andreas (R. & S. 10912), Plaki (R. & S. 10935); Folegandros, Adelfia Petra: E-islet (R. & N. 14607), W-islet (R. & N. 14624); Sikinos: W of Kara (R. & N. 14777), Kalogeros (R. & N. 14745); Ios, the harbour (R. 2176, 2191, 2350); Amorgos: Katapola (R. 1434), Akr. Xodotos (R. & S. 12239); Kinaros 1935 Rechinger (W); Levitha, Mavronisi (R. & S. 12079); Anidros (R. & S. 8315); Anafi: Fteni, W-islet (R. & N. 14934), Makra (R. & S. 7962); Astipalea: Baia della Sabbia (R. & N. 15092 b), Vathi (R. & N. 15168 b), Maltesana (R. & N. 13398 a), Ag. Kiriaki (R. & N. 15454), Ag. Kiriaki, the small islet (R. & N. 15468), Ofidousa (R. & N. 13844), Tigani Nisos (R. & N. 15416), Koutzomiti (R. & N. 15435); Sirina: Dio Adelfi, W-islet (R. & N. 14150, 14201), E-islet (R. & N. 14125), Tria Nisia E-islet 1935 Rechinger (W) S-islet (R. & N. 14333); Kamila (R. & S. 7892) — Dodecanisos. Rodos: near the town 1890 Bourgeau (G), N of Cap Fokas, the W-islet (R. & N. 16728); Kasos, Plato Nisia, E-island (R. & N. 16621) — Crete. Selinos, Lafonisi, Prasonisi 1942 Rechinger (W); Malewyzi, Gazi 1942 Rechinger (G, K, W); Merabello, Spinalonga 1846 Heldreich (BM, E, FI, G, W), Nelonia 1846 Heldreich (BM, K, E, G, W); Hierapetra: near the town 1942 Rechinger (W), Kavusi 1911 Neukirch (W); Sitia: Gandoger (K), Palaekastro Gandoger (K), Toplu 1942 Rechinger (K, W), Yanisades, Dragonara 1942 Rechinger (W)

Cyprus. Lacarna 1862 Kotschy (W)

Syria. Without locality Blanche (W)

Egypt. Mariut, El Omaied 1931 Gauba (W) — Alexandria: 1888 Samaritani (FI), Sidi Gaber 1908 Bornmüller (G, E, W), Abu Qir Figari (FI) — Baltim Ascherson (W) — Damietta 1887 Ascherson (W) — Rosetta 1843 s. coll. (G)

Libya. Cirenaica. Benghasi Ruhmer (E) Sandwith (K), Samet el Hamar, SE of Agedabia Pampanini (K)

Tunisia. Nabeul 1910 Pitard (G)

Parapholis filiformis

(Collections seen from the Atlantic coast)

Morrocco. Chaoui, "El Hauk" 1912 Pitard (G), Rabat 1926 Lindberg (W), Tanjier el Belia 1912 Pitard (C), Tanger s. coll. (W) 1839 Salzmann (G) Schousboe (FI, W)

Spain. Andalucia. Algeriças 1883 Nilsson (LD) 1887 Reverchon (W), Cadiz Monard (G), Isle de Léon 1829 Monard (W)

Portugal. Algarve: Loulé, Brosailles 1835 Bourgeau (LD), Sagras 1939 Rothmaler (FI) — Estremadura: Lisboa 1848 Welwitsch (G, W), Lisboa, Trafaria 1888 Daveau (FI, LD, W), Setubal 1900 Luisier (LD, W)

Parapholis strigosa

(Collections studied from the Iberian Peninsula and the Mediterranean)

Spain. Cantabria. San Sebastian 1873 Gertel (W), Santander: Comillas 1925 Leroy (G, LD, W), Santona 1922 Elias (G, W) — Andalucia. Fuente de Piedra, Lago Salida 1873 Winkler (W)

Portugal. Beira Litoral. Figueira da Foz 1880 s. coll. (W) 1909 Ferreira (LD, G, W), Ilhavo, Ria 1901 Sampaio (LD, W)

France. *Mediterranean coast.* Herault. Montpellier Boivin (G) — Var. Toulon s. coll. (G), Hyères 1905 Huet & Jacquin (G) — Alpes-Maritimes. Nice Carras 1857 Ayasse (G)

Italy. Friuli-Venezia. Aquileja s. coll. (G, W), Grado 1903 s. coll. (FI, W), Isonzo, "Cona" Tommasini (W), Monfalcone 1843 s. coll. (W) Tommasini (FI) — Veneto. Lido Kellner (W) — Abruzzi. Giulianova 1906 Rigo (LD) — Apulia. Foggia, Lago di Lesina 1898 Fiori (FI)

Yugoslavia. Istria. Pola 1900 Makowsky (W) — Dalmatija. Veglia Müller (W).

Greece. Crete Sieber (W). — Locality to be doubted.

Parapholis pycnantha

(All collections studied)

Portugal. "Liburnia" s. coll. (LD)

Spain. Andalucia. Isle de Léon 1828 s. coll. (W), Puerto S:ta Maria 1849 Bourgeau (G), Algeçiras 1883 Nilsson (LD), San Roque s. coll. (G)

France. Haute Garonne. Toulouse (introduced) 1877 Duval-Jouve (W) — Herault. Montpellier DeCandolle (G) — Bouches-du-Rhone. Marseille Duval-Jouve (FI)

Italy. Liguria. Albenga 1927 Corradi (FI), Genua 1837 De Notaris (FI), 1889 Bastreri (FI) — Toscana. Montalcino, Cartiglion del Bosco 1888 Biondi (FI), Orciano 1914 Fiori & Passerini (FI), Pisa 1808 Savi (G) 1916 Savelli (FI), Volterra, Saline 1892 Martelli (FI), Serrazzano 550 m. s.m. 1953 Chiarugi, Vergniano & Corradi (FI), Siena, "Coroncina" 1873 Levier (G, W) — Lazio. Citiavecchia 1877 Chierici (G), Roma s. coll. (G), "Porto di S. Pancrazio" 1848 Donaselli (FI) — Campania. s. coll. (W), Paestum Maire (W) — Calabria. "du bord de la mère jonique" Thomas (G) — Sardegna. s. coll. (G, FI) — Sicilia. s. coll. (G), Gasparrini (W) Presl (W) Parlatore (G) Orsini (G), "Sagana" Parlatore (W), Palermo 1850 Tineo (G), Mondello Todari (W), Madonie, Isnello 1873 Strobły (W), Ficuzza s. coll. (FI)

Greece. Kerkira (Corfu) 1877 Ball (G)

Algerie. "Mauritania" Bové (W) — Constantine. Town of C. 1876 Reboud (G), "Dj. Ouach" near the town of C. 1888 s. coll. (G), Bougie 1896 Reverchon (G — Alger. Outlet of the river Isser 1888 Letourneaux (FI), Rerhaya 1837 Bové (G), Blida Lefèvre (W), Dely-Ibrahim (near the town of A.) 1863 Durando (FI), Dellys 1878 Meyer (G)

Tunisia. Fondouk-Djédid 1910 Pitard (G)

England. Buckinham. Iver, Bucks (introduced) 1903 Druce (W).

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Summary

A survey of *Parapholis* and *Monerma* is given including a key, descriptions, chromosome numbers, ecology, and distribution areas for the species recognized.

A new east-Mediterranean species, *Parapholis marginata* Run., related to *P. incurva*, is described. The west-Mediterranean species, *P. pycnantha* (Hack.) Hubb., previously only mentioned incidentally in the literature is treated in detail.

The polyploid series 14, 26, and 38 occurring within the tribe *Monermeae* is explained by the fusion in polyploids of all but one pair of satellited chromosomes with other chromosomes.

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Contribution to the Taxonomy of Callithamnion Lyngbye emend. Naegeli

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The genus *Callithamnion* was one of six genera in Lyngbye's (1819) Section IV, Siphonigonata which contained the algae with '*filamentous, tubular, articulate fronds*'. *Callithamnion* was described as containing plants with '*Frons teres, articulata, ramosissima, rosea*; *articuli uno tubulo latiori, longitudinali notati. Fructus capsulae ad latera ramulorum subpedunculatae*'.

Lyngbye included the following twelve species in the genus: *Conferva arbuscula* Dillw.=*Callithamnion arbuscula* (Dillw.) Lyngbye; *Ceramium fruticulosum* Roth=*Callithamnion fruticulosum* (Roth) Lyngb.; *Conferva corymbosum* Sm.=*Callithamnion corymbosum* Sm. Lyngb.; *Ceramium roseum* Roth=*Callithamnion roseum* (Roth) Lyngb.; *Conferva plumula* Ellis=*Antithamnion plumula* (Ellis) Thuret; *Conferva repens* Dillw.=*Spermothamnion repens* (Dillw.) Rosenv.; *Conferva Rothii* Turt.=*Rhodochorton rothii* (Turt.) Naeg.; *Conferva Daviesii* Dillw.=*Acrochaetium daviesii* (Dillw.) Naeg.; *Conferva lanuginosum* Dillw.=*Acrochaetium lanuginosum* (Dillw.) Naeg.

C. A. Agardh (1828) and Harvey (1833) added approximately forty more species, but the majority of these have been removed to other genera. Meanwhile Bonnemaison (1828) retained in the genus *Ceramium* those species which are recognized today as belonging to *Callithamnion* sensu Naegeli. Later, Kuetzing (1843) divided the genus *Callithamnion* sensu Lyngbye into two genera on the basis of differences in the cortication and tetrasporangia. *Callithamnion* sensu Kuetzing was described as having ecorticate thalli and tetrasporangia '*ramis insidentia*'. The new genus *Phlebothamnion*, which contained *Calli-*

thamnion sensu Naegeli, had corticate primary filaments, and tetrasporangia '*ramis inserta*'. However, no support was forthcoming from algologists of the time for the proposals of Bonnemaison or Kuetzing.

The concept of the genus has been modified since Lyngbye's time by two major and a number of minor changes. The first major change was made by Naegeli (1861) who transferred the species without alternate branches to the newly described genera, *Antithamnion*, *Rhodochorton*, and *Acrochaetium*.

The second major change was made by Feldmann Mazoyer (1940) when she divided the *Callithamnion* sensu Naegeli into two genera. She placed the species which had uninucleate cells throughout the plant, carpogonial branches with the cells arranged in zig-zag manner, and spherical, irregularly-lobed carposporophytes in a new genus named *Aglaothamnion* with *A. furcellaria* (J. Ag.) comb. nov. as the type. Feldmann Mazoyer listed the following species in her new genus: *A. brodiaei* (Harv.) comb. nov.; *A. furcellaria* (J. Ag.) comb. nov.; *A. neglectum* nov. sp.; *A. tripinnatum* (Grat.) comb. nov.; *A. caudatum* (J. Ag.) comb. nov.; *A. scopulorum* (J. Ag.) comb. nov.

Feldmann Mazoyer described the emended genus *Callithamnion* in considerable detail. The main characters of this genus were multinucleate cells except at the apices, carpogonial branches in which the first three cells were formed by divisions parallel to the main axis and to each other (i.e. straight), and round gonimolobes. She did not name a type species for her emended genus *Callithamnion* but described three species in the genus, namely: *C. tetragonum* (With.) C. Ag.; *C. corymbosum* (Sm.) Lyngb., and *C. granulatum* (Duclu.) C. Ag.

The division of *Callithamnion* as proposed by Feldmann Mazoyer was accepted by Parks (1953) and Feldmann (1954) but was not accepted by Blackler (1956) or Taylor (1957 and 1960).

The only minor change which is relevant to this investigation is the transfer of *C. byssoides* Arn. and *C. tenuissimum* (Bonnem.) Kuetz. to the genus *Seirospora* by De Toni (1903). This change has never been accepted and both species remained in the genus *Callithamnion* until *C.tenuissimum* was removed to *Aglaothamnion* by Feldmann Mazoyer (1940).

The object of this investigation was to assess the justification for the division of the genus into the two taxa *Callithamnion* and *Aglaothamnion* as proposed by Feldmann Mazoyer (1940).

Material and Methods

Five multinucleate species [*C. tetricum* (Dillw.) C.Ag., *C. purpurascens* (Huds.) Harv., *C. tetragonum* (With.) C.Ag., *C. corymbosum* (Sm.) Lyngb. and *C. roseum* (Roth) Lyngb.] and three uninucleate species [*C. byssoides* Arn. ex. Harv. in Hook., *C. brodiaei* Harv. in Hook. and *C. hookeri* (Dillw.) C.Ag.] were included in the study.

To determine which characters were of taxonomic value plants were collected from as many habitats as possible. Some of the plants were immediately fixed in formalin alcohol while other typical plants were cultured to determine the morphological and cytological changes produced in different environments.

After the non-plastic taxonomic characters had been determined 72 collections preserved in liquid fixations were examined. The collections were mainly from the British Isles but also included collections from the Mediterranean and Coast of Brittany, France. In addition to the preserved collections the herbaria of the British Museum (Natural History), London; Royal Botanic Gardens, Kew; University Department of Botany, Oxford; School of Botany, Trinity College, Dublin; Eire National Museum, Dublin; Department of Botany, University College of North Wales, Bangor; Manchester Museum, Manchester; Museum Nationale d'Histoire Naturelle, Paris; a large number of privately owned herbarium specimens and selected plants from many herbaria in northern Europe were examined.

Taxonomic Characters

Vegetative

The colour of the thallus, the size and ratio of diameter to length of the cells, and differences in the length, shape and arrangement of the ramuli are all affected by the light intensity, particularly in *C. hookeri*, *C. tetragonum* and *C. purpurascens*. In low light intensities the colour is lighter, the cells are longer and narrower (thereby increasing the length to diameter ratio) and the arrangement of the ramuli are more irregular than in high light intensities. Despite the effect of light, however, the species can be divided into two groups on the basis of the length to diameter ratio of the cells. In *C. hookeri*, *C. tetragonum*, *C. purpurascens*, *C. brodiaei* and *C. tetricum* the length of the cells rarely exceeds six times the diameter, whereas in *C. roseum*, *C. byssoides* and *C. corymbosum* the length is rarely less than five times the diameter.

The presence or absence of terminal hairs and the amount of cortication appears to be affected by the amount of exposure to wave action. In *C. corymbosum* plants growing in a sheltered bay were devoid of hairs, whereas those growing in an exposed position at the mouth of

the bay had hairs on practically every terminal cell. A similar trend was found in the amount of cortication in *C. hookeri*, where plants in sheltered habitats were only lightly corticated while those in exposed habitats were heavily corticated. In both species plants moved from an exposed habitat to artificial culture developed the characteristics of the plants growing in sheltered habitats.

Differences in the place of origin and rate of growth of the laterals produce three types of apices. In *C. hookeri* and *C. tetricum* the laterals are first apparent on the second to sixth cell below the apex and grow at a slower rate than the axis producing a 'distinctly monopodial' type of apex. In *C. roseum* and *C. byssoides* the laterals are also first apparent on the second to sixth cell below the apex but differ from the distinctly monopodial type in that for a short period the laterals grow at a faster rate than the axis, producing an 'intermediate' type of apex. In the third type, found in *C. brodiaei*, *C. corymbosum*, *C. purpurascens* and *C. tetragonum*, the apical cell of the axis forms two cells in rapid succession producing a 'pseudo-dichotomous' type of apex. In most plants with the pseudo-dichotomous apex the laterals and axes grow at different rates and the pseudo-dichotomy is only apparent at the apex, however in some plants of *C. corymbosum* and *C. purpurascens* the laterals and axis on some, or all axes, grow at the same rate, producing a dichotomously divided thallus.

Reproductive

Spermatangiophores: Several types of spermatangiophores in *Callithamnion* have been described (Derbes and Solier, 1850; Buffham, 1884; Kylin, 1907; Rosenvinge, 1923—24; Grubb, 1925 and Westbrook, 1927 A and 1930). Feldmann Mazoyer illustrated three types but does not use them in her generic discriptions of *Callithamnion* or *Aglaothamnion*.

The difference between types was found to be due to differences in the number and length of the branchlets produced on the spermatangiophore-initial. In *C. byssoides* and usually in *C. hookeri* and *C. brodiaei* the spermatangiophore-initial produces one branchlet. The branchlets in *C. byssoides* are usually five to six cells long but in *C. hookeri* and *C. brodiaei* the branchlets are usually three to four cells long. The spermatangiophore-initials in all other species and also frequently in *C. hookeri* and *C. brodiaei* bear four to six branchlets. The branchlets of *C. corymbosum* are one cell long whereas in *C. tetragonum*, *C. tet-*

ricum and *C. purpurascens* the branchlets are two to four cells long. The spermatangiophores of *C. hookeri* and *C. brodiaei* vary considerably even on a single plant. The majority are the one branchlet type but many are similar to those of *C. tetragonum*.

Carposporophyte: Except for modifications in the shape of the carpogonial branch (Kylin, 1907; Rosenvinge, 1923—24, and Miranda, 1934) and the shape of the gonimolobes (Feldmann Mazoyer, 1940) all workers have found that the procarp and carposporophyte of *Callithamnion* develop in the manner described by Oltmanns (1898).

Feldmann Mazoyer described the emended genus *Callithamnion* as having "straight" (Oltmanns, 1898) carpogonial branches and round carposporophytes while *Aglaothamnion* was described as having "zig-zag" (Kylin, 1907) carpogonial branches and spherical, irregularly-lobed carposporophytes.

The uninucleate species studied usually have zig-zag carpogonial branches but in all species, particularly *C. hookeri* and *C. brodiaei*, straight, and branches intermediate in form between straight and zig-zag, are found. Similarly, the multinucleate species usually have straight carpogonial branches but zig-zag and intermediate forms are also found.

Differences were also found in the length of the gonimoblasts. In *C. byssoides* and frequently in *C. tetragonum* the first formed gonimoblast is two cells long but in all other species it is only one cell long.

All species have round gonimolobes except *C. byssoides* which has "pointed" gonimolobes.

It was found that all the species form one to three gonimolobes on the first formed gonimoblast and one on each of the secondary gonimoblasts. The gonimolobes on separate gonimoblasts develop at different rates and rarely grow together and, therefore, all species have irregularly lobed carposporophytes. However, the amount of lobing on the first formed gonimoblast varies in different species and depends on the number of gonimolobe-initials formed and the degree to which the gonimolobes grow together. *Callithamnion tetricum* usually forms only one initial on each gonimoblast but all other species produce two or more initials on the first formed gonimoblast. In *C. purpurascens*, *C. tetragonum* and usually in *C. hookeri* and *C. brodiaei* the gonimolobes grow together and form a single large compound lobe. In *C. corymbosum*, *C. roseum* and *C. byssoides* the gonimolobes grow together only at the base producing a many-lobed carposporophyte.

Tetrasporophyte: The size and shape of the tetrasporangia were found to be affected by environmental conditions and to be quite variable in most species. Most species produce only a single tetrasporangium on each cell but *C. byssoides, C. corymbosum* and *C. roseum* produce up to four on a single cell.

Monosporangia (Blackler, 1956), bisporangia (Kylin, 1907 and Rosenvinge, 1923—24), trisporangia (Westbrook, 1930), polysporangia (Westbrook, 1927 b and Naegeli, 1861) and parasporangia (Kylin, 1907; Rosenvinge, 1923—24; and Levring, 1937) were found, usually on plants with normal tetrasporangia and therefore do not appear to have any taxonomic significance.

Cytology

Chromoplasts: The chromoplasts in the young cells of all species are more or less elongated discs up to 10 μ in diameter but in older cells the chromoplasts usually fuse together to form masses or ribbon-like structures. The chromoplasts in *C. tetricum*, *C. purpurascens* and *C. tetragonum* fuse to form short, broad ribbons or small masses; those of *C. hookeri* and *C. brodiaei* form long, moderately broad, more or less curved ribbons, while those of *C. byssoides*, *C. roseum* and *C. corymbosum* form long, thin, almost straight ribbons.

Chromosomes: The chromosomes in all species are small, ranging from about 0.3 μ to 1.5 μ in length. The number of chromosomes did not form a well-defined series but with the exception of *C. roseum* and *C. tetricum* the haploid number ranged from 28 to 33. *Callithamnion roseum* had a haploid chromosome complement of 39 and *C. tetricum* appeared to be a polyploid with between 90 and 100 univalent chromosomes.

To summarize it can be said that differences in the colour of the thallus; length, shape and arrangement of the ramuli; number of terminal hairs; amount of cortication; shape and size of the tetrasporangia and type of sporangia are too plastic to be used for separating taxa in *Callithamnion*. On the other hand, eleven characters, which are summarized in Table 1, are sufficiently non-plastic to be used.

Discussion

It was pointed out previously that Feldmann Mazoyer (1940) emended the genus *Callithamnion* sensu Naegeli (1861) by placing the species having uninucleate cells throughout the plant, carpogonial branches

with the cells arranged in a zig-zag manner and spherical, irregularly lobed gonimolobes, in the newly described genus *Aglaothamnion*. The genus *Callithamnion* sensu Feldmann Mazoyer was characterized by having multinucleate cells, straight carpogonial branches and rounded gonimolobes.

It has been shown that although the carpogonial branches of the multinucleate species are usually straight they are sometime zig-zag or intermediate, while in the uninucleate species the carpogonial branches are mainly zig-zag but are frequently straight or intermediate. Also, the gonimolobes of all species except *C. byssoides* are usually round but that even in *C. byssoides* round gonimolobes have been reported (Rosenvinge, 1923—24). Likewise although the amount of lobing on the first-formed gonimoblast varies between species, there is no correlation between the amount of lobing and the number of nuclei in the cells. It is apparent, therefore, that an association of the shape of the carpogonial branch and carposporophyte, and the number of nuclei in the cells cannot be used as the only criteria for separating the species into different genera as proposed.

There are many different concepts of the genus (see Bartlet et al. 1940 and Just et al. 1953) but in general most taxonomists agree that a genus is a group of similar species and cannot be precisely delimited. Therefore, before rejecting the division of the genus as proposed by Feldmann Mazoyer it will be necessary to determine (a) whether there are any characters associated with the number of nuclei in mature cells, thus indicating separate evolutionary lines, or (b), whether the difference in the number of nuclei in the older cells of some species is of sufficient phylogenetic importance to merit placing the species with uninucleate and multinucleate cells in separate genera.

From Table 1 it will be seen that multinucleate species usually have multibranched spermatangiophores and straight carpogonial branches, while uninucleate species usually have a single-branched spermatangiophore and zig-zag carpogonial branches. However, multibranched spermatangiophores and straight carpogonial branches are frequently found in uninucleate species, and zig-zag carpogonial branches in multinucleate species. Furthermore, there does not appear to be any association between the number of nuclei in the cells and any other character.

It will be seen from Table 1 that the species can be divided into four distinct groups, namely: the coarse-textured, multinucleate "*purpurascens*" group containing *C. purpurascens*, *C. tetragonum* and *C. tetri-*

Table 1. — List of characters found to be sufficiently stable in Callithamnion to be used for taxonomic purposes

Species	Column (see key below)										
	1	2	3	4	5	6	7	8	9	10	11
C. tetricum	A	B	A	Ab	A	A	A	B	B	A	A
C. purpurascens.	A	B	A	Ab	A	A	A	A	A	A	B2
C. tetragonum	A	B	A	Ab	A	A	A	A	A	Ab	B1
C. corymbosum	A	B	B	Ab	B	B	C	A	B	A	B2
C. roseum	A	B	B	Ab	B	B	C	B	B	A	B1
C. hookeri	B	Ab	A	aB	A	A	B	B	Ab	A	A
C. brodiaei	B	Ab	A	aB	A	A	B	A	Ab	A	B1
C. byssoides	B	A	B	aB	B	B	C	B	B	B	B1

NOTE:

A capital letter indicates the commonest form which is found in that species, while a small letter indicates that the form it represents is also found but less frequently. For example, *C. tetricum* usually has zig-zag carpogonial branches but occasionally has straight and thus is coded Ab from key below.

KEY:

Column:

1 Number of nuclei in mature cells. A — more than one, B — one.

2 Number of branches in spermatangiophore. A — one, B — more than one.

3 Number of cells in spermatangiophore branches. A — more than two cells long, B — less than 3 cells long.

4 Shape of carpogonial branch. A — straight, B — zig-zag.

5 Length of cells. A — less than six times the diameter, B — more than five times the diameter.

6 Number of tetrasporangia on each cell. A — one, B — frequently more than one.

7 Shape of chromoplast masses. A — short broad ribbons, B — long moderately broad ribbons, C — long thin ribbons.

8 Origin of laterals. A — immediately after apical cell, B — two or more cells below the apical cell.

9 Shape of gonimolobes on first-formed gonimoblast. A — single compound lobe, B — irregularly lobed.

10 Length of gonimoblasts. A — one-celled, B — two-celled.

11 Relative rate of growth of laterals. A — laterals slower than main axis, B — laterals not slower (1 — faster than main axis, 2 — sometimes equal to main axis).

cum; the fine-textured, multinucleate "*corymbosum*" group containing *C. corymbosum* and *C. roseum*; the coarse-textured, uninucleate "*hookeri*" group containing *C. hookeri* and *C. brodiaei*, and the fine-textured uninucleate *C. byssoides*. A comparison between groups shows that the multinucleate "*corymbosum*" and "*purpurascens*" groups have four

characters common to all species, whereas, the multinucleate "*corymbosum*" group and the uninucleate *C. byssoides* have at least five characters common to all species. Similarly, all species in the uninucleate "*hookeri*" group have as many characters common to all species in the multinucleate "*purpurascens*" group as they have to the uninucleate *C. byssoides.*

There are therefore no characters associated exclusively with either the multinucleate or uninucleate condition, nor do all the species with multinucleate cells show a closer similarity to each other than they do to species with uninucleate cells. Therefore, unless more importance is placed on the number of nuclei in the cells and the tendency to bear single-branched or multi-branched spermatangiophores and straight or zig-zag carpogonial branches than to all other characters, there is insufficient evidence to indicate separate evolutionary lines of development.

Unfortunately, very little information is available on the origin of the multinucleate condition. All cells of the less specialized Rhodophyceae are uninucleate and this is also true of many Cryptonemiales and Gigartinales. In other taxa only a few cells near the apices are uninucleate, while in genera such as Griffithsia and Bornetia all cells are multinucleate. It has been assumed from this that the multinucleate condition arose from the uninucleate.

Because so little is known about the origin of the multinucleate condition there is a tendency to assume that the change from a uninucleate to a multinucleate condition is a primary fundamental change which occurs very rarely. If this were so, and the two conditions were isolated, either genetically or otherwise, two groups would probably arise in which all members of one group were more like members of the same group than they were to members of the other group. There would then be a sound argument for separating the two groups into different genera. On the other hand, if the multinucleate and uninucleate condition were not isolated there would be hybridization between members of both groups giving rise to an interrelated group of species. In such a case there would be no excuse, except on a purely artificial basis, for separating the two groups into different taxa.

Summary

The evidence accumulated in this investigation does not indicate separate lines of development in each group. On the contrary, although the extreme "*purpurascens*" group and *C. byssoides* are probably suffi-

ciently different to place in separate genera, the remaining species appear to be intermediate, connecting the two extremes into an interrelated group. The division of the genus *Callithamnion* sensu Naegeli as proposed by Feldmann Mazoyer (1940) is, therefore, not warranted.

Acknowledgement

This investigation was carried out while a candidate for the Degree of Ph. D. in the University of Manchester. The author wishes to thank the late Dr. K. M. Drew Baker for her suggestions and assistance and the National Research Council of Canada for financial assistance.

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Cotoneaster Harrysmithii, a New Species from Western China

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In recent examination of specimens of Cotoneaster from the Botanical Museum of Upsala, collected by Dr. Harry Smith in Western China during 1922—1934, one collection was noted which is believed to represent the following new taxon.

Cotoneaster ap. Harrysmithii Flinck et Hylmö sp. nova. Fig. 1 et Fig. 3.

Ex affinitate *C. nitentis* Rehd. et Wils. sed distat foliis ellipticis, acutis—acuminatis, utrinque persistenter pilosis, frutice omnibus partibus minore et tenuiore.

Frutex 1—2 m. altus, ramis saepissime paullo arcuatis, interdum pendulis, angulo recto ramulosis; ramuli juniores pilis cinereo-flavescentibus, sursum densissime deorsum densiuscule, adpresse strigilloso-pilosi; ramuli annotini demum glabrescentes; gemmae acutiusculae pubescentes; cortex lutescenter cinerascens, aetate rufo-brunneus.

Folia decidua, elliptica—ovato-elliptica, apice acuta—acuminata, basi subobtusa vel acuta, 7—20, vulgo 15—17 mm. longa et 4—11, vulgo 8—9 mm. lata, in pagina superiore laete viridia, papillis albis, minutis, mox evanidis dense obsita, modice pilosa, pilis subarcuatis longe persistentibus, in pagina inferiore albo-viridia, densiuscule pilosa, pilis rectis, albis vel cinerascentibus, aetate glabrescentia sed pilis in costa dorsali et in marginibus persistentibus; nervi laterales utrinque 3—4, obsolete impressi; petiolus 2—3 mm. longus albescenter strigosus; stipulae subulatae, membranaceae, 2—5 mm. longae, supra glabrae vel glabrescentes, rubrae vel violaceae, subtus strigosae, virides vel rubro-virides.

Cymae parvae, plerumque 3-florae (2—4), in ramulis lateralibus 2—4 mm. longis, vulgo 3—4-foliatis insidentes; pedicelli 1—3 mm. longi, pilosi; bracteae subulatae, rubrae, pilosae, c. 2 mm. longae.

Flores erecti, 4—5 mm. longi et aequiampli; calyx pilosus, 4 mm. diametiens, lobi erecti, deltoidei, breviter acutati vel acuminati, c. 1 mm. longi et


PLANTÆ SINENSES
N 12647
Cotoneaster
Sikang: Tanpa (Romichango) distr. Maonia (Ndrömé):
frutex 2-metralis in colle fruticoso.
Ca 3000 m. s. m. 1. 10. 1934
Det.
leg. HARRY SMITH

1,5 mm. lati, in margine tomentosi; petala erecta, fere orbicularia, rosea vel fuscescenter rubra, late albo-marginata, 2—3 mm. longa, 1.5—2 mm. lata, integra vel apice suberosa, basi cuneata, ungue valde concavo; receptaculum vix 2 mm. diam.

Stamina 10—14, plerumque 12, 1.5—2 mm. longa, filamenta subulata, aequalia, apice incurvata et ibi laete rosea, antherae flavescenter albae vel roseae.

Carpidia 2—3, styli 1 mm. longi, fructus fusco-nigri vel nigri, ovoidei vel subglobosi, 6—7 mm. longi et 4—5 mm. diam., apice truncati, pedicellis 1—3 mm. longis, pilosis, patentibus; calyx apertus, lobis erectis; umbo patens.

Pyrenae 2—3 (raro 4), 4 mm. longae et 3 mm. latae, nitentes, flavo-brunneae, supra sparse villosae, stylo tertiae parti infra apicem ventris insidente.

Holotype; Universitas Regia Upsaliensis: Harry Smith No. 12647, Western China: Sikang Tanpa (Romichango), district Maoniu (Ndrömé): ca 3,000 meter supra mare 1 oct. 1934; frutex 2-metralis in colle fruticoso.

Cotoneaster ap. Harrysmithii Flinck et Hylmö, n. sp., is a 1—2 meter high, deciduous shrub, with the lateral branchlets arranged strictly horizontally. Young branches are grayish yellowish strigose, whereas the 1-year-old branches are only thinly pilose becoming glabrous. The leaves are bilaterally directed, elliptic to elliptic-ovate, with acute to acuminate tip and cuneate to obtuse base. The length is usually 15—17 mm. and the width 8—9 mm. The upper surface of the leaves is vivid green and pilose with wavy hairs, which are partially persistent even on older leaves. On the lower side the leaves are light green, pilose with long, straight, white to grayish white hairs. The petioles are 2—3 mm. long, strigose, with white to grayish white persistent hairs.

The inflorescence is small with 2—4, usually 3 flowers on short 3—4 leaved spurs, 2—4 mm. in length. The pedicels are pilose, 1—3 mm. long. The flowers are erect, 4—5 mm. wide and 4—5 mm. long; the calyx is pilose with erect, triangular, short, acute or acuminate lobes with tomentose margin. The petals are erect, pink to reddish brown with a marked broad white margin. The stamens are usually 12 with red filaments and yellowish white to pink anthers.

The fruits are erect, brownish black to black, pilose at top with calyx lobes erect keeping the navel free. The pyrenes are 2—3 shiny yellowish brown.

Cotoneaster Harrysmithii is obviously closely related to *C. nitens* Rehder et Wilson (in Sargent Plantae Wilsonianae I 1912 p. 156). The holotype of *C. nitens* has been kindly placed at our disposal by the

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Fig. 1. *Cotoneaster Harrysmithii* Flinck et Hylmö. Type specimen in herbarium of Upsala. Harry Smith 12647, Sikang Oct. 1, 1934.

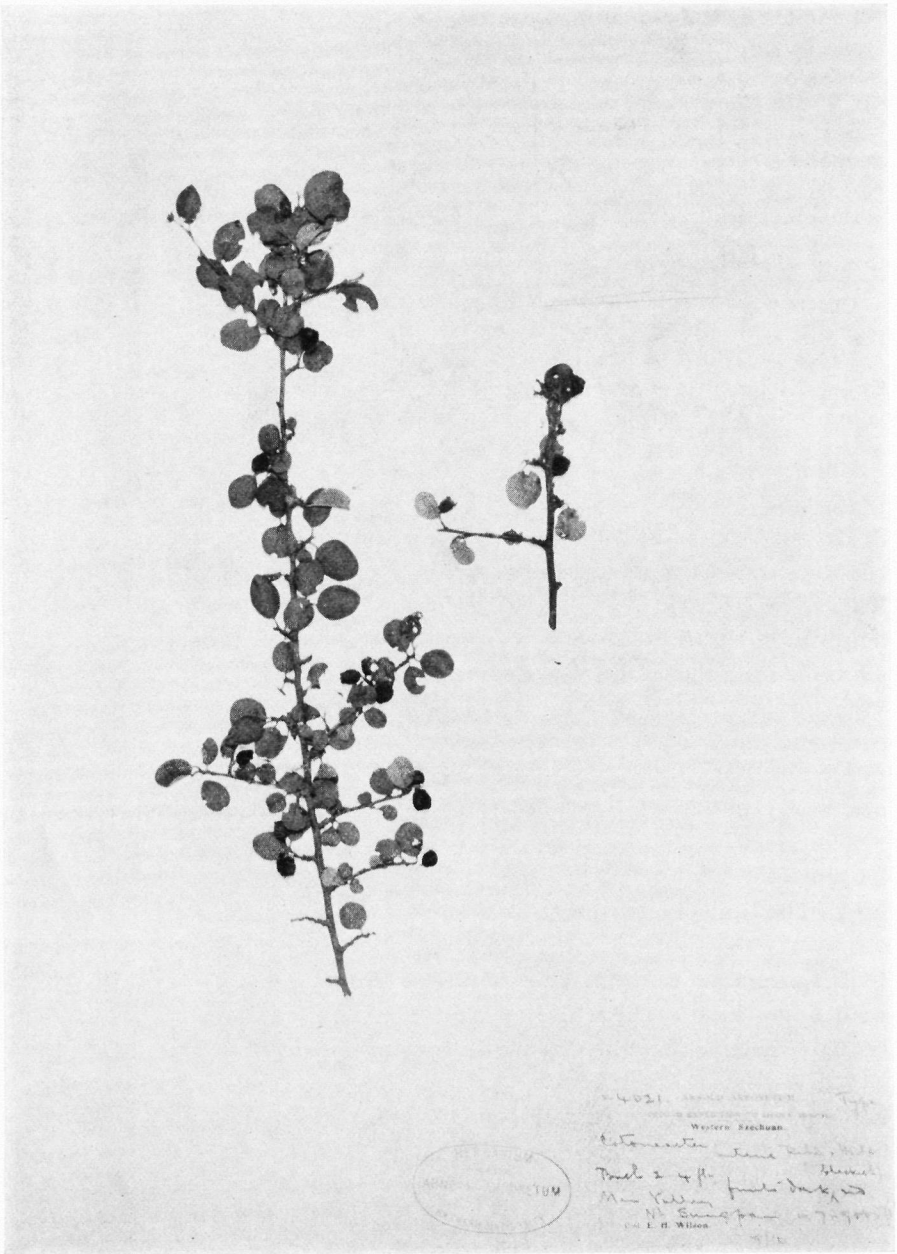

Fig. 2. *Cotoneaster nitens* Rehder et Wilson. Type specimen in herbarium of Arnold Arboretum. E. H. Wilson 4021, Western Szech'uan Sept. 10, 1910.

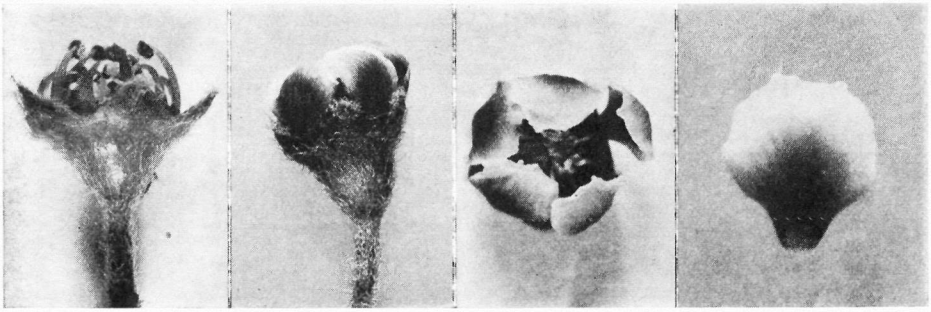

Fig. 3. *Cotoneaster Harrysmithii* Flinck et Hylmö. From plant No. 9298 of Botanical Gardens of Alnarp, Sweden. Photo Oct. 1961.

Herbarium of Arnold Arboretum (Fig. 2). *C. nitens* is rather common in botanical gardens in the temperate zones. We have been able to ascertain that the cultivated material of *C. nitens* from several different gardens agrees well with the holotype of Rehder and Wilson.

The new species is easily distinguished from *C. nitens* by its less vigorous growth and smaller leaves, flowers and fruits. Branchlets and leaves are more regularly bilaterally orientated. The leaves are elliptic, acute to acuminate, persistent pilose on both sides. *C. nitens* has orbicular leaves with obtuse tip and rotund base. The upper surface of these leaves are glabrous and lustrous and the under surface is at first pilose but soon becomes almost bare. Newly unfolded leaves of *C. Harrysmithii* are closely studded on the upper surface with small white papillae, a characteristic which is lacking in *C. nitens*. *C. Harrysmithii* has about 12 stamens while *C. nitens* has 10.

On cultivation *C. Harrysmithii* is very distinctive and differs markedly from *C. nitens*. Sax (Journ. Arnold Arboretum 35, pp. 334—365, 1954) has shown that *C. nitens* is triploid and probably an apomictic species. However, after sowing seeds of *C. nitens*, Sax obtained 26 seedlings, of which 3 were different and varied among themselves and the others were alike. We have not been able to confirm the observation of Sax that variation occurs in the offspring of *C. nitens*. In our own material and in several nurseries we have examined a total of about 500 bushes raised from seed without being able to find any diverging plant. We have gotten the decided impression that *C. nitens* breeds true and is an apomictic species.

C. Harrysmithii has been in cultivation for more than 25 years, under the designation H. Smith collect 12,647, from seeds of the type bush

in botanical gardens in Scandinavia, i.a., in Upsala, Stockholm, Lund, Alnarp and Copenhagen. Like *C. nitens,* the new species is not fully hardy in cultivation in Scandinavia, but freezes during severe winters. The close relationship with *C. nitens* is evidenced by the fact that the two species flower at the same time relatively early, together with *C. lucida* Schlecht. and *C. Nanshan* Motte (syn. *adpressa* var. *praecox* (Vilm.) Bois. & Berthault) and much earlier than the majority of species from Western China. Even the fruits ripen earlier.

Whereas *C. nitens* is known from western Szech'uan (Min Valley alt. 2,300—3,000 m.; holotype) and southwestern Kansu [Lower Tebbu alt. 2,400 m.; Rock collect 14,806 (Rock collect 14891 in Herbarium of Stockholm is not *C. nitens*); in Rehder & Wilson, Journ. Arnold Arboretum IX: 63, 1928], *C. Harrysmithii* is collected in the Sikang province.

We take pleasure in naming this species in honor of Dr. Harry Smith of Upsala.

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Revision einiger Typen von Velenovsky's Plantae Arabicae Musilianae

Von K. H. Rechinger
Wien

Mit Beiträgen von B. L. Burtt
Edinburgh

Bei Bearbeitung meiner in den Jahren 1956 und 1957 in den Wüstengebieten von Iraq zusammengebrachten botanischen Ausbeute stiess ich mehrfach auf Velenovsky's Bearbeitung der von dem bekannten Orientalisten A. Musil in Arabien gesammelten Pflanzen (Velenovsky 1911, 1921—22). In den meisten Fällen ergab das Studium der Beschreibungen kein Bild, das klar genug gewesen wäre, um die betreffenden Arten identifizieren zu können. Ich wandte mich daher brieflich an Herrn Prof. Dr. Albert Pilat, Direktor der Botanischen Abteilung des National-Museums in Prag, mit der Bitte, mir die Typen leihweise zur Verfügung zu stellen. Ich erhielt darauf die Mitteilung, dass diese, soweit sie überhaupt auffindbar waren, vor einigen Jahren an Herrn B. L. Burtt, Edinburgh, verliehen worden seien, der damals mit Studien über die Flora von Kuwait beschäftigt war (Burtt & Lewis). Auf meine Anfrage hin erhielt ich von Herrn Burtt die Mitteilung, dass er nicht die Absicht habe, seine Untersuchungen über die Flora von Kuwait fortzusetzen. Er stellte die Velenovsky'schen Typen nach Prag zurück. Von dort wurden sie mir in dankenswerter Weise leihweise zur Verfügung gestellt. Herr Burtt sandte mir überdies seine Notizen über die Ergebnisse, zu denen ihn die Untersuchungen einiger der Velenovsky'schen Typen bereits geführt hatten, zu. Die von ihm stammenden Angaben sind im folgenden durch das Monogramm B.L.B. gekennzeichnet, die von mir selbst stammenden durch K.H.R. Den Herren Th. R. Dudley, Edinburgh (*Alyssum*) und Dr. H. Riedl, Wien (*Heterocaryum*) danke ich für ihre Beiträge.

In Anbetracht der Tatsache, dass Arabien auch heute noch zu den botanisch am unvollständigsten bekannten Gebieten des Orients gehört, kommt den Musil'schen Sammlungen eine besondere Bedeutung zu. Leider sind die Fundortsangaben vielfach unvollständig bezw. schwer zu lokalisieren. In vielen Fällen ist es nicht klar, wie weit sich die Daten auf Gebiete beziehen, die heute zu Iraq gehören. Für die zahlreichen Fälle, wo die Fundortsangaben lediglich „Ad Euphratem" oder „Mesopotamia" lautet, ist dies jedoch höchst wahrscheinlich. In vielen Fällen dürften tatsächlich die Musil'schen Funde die ältesten Nachweise der betreffenden Arten aus Iraq darstellen. Es wäre höchst wünschenswert, wenn auch die bisher nicht zugänglichen Typen der Velenovsky'schen Plantae Musilianae wieder aufgefunden und einer kritischen Sichtung zugeführt werden könnten. In einzelnen Fällen habe ich einschlägige Fundorte aus meinen eigenen Aufsammlungen eingefügt, um das Bild der Verbreitung der behandelten Arten zu vervollständigen. (K.H.R.)

1. ***Horwoodia Dicksoniae*** Turrill, Journ. of Bot. 77: 117 (1939); Burtt & Lewis, Kew Bull. 1949: 291.

Syn. *Malcolmia Musilii* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 13 (1913) pro parte minore, nomen confusum.

A r a b i a: Al Karana (Musil, hb. PR). K u w a i t: Subahayeh (Subeihiyah) Wells, 32 miles S Kuwait, 20 miles from the coast, 8.II.1935 (Mrs. H. V. Dickson 162, Typus der Horwoodia Dicksoniae, hb. K). Abrajal Khalija, 100 miles S Kuwait, Arafaj dist., 15 m, 10.I.1935 (Mrs. H. V. Dickson 155, hb. K). Dahana Desert, Red Sand, SW Kuwait, 300 m, X.1937 (Mrs. H. V. Dickson 402, hb. K).

I r a q: Desertum meridionale: Chilawa, 110 km SSW Basra, 170—180 m, 24.—25.III.1957 (K. H. Rechinger 8798, 8811, hb. W). Jumaima, 140 km SW As-Salman, 390 m, 22.—23.IV.1957 (K. H. Rechinger 9393, hb. W).

J o r d a n: Kilwa, sandy slopes, 15.IV.1955 (Hunting Aero Survey 90-b, hb. E).

Das Original-Material von *Malcolmia Musilii* besteht aus zwei Bogen. Einer, der auch Velenovsky's Manuskript-Beschreibung trägt, enthält zwei Pflanzen, eine *Horwoodia Dicksoniae* in Blüte sowie eine *Diplotaxis acris* in Frucht. Der zweite Bogen enthält drei Exemplare von *Horwoodia*. Velenovsky's Beschreibung vermengt die Merkmale der beiden Pflanzen. Die wesentlichen Fruchtmerkmale beziehen sich jedoch ausschliesslich auf *Diplotaxis acris*. Alle Exemplare von *Horwoodia* sind nicht fruchtend. Eine Emendation des Velenovsky'schen Namens im Sinne von *Horwoodia* ist daher nicht möglich und der Name *Malcolmia Musilii* muss daher als nomen confusum verworfen werden. (B.L.B.)

2. ***Diplotaxis acris*** (Forsk.) Boiss., Fl. or. 1: 389 (1867).

Syn. *Malcolmia arabica* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 14 (1911), syn. nov.

Malcolmia Musilii Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 13 (1911) pro parte maiore — nomen confusum, syn. nov.

Arabia: Distr. El-Hawra: Hzamo (-a), 1909 (Musil, Typus der *Malcolmia arabica*, hb. PR). Hzamo, el Bwejbijje, az Jerka, 1909 (Musil, Typus der *Malcolmia Musilii*, hb. PR).

Das als *Malcolmia arabica* bezeichnete Material besteht aus zwei Bogen. Einer davon trägt kleine Exemplare von *Diplotaxis acris*. Dieser Bogen enthält auch die Manuskript-Beschreibung; er kann als Typus angenommen werden. Ein zweiter Bogen, von Al Karana, ist *Horwoodia Dicksoniae*. In der kurzen Beschreibung weist nichts auf *Horwoodia*; auch der Fundort von *Horwoodia*, Al Karana, wird bei *Malcolmia* nicht erwähnt. Dieser zweite Bogen kann daher nicht als Syntypus aufgefasst werden und er braucht bei der Typifizierung nicht in Betracht gezogen zu werden.

Über *Malcolmia Musilii* siehe die Notiz unter *Horwoodia*. (B.L.B.)

3. ***Alyssum homalocarpum*** (Fisch. et Mey.) Boiss., Fl. or. 1: 285 (1867).

Syn. *Alyssum Musilii* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 13 (1911), syn. nov.

Arabia: Distr. Harara et Wudijan, Drejhme et Zerko (Musil, Typus des *Alyssum Musili*, hb. PR). (Dudley)

4. ***Alyssum (Odontarrhena) singarense*** Boiss. et Hausskn. in Boiss., Fl. or. Suppl. 49 (1888).

Syn. *Alyssum anamense* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 13 (1911), syn. nov.

Arabia: Distr. Abar Ikuk, Anama (Musil, Typus des *Alyssum anamense*, hb. PR). (Dudley)

5. ***Farsetia Burtonae*** Oliv. in Hook. f., Ic. Pl. tab. 1310 (1880); Burtt & Lewis in Kew Bull. 1949: 291.

Syn. *Erysimum nanum* Vel., Mém. Soc. Sc. Bohème, Cl. Sci. 1921—22, Art. VI: 2 (1923).

Arabia: Ega, Dhana (Musil, Typus des *Erysimum nanum*, hb. PR). (B.L.B.)

6. ***Maresia pygmaea*** (Del.) O. E. Schulz, Pflanzenr. IV, 105: 210 (1924).

Syn. *Sisymbrium Musilii* Vel., Mém. Soc. Sci. Bohème, Cl. Sci. 1921—22, Art. VI: 2 (1923), syn. nov.

Arabia: Al Hmudijje, as Sejjerijjat, al Grejf, al Gbele, I.1915 (Musil, Typus des *Sisymbrium Musilii,* hb. PR). (B.L.B.)

7. ***Eremobium nefudicum*** (Vel.) Burtt et Rech. f., stat. nov.

Syn. *Malcolmia nefudica* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss. Prag 1911, No. 11: 13 (1911).

Arabia: In desertis districtus Hawra, Nefud, Tarbo late obvia (Musil, Typus der *Malcolmia nefudica,* hb. PR).

Jordan: Quweira camp, NW of Agaba, 29.III.1955 (Hunting Aero Survey 19, hb. E).

Iraq: Desertum meridionale: Chilawa, 110 km SSW Basra, in arenosis lapidosis, 180 m, 24.III.1957 (K. H. Rechinger 8800, hb. W). NE Ghazlani, 105 km SW Basra, in arenosis, 120 m, 24.III.1957 (K. H. Rechinger 8821, 14380, hb. W).

Wegen der stumpflichen Narbe, der abgeflachten, zwischen den Samen etwas eingezogenen, sich leicht öffnenden Schoten und der geflügelten Samen gehört die Art eindeutig zu *Eremobium* und nicht zu *Malcolmia.* Die Unterschiede, die sich gegenüber *E. aegyptiacum* (Spreng.) Hochr. ergeben, sind auf eine Zahl feinerer, aber anscheinend konstant korrelierter Merkmale begründet. Sie sind im folgenden zusammengestellt. Von *E. aegyptiacum* lagen mir im Herbarium W zum Vergleich die beiden folgenden Exemplare vor, die als *E. lineare* (Del.) Aschers. et Schweinf. bestimmt waren: 1. Sahara algeriensis: In desertis arenosis inter Onargla et Tonggonit, ca. 150 m (Andreanszky, 15.III. 1928). 2. Israel: Wadi Araba, N of Ain Ghadian (Zohary in Fl. terr. Israelis exsicc. No. 429).

Eremobium aegyptiacum (Spreng.) Hochr.	*Eremobium nefudicum* (Vel.) Burtt et Rech. f.
Stengel und Äste relativ kräftig.	Stengel und Äste sehr zart und dünn, oft fast fadenförmig.
Ganze Pflanze durch dichtstehende, persistierende, reich und lang strahlige, z.T. nicht streng angepresste Sternhaare grau.	Pflanze grün; Sternhaare locker angeordnet, z.T. nicht persistierend, arm- und kurzstrahlig, streng angepresst.
Blätter meist lineal, 10—20 mm lang, 1,5 (—2) mm breit, die längsten kürzer als die ausgereiften Schoten.	Blätter sehr lang und schmal lineal, bis 30 mm lang, 1 mm breit, die längsten meist länger als die ausgereiften Schoten.
Schoten meist 30—35 mm lang, meist 12—14-samig.	Schoten durchschnittlich kürzer, meist (15—)20—25 mm lang, meist 10-samig.
Samen bis 1,5 mm lang, schmäler geflügelt.	Samen bis 2(—2,5) mm lang, breit geflügelt.

Die Konstanz bezw. Variationsbreite der angegebenen Merkmale müsste an einem reicheren Material überprüft werden. (B.L.B., K.H.R.)

8. ***Matthiola arabica*** Boiss., Ann. Sc. Nat. Ser. 2, 17: 49 (1842).

Syn. *Matthiola arabica* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 12 (1911), syn. nov.

Arabia: Distr. Nefud, Hemhem (Musil, Typus der *Matthiola arabica,* hb. PR).

Velenovsky hat den Namen *Matthiola arabica* offenbar unabhängig von Boissier verwendet. Die Boissier'sche und Velenovsky'sche Art sind gleichzeitig homonym und synonym. (K.H.R.)

9. ***Astragalus (Ammodendron) camelorum*** Barbey, Herbar. Levant. 131, tab. 3 (1882).

Syn. *A. macrobotrys* Bge. var. *camelorum* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 15 (1911), syn. nov.

Arabia: El Labbe, Metnan (Musil, Typus des *Astragalus macrobotrys* var. *camelorum,* hb. PR).

Der Varietätsnamen „*camelorum*" wurde von Velenovsky unabhängig von Barbey's Art *A. camelorum* gewählt. Die vorliegenden Pflanzen stimmen mit Beschreibung und Abbildung der Barbey'schen Art gut überein.

Die Art ist die einzige im saharo-sindischen Gebiet vorkommende der Sektion *Ammodendron.* Man vergleiche K. H. Rechinger, H. Dulfer, A. Patzak, Širjaevii fragmenta astragalogica XV. in Sitzungsber. Oesterr. Akad. Wiss., math.-naturw. Kl. Abt. 1, 170: 35—53 (1961). (K.H.R.)

10. ***Astragalus (Platyglottis) bombycinus*** Boiss., Diagn. Ser. 1, 2: 50 (1843).

Syn. *Astragalus Musilii* Vel., Mém. Soc. Sci. Bohème, Cl. Sci. 1921—22, Art. VI: 4 (1923), syn. nov.

Arabia: Al Gidijje, II.1915 (Musil, Typus des *Astragalus Musilii,* hb. PR). (K.H.R.)

11. ***Astragalus (Xiphidium) al-hamedensis*** Rech. f., n. sp.

Syn. *A. sanctus* Boiss. var. *hamadensis* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss. Prag, Jahrg. 1911, No. 11: 15 (1911).

Rhizoma tenue, lignescens, pluriceps. Caules floriferi plures verosimiliter decumbentes vel ascendentes, cum pedunculis inflorescentiisque ± 10 cm longi, pilis albis bifidis ± appressis dense obsiti, simplices vel ramos 1—2 breves

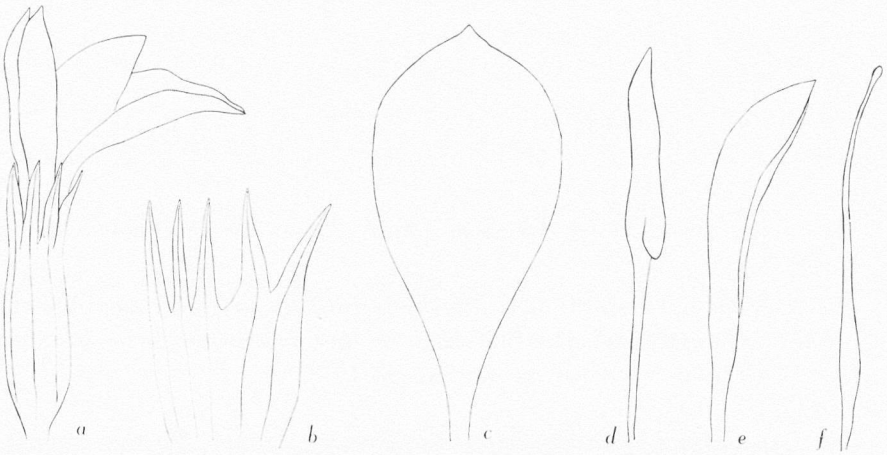

Fig. 1. *Astragalus al-hamedensis* Rech. f. a. Blüte, b. Kelch, c. Fahne, d. Flügel, e. Schiffchen, f. Fruchtknoten (Al Hamed, leg. Musil).

floriferos emittentes, folia plerumque 2—3 proferentes. Stipulae usque 5 mm longae, lanceolato-subulatae, saepe ± curvatae vel obliquae, subherbaceae, subtus albo-pilosae, supra glabratae. Folia 3—6 cm longa, remote (2—)3—4-juga, imparipinnata, rachide herbacea subflexuosa; foliola lanceolata, 10—18 mm longa, 3—6 mm lata, pilis bifidis appressis utrinque canescentia, utrinque subaequaliter attenuata, in medio vel paulo supra latissima, indistincte cartilagineo-apiculata. Pedunculus absque inflorescentia 2—4 cm longus. Racemus laxe 3—7-florus. Bracteae lanceolato-subulatae, ± 3 mm longae, persistentes. Pedicellus saepe subnullus, ad summum 1 mm longus. Calyx tubulosus, 20—22 mm longus, basi valde obliquus gibbus ibique atratus, ceterum pilis albis brevibus subappressis usque erecto-patulis densiuscule obsitus; dentes calycini subulati, 2—3 mm longi. Corolla 25—28 mm longa, colore in vivo ignoto, in sicco brunescente; vexillum usque 28 mm longum, valde recurvum, oblongum, acutiusculum, lamina 12—15 mm longa, 6—7 mm lata; alae lineares quam carina paulo longiores, alae lamina ± 10 mm longa, ± 2 mm lata, basi longe auriculata; carinae lamina oblique oblonga ± 9 mm longa. — Species nova *A. sancto* Boiss. affinis videtur sed ab eo imprimis calycibus subduplo maioribus pilis albis tantum obsitis facile discernendus et certe specifice diversus.

Arabia: Al Hamed (Musil in hb. Prag). (K.H.R.)

12. *Haplophyllum Blanchei* Boiss., Fl. or. 1: 937 (1867).

Syn. *Haplophyllum rubrum* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 16 (1911), e descr., synon. nov.

Haplophyllum rubellulum Thiéb. et Gomb., Mém. Inst. Égypt. 31 (Fl. Liban.-Syr. I): 165 (1936) in clavi, descr. gall., e descr., synon. nov.

Syria: Au pied oriental du Djebel Abjad, Palmyra (Blanche 3021, Typus des *H. Blanchei*, hb. Boiss., G). Steppe zwischen Deir ez Zor und Palmyra

Fig. 2. *Astragalus al-hamedensis* Rech. f. (Al Hamed, leg. Musil). 2/3.

(Strauss, hb. Hausskn., Je). Isriyeh to Jabal-al-Mauredah (Post, hb. Bornm., B). Jabal-al-Kos (Typus des *H. rubellulum* Thiéb. et Gomb. l.c.).

J o r d a n: W of Azrak, stony desert, 600 m (J. E. Dinsmore 11807, hb. S). Jurf ed Derawish, stony desert, 910 m (J. E. Dinsmore 11722, hb. S). Wadi S of Hasa, 8.V.1955 (Hunting Aero Survey 184, hb. E). Steinwüste bei Ma'an Nábčlek, hb. NAB.).

A r a b i a s e p t.: Distr. Sowwan, Frejta (Musil, Typus des *H. rubrum* Vel., PR).

I r a q: Desertum occidentale: 3 km resp. 5 km SE Rutba, 560—750 m, 7.VI.1957 (K. H. Rechinger 9875, 12585, hb. W). 260 km W Ramadi, 500 m, 6.—7.VI.1957 (K. H. Rechinger 9842, hb. W).

Ich habe zwar weder den Typus von *H. rubrum* Vel., noch den von *H. rubellulum* Thiéb. et Gomb., noch auch den von *H. Blanchei* Boiss. gesehen, hatte jedoch Gelegenheit, an drei Fundorten in den westlichen Wüstengebieten von Iraq Populationen zu studieren und reichlich Material einzusammeln, welches den Schluss zulässt, dass es sich um einen einzigen, ausserordentlich variablen Formenkreis handelt. Die als Grundlage für die drei Artbeschreibungen angenommenen Merkmalskombinationen erscheinen in keiner Weise fixiert. Einzelne extreme Individuen aus meinen Aufsammlungen gehen sogar noch in verschiedenen Richtungen über die sich aus den drei Diagnosen scheinbar ergebenden Unterschiede hinaus. Man vergleiche übrigens Handel-Mazzetti, Verh. Zool.-Bot. Ges. Wien 63: 46 (1913) und K. H. Rechinger, Reliquiae Samuelssonianae V. in Ark. f. Bot. Ser. 2, Bd. 2, No. 5: 381 (1952). (K.H.R.)

13. ***Anisosciadium lanatum*** Boiss., Fl. or. Suppl. 261 (1888).

Syn. *Dicyclophora caucalioides* Vel., Mém. Soc. Sci. Bohême, Cl. Sci. 1921—22, Art. VI: 5 (1923), syn. nov.

I r a q: Mesopotamia meridionalis, V.1912 (Musil, Typus der *Dicyclophora caucalioides,* hb. PR). Desertum occidentale: 20—25 km W Rutba, 600 m, 7.—8.VI.1957 (K. H. Rechinger 12546, hb. W). 3 km SE Rutba, 560 m, 7.VI.1957 (K. H. Rechinger 12616, hb. W). 45 km E Rutba, 9.VI.1957 (K. H. Rechinger 9960, hb. W). 235 km W Ramadi, 6.—7.VI.1957 (K. H. Rechinger 9829, hb. W). 260 km W Ramadi, 500 m, 6.—7.VI.1957 (K. H. Rechinger 9840, hb. W). 8 km NW Aidaha, 410 m, 25.IV.1957 (K. H. Rechinger 15826, hb. W). Wadi al Khirr, 90 km NNW Shabicha, 330 m, 26.IV.1957 (K. H. Rechinger 13578, hb. W). 40 km WNW Shabicha, 380 m, 25.IV.1957 (K. H. Rechinger 9457, hb. W). 13 km NE Shabicha, 25.IV.1957 (K. H. Rechinger 13673, hb. W). Jumaima, 140 km SW As-Salman, 390 m (K. H. Rechinger 13766, hb. W).

J o r d a n: In deserto basaltico arenoso prope H 5, 163 km E Amman, 27.V. 1957 (K. H. Rechinger 12957, hb. W). (K.H.R.)

14. ***Anisosciadium orientale*** Dc., Coll. Mém. Umbell. p. 63, tab. 15 (1829).

Syn. *Dicyclophora morphologica* Vel., Mém. Soc. Sci. Bohême, Cl. Sci. 1921—22, Art. VI: 5 (1923) pro parte maiore, nomen confusum.

Syria/Iraq/Arabia borealis: Ad Euphratem, 1912 (Musil, hb. PR). Al Haram, III.1915 (Musil, hb. PR).

Das Originalmaterial von *Dicyclophora morphologica* besteht aus drei Bogen:

1. Ein Fruchtexemplar, von Velenovsky's Hand als *Dicyclophora morphologica* bezeichnet, mit dem Fundort: Arabia borealis: ad Euphratem, 1912, leg. A. Musil; dieses ist *Anisosciadium orientale.*

2. Ein Fruchtexemplar, ebenso von Velenovsky bezeichnet, mit dem Fundort: Arabia borealis: al Haram, III. 1915, leg. A. Musil; dieses ist gleichfalls *Anisosciadium orientale.*

3. Ein blühendes Exemplar ohne Bestimmung, mit dem Fundort: Ammu Greyf, 2.II.1915, leg. A. Musil; dieses ist *Echinosciadium arabicum.*

Ähnlich wie im Falle von *Malcolmia Musilii* vermengt die Beschreibung von *Dicyclophora morphologica* die Merkmale zweier, nach der heutigen Auffassung verschiedenen Gattungen angehörigen Arten. Von den angegebenen Merkmalen beziehen sich mindestens fünf eindeutig auf *Anisosciadium orientale,* nämlich:

1. umbellis longissime pedunculatis
2. involucri phyllis minutis eadiis multo brevioribus
3. involucelli phyllis externis ovatis tandem patenti-reflexis
4. florum sterilium exteriorum pedicellis tandem strictis duris fructum involucrantibus
5. calycis laciniis externis magnis planis ellipticis pedicellos aequantibus

Auf *Anisosciadium orientale* beziehen sich zwei der von Velenovsky angegebenen drei Fundorte, nämlich „ad Euphratem" und „al Haram".

Von den übrigen Merkmalen sind offenbar nur zwei von *Echinosciadium arabicum* genommen, nämlich:

1. die Beschreibung der Blätter, und
2. petalis albis valde radiantibus,

ferner der eine der drei angegebenen Fundorte, „Ammu Greyf", nicht aber das entsprechende Datum.

Die wenigen auf *Echinosciadium* hinweisenden Merkmale sind zu unbestimmt, als dass eine Emendation von *Dicyclophora morphologica* im Sinne von *Echinosciadium* in Betracht käme. Die Blattenbeschreibung könnte infolge der sehr ähnlichen Blätter tatsächlich ebensogut auf *Anisosciadium* bezogen werden, doch sind die Blätter an den vorliegenden, im vorgeschrittenem Zustand gesammelten Pflanzen nur fragmentarisch vorhanden. Blüten fehlen bei diesen überhaupt. Daher muss der Name *Dicyclophora morphologica* als nomen confusum verworfen werden. (K.H.R.)

15. ***Echinosciadium arabicum*** Zohary, Palaest. Journ. Bot., J. Ser. 4: 175 (1948).

Syn. *Dicyclophora morphologica* Vel., Mém. Soc. Sci. Bohême, Cl. Sci. 1921—22, Art. VI: 5 (1923) pro parte minore, nomen confusum.

Arabia borealis: Ammu Greyf, 2.II.1915 (Musil, hb. PR).

Iraq: Desertum meridionale: 50 km NW Aidaha, 80 km SSW As-Salman, 370 m (K. H. Rechinger 13697, hb. W). 27—46 km WNW Ansab, 137 km S As-Salman, 340 m (K. H. Rechinger 9369, hb. W). 20 km SW Safwan (K. H. Rechinger 14485, hb. W). Jabal Sanam (K. H. Rechinger 8724, hb. W). NE Ghazlani, 105 km SW Basra, 120 m (K. H. Rechinger 14353, hb. W). Chilawa, 110—112 km SSW Basra, 180 m (K. H. Rechinger 8808, hb. W).

Siehe die Bemerkung über *Dicyclophora morphologica* Vel. unter *Anisosciadium orientale* DC. (K.H.R.)

16. ***Heterocaryum pachypodum*** A.DC., Prodr. 10: 144 (1846).

Syn. *Paracaryum arabicum* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 6 (1911), syn. nov.

Arabia: Distr. Harara, Kamso (Musil, Typus des *Paracaryum arabicum*, hb. PR). (H. Riedl)

17. ***Thymus Musilii*** Vel., Sitzungsber. Königl. Böhm. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 5 (1911), descr. compl.

Suffrutex valde aromaticus, basi crasse lignosus dense caespitosus, ramis erectis 6(—13) cm altis, simplicibus vel a medio pauciramosis vel ascendentibus et crebrius infra medium ramosis; rami floriferi tota longitudine dense foliati, internodiis folia aequantibus vel eis brevioribus, omnino circumcirca aequaliter pilis albis eglandulosis diametro rami pluries brevioribus patulis vel subretrorsis obsiti. Folia sursum leviter increscentia et latiora, anguste vel late lanceolata, 5—8 mm longa, 2—4 mm lata, brevissime petiolata vel subsessilia, pallide viridia, concoloria, crasse coriacea, prope basin setis longis paucis ciliata, ceterum sparse papilloso-puberula interdum subglauca, utrinque glandulis sessilibus numerosis aequaliter aspersa, basi brevius apicem acutam versus longius attenuata, inferiora ex axillis fasciculos foliorum proferentia, nervorum paribus 2(3) subtus crasse sed non distincte prominentibus, marginibus incrassato-revolutis. Folia flores fulcrantia a ramealibus haud distincta sensim latiora distinctius sessilia et minus acuta, superiora interdum sparse breviter albo-pilosa, flores suboccultantia. Flores in axillis foliorum flores suboccultantium, in verticillastris 1—3-floris dispositi. Bracteae minutae lanceolato-subulatae herbaceae, rigide ciliatae, pedicello rigido crassiusculo ± 2 mm longo stricte erecto breviores vel eum aequantes. Calyx 5 mm longus, campanulatus, haud gibbosus, ultra medium bilabiatus, elevate crassiuscule 10-nervius; tubus brevissime albo-pilosus et glandulis sessilibus copiose obsitus, fauce longe albo-villosus, labium interius sublongius in dentes subulatos ciliatos porrectos vel leviter sursum curvatos longe rigide ciliatos divisum;

labium superius leviter recurvum breviter late subaequaliter tridentatum dentibus subglabris. Corolla pallide roseo-violacea fere albida extus breviter albopilosa et glandulis sessilibus copiose obsita, tubo recto in calyce incluso, limbo calycem paulo tantum superante; labium superius breviter emarginatum; labium inferius trilobum. Stylus longe exsertus glaber; stigma bifidum. Stamina quatuor, omnia fertilia, exserta, leviter divergentia ascendentia. Nuculae ignotae.

A r a b i a: In distr. Sowwan, Zatar (Musil s.n., Typus, PR). Iraq: Desertum occidentale: Rutba, 10.—12.V.1934 (H. Field & Y. Lazar 132, W). Inter Rutba et Ramadi, 5 km a Rutba austro-orientem versus, in monte calcareo, 750 m, 7.VI.1957 (K. H. Rechinger 9885, W). Desertum meridionale: Distr. Diwaniya, ca. 6 km a Shabicha austro-orientem versus, 26.IV.1957 (K. H. Rechinger 9436, W). Transjordania: Desertum syriacum: Ca. 163 km ab Amman orientem versus, inter Amman et Rutba, 27.V.1957 (K. H. Rechinger 12933, W).

Die hier wiedergegebene Beschreibung wurde auf Grund der von mir in Iraq gesammelten Exemplare entworfen. Velenovsky's Typus ist im Wuchs mehr locker und mehr schmalblättrig als meine iraqischen Exemplare. Die wesentlichen Kelch-, Blüten- und Behaarungsmerkmale stimmen jedoch überein.

Systematisch wie auch geographisch und ökologisch steht die Art recht isoliert. Die von Velenovsky angedeutete Zugehörigkeit zur Sektion *Vulgares* ist nicht über jeden Zweifel erhaben, die habituelle Ähnlichkeit mit *Satureia* dagegen auffällig. Keine andere *Thymus*-Art ist aus dem Inneren der Wüstengebiete Südwestasiens bekannt. (K.H.R.)

18. ***Plantago amplexicaulis*** Cav. var. ***bauphula*** (Edgew.) Pilg., Pflanzenr. IV, 269: 312 (1937).

Syn. *Plantago Gintlii* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math-naturw. Cl. Prag 1911, No. 11: 7 (1911).

A r a b i a: Distr. El Sowwan, Resad (Musil, Typus des Plantago Gintlii, hb. PR).

Plantago Gintlii wurde bereits von Pilger, Pflanzenreich IV, 269: 312 (1937) als Synonym von *P. amplexicaulis* angenommen. Ich kann diese Auffassung nunmehr nach Untersuchung des Typus von *Plantago Gintlii* bestätigen. (K.H.R.)

19. ***Matricaria auriculata*** (Boiss.) Benth. et Hook. f., Gen. 2: 428 (1873).

Syn. *Matricaria arabica* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 10 (1911), syn. nov.

A r a b i a: El Sowwan, Hlewa (Musil, Typus der *Matricaria arabica,* hb. PR). (B.L.B.)

20. *Achillea fragrantissima* (Forsk.) Sch.-Bip. in Flora 38: 13 (1853).

Syn. *Pyrethrum Musilii* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 11 (1911), syn. nov.

Arabia bor.-occ./Jordan: Distr. El-Hamad, Kejsum (Musil, Typus des *Pyrethrum Musilii*, hb. PR). (B.L.B.)

21. *Scorzonera Musilii* Vel., Sitzungsber. Königl. Böhm. Ges. Wiss., math.-naturw. Cl. Prag 1911, No. 11: 8 (1911).

Arabia: Distr. Nefud, Taluk el Mti (Musil, Typus der *Scorzonera Musilii*, hb. PR).

Iraq: Desertum meridionale: 62 km WNW Ansab, 135 km SSW As-Salman, 360 m (K. H. Rechinger 9382, hb. W).

S. Musilii steht zwar der *Scorzonera tortuosissima* Boiss. äusserst nahe; von dem mir bisher vorliegenden, ziemlich reichlichen Vergleichsmaterial der *S. tortuosissima* lässt sich jedoch *S. Musilii* durch eine Reihe von feineren Merkmalen unterscheiden, über deren systematischen Wert resp. Korrelation erst reichlicheres Material von *S. Musilii* Auskunft geben könnte.

Soweit ich sehe, lässt sich *S. Musilii* von *S. tortuosissima* unterscheiden durch längere äussere Hüllblätter von denen wenigstens je eines ± die Hälfte der Länge der inneren erreicht, sowie durch kürzere Pappusstrahlen, deren längste nur ± die Länge der reifen Achänen, nicht aber annähernd deren doppelte Länge erreichen. Velenovsky's Typus hat keine Früchte; das Fruchtmerkmal habe ich meiner No. 9382 entnommen.

Übrigens bleibt *S. tortuosissima*, auch wenn man *S. Musilii* nicht einbezieht, nach meinen neueren Aufsammlungen eine recht variable Art, vor allem habituell bezüglich der Dicke und des Grades der Verzweigung und Verflechtung der Stengel und Aeste, der Dichte und der Dauerhaftigkeit des Induments, jedoch in geringerem Mass bezüglich der Grösse der Hülle und Achaenen.

Man vergleiche übrigens die Beschreibung von *Scorzonera microcalathia* (Rech. f.) Rech. f., Anz. math.-naturw. Kl. Österr. Akad. Wiss. 1961 (im Druck). (K.H.R.)

Liste der revidierten Velenovsky'schen Arten — anerkannte Arten und Synonyme:

Liste der nicht revidierten Velenovsky'schen Arten:

Anthemis arabica Vel.
Asteriscus arabicus Vel.
Astragalus koufensis Vel.
A. Musilii Vel.
Ballota luteola Vel.
Barbarea arabica Vel.
Bellevalia bracteosa Vel.
Centaurea arabica Vel.

C. camelorum Vel.
C. epapposa Vel.
C. Musilii Vel.
Euphorbia Musilii Vel.
E. Rohlenae Vel.
Hyoscyamus arabicus Vel.
*Linaria Musilii Vel.
*Prangos arabica Vel.
Pseudocrupina arabica Vel.
*Scorodosma arabica Vel. = Ferula sp.
Stachys Musilii Vel.
*Tamarix nilotica Ehrenbg. var. verrucosa Vel.
Tecoma arabica Vel.
Tephrosia Musilii Vel.

Die mit * bezeichneten Exemplare sind im hb. PR vorhanden, wurden jedoch von mir nicht revidiert.

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Pollen Morphology of Ctenolophon

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Introduction

The phylogenetic affinities of *Ctenolophon* have been variously interpreted. *Ctenolophon* was originally referred to Olacaceae by Ridley (1922). Later, it was placed in the Linaceae by Winkler (1930). Hallier (1921) transferred *Ctenolophon* from Linaceae to Celastraceae and then to Ixonanthaceae. Exell and Mendonca (1951) consider *Ctenolophon* as a family of its own, the Ctenolophonaceae, between the Linaceae and the Erythroxylaceae. Hutchinson (1959) places the Ctenolophonaceae in the order Malpighiales between the Erythroxylaceae and the Malpighiaceae.

Erdtman (1955) found a striking resemblance between the pollen grains of *Ctenolophon engleranum* Mildlr. and those of *Septacolpites* and *Octacolpites* described by Rao and Vimal (1952), and Vimal (1953) from the Tertiary deposits in India. They are of the same size and show similar apertures. *Ctenolophon* fossil pollen grains were also found in Cretaceous and Miocene deposits in Nigeria (Kuyl, Muller and Waterbolk, 1955).

Owing to scarcity of material no thorough investigation of *Ctenolophon* pollen grains was carried out. Recently, three samples of *Ctenolophon* pollen grains were kindly received from Mr. Exell of the British Museum, London, under the names: *C. engleranum* Mildlr. (Angola), *C. grandifolius* Oliv. (Malaya) and *C.* species (E. Borneo). The present work has been undertaken with a view to investigate the detailed structure of these pollen grains, hoping that this study may contribute to a better understanding of the real taxonomic position of these plants.

Technique

Part of the material was acetolyzed and chlorinated after acetolysis, another part was directly chlorinated and then stained with ruthenium red. For thin sectioning the material was fixed in glacial acetic acid, and embedded in methacrylate according to the technique described in Erdtman's book (1957).

Results and discussion

Ctenolophon engleranum Mildlr. (Angola): Grains barrel shaped (55 ×60 μ); zonocolporate. The exine is provided with thickenings in the form of two rings one at each pole connected by meridional ridges; the colpi are situated between the ridges (Fig. 1: 1 and 3, Fig. 2: 1—3). The colpus margin is incrassate except at the equator, where it is interrupted by a pair of gaps. The pollen wall consists of a granular material which is solidified at certain parts forming the ridges which are covered by an outer transparent layer. Such a structure resembles the skeletal bone which is covered with flesh. The outer transparent layer (flesh) is thickened at the poles and over the colpi (Fig. 1:4). In polar view (Fig. 1:2; Fig. 2:4), the meridional ridges are flanked by two smaller ones which form the incrassate margins of the colpi (Fig. 1:1; Fig. 2:2). In the middle of the thick meridional ridges and just opposite the gaps there is another pair of gaps connecting the adjacent colpus lacunae (Fig. 1:1; Fig. 2:3). A relatively thin layer lining the thick pollen wall and extending to the pores forming the pore membrane can be seen (Fig. 1:4).

Ctenolophon grandifolius Oliv. (Malaya) and *C. sp.* (E. Borneo): Grains 3—6 colporate (48×60 μ); pores lie in the bottom of furrows in the outer wall (Fig. 3:1 and 3). The grains of these two species lack such ridges which are found in *C. engleranum*. The exine consists of a thick outer layer (5—6 μ) underlain by a relatively thin one (Fig. 3:1). The former consists of two distinct layers: an inner structureless layer carrying small processes, and a second outer layer consisting of long conical processes in mesh with the smaller ones (Fig. 3:1 and 5). However, narrow passages between the processes can be observed which appear as pores from the surface (Fig. 3:1—3). The thin innermost layer extends to the apretures to form the pore membrane (Fig. 3:2 and 4). Between the pore membrane and the intine a thick plug-like structure lies, probably the medine (Saad, 1961).

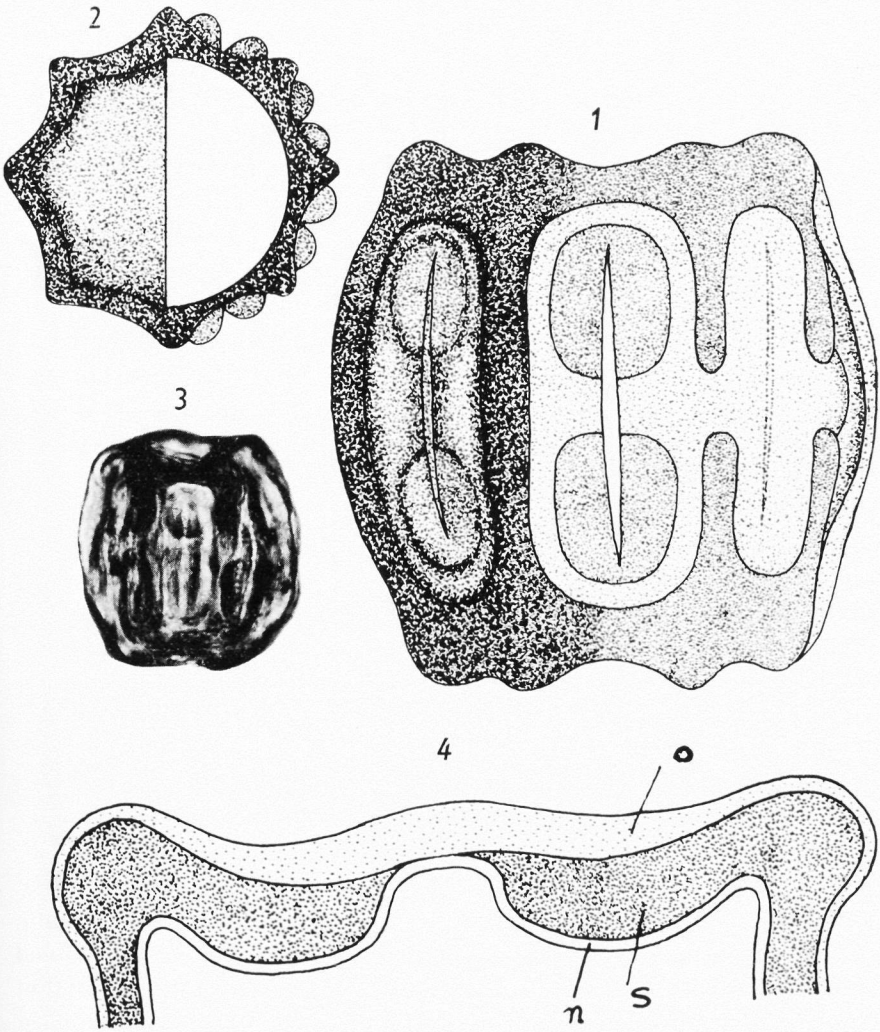

Fig. 1. *Ctenolophon engleranum.*

1. Palynogram in equatorial view, at high (left part), medium (middle part) and low adjustments (right part).
2. Palynogram in polar view.
3. Photomicrograph in equatorial view ×500.
4. Diagramatic representation of cross section of acetolyzed grain showing nexine (n), outer transparent layer (o) and sexine (s).

It is obvious that pollen morphology as well as sporoderm stratification of *C. engleranum* (Angola) differ from those of *C. grandifolius* (Malaya) and the other species (E. Borneo).

As to the taxonomic relationships of *Ctenolophon*, the pollen structure as well as floral and anatomical structures deny its affinity to Linaceae. Its relationship to Humiriaceae, as pointed out by Metcalfe and Chalk (1950), is not close since the pollen grains of this family are smaller in size and usually 3—4 colporate. Also, the pollen wall is not as thick as that of *Ctenolophon* (2—3 μ). Thin sections of the pollen grains of Humiriaceae showed that the exine consists of real bacula united to form a tegillum. The only pollen character common between *Ctenolophon* and Humiriaceae is the incrassate margins of the colpi. Not only the pollen structure of *Ctenolophon* differs from those of Humiriaceae but also the general morphology. Humiriaceae has alternate leaves, numerous stamens and 5 to 7-locular ovary; while *Ctenolophon* has opposite leaves, 10 stamens and two carpilary ovary. As to its relationship to Olacaceae, Celastraceae and Icacinaceae, pollen morphology does not suggest such relationship.

Studying pollen structure of Malpighiaceae, a striking resemblance between some of them and those of *Ctenolophon angustifolius* was observed. The pollen grains of *Camarea, Dicella, Aspicarpa* and *Clonodia,* all belonging to tropical plants, are large (50—65 μ) and have very thick pollen wall (5—6 μ) as those of *Ctenolophon.* The pollen wall in these malpighiaceous plants consists of two distinct layers, the outer layer of which is easily separated from the inner one (Fig. 4: 1 and 2). Thin sections of *Dicella bracteosa* pollen wall, treated with fuchsin, showed the inner part consisting of very thick compact layer carrying small processes and covered by another easily detachable deeply stained outer layer (Fig. 4: 2). This exine structure is exactly the same as that of *Ctenolophon angustifolius* (Fig. 3: 4 and 5). Some pollen grains of *Aspicarpa rosei* showed complete separation of this outer layer. Pollen grains of *Clonodea racemosa* are covered by an uneven undulated wall concealing totally the inner structure of the grains. Fossil pollen grains of Malpighiaceae (*Aspicarpa* type) have been recorded in U. Tertiary in Trinidad (Kuyl, Muller and Waterbolk, 1955). The nature of this layer covering the pollen grains of *Ctenolophon* and some malpighiaceous plants and its separation from the pollen wall suggest that this layer is not a part of the exine but perhaps an outer accumulation, i.e. of tapetal origin. This layer shows a number of anastomosing fissures which sometimes look like colpi (Fig. 4: 3). That is why such pollen

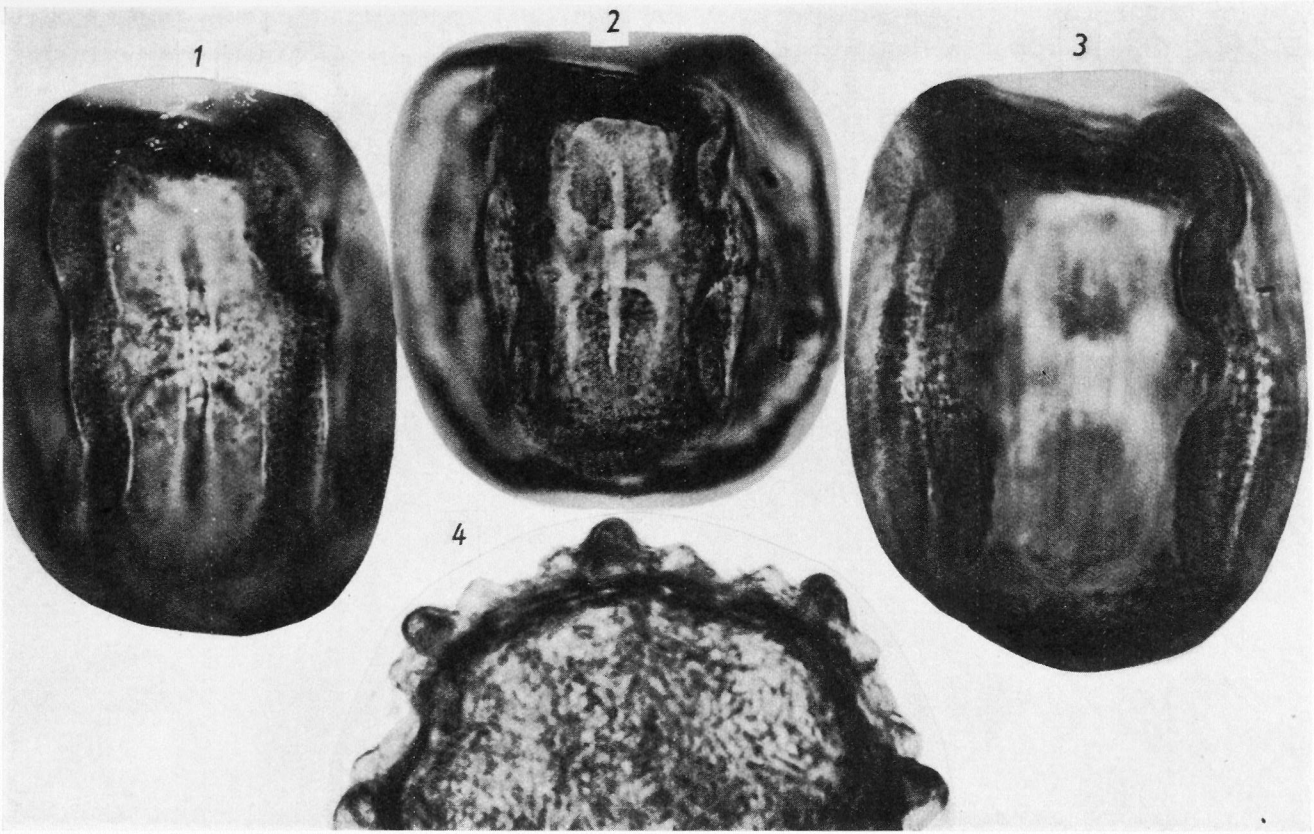

Fig. 2. *Ctenolophon engleranum*. — 1—3. Photomicrographs in equatorial views at different foci. 1. Shows first focus (surface view) ×1200. 2. Shows lower focus ×1000. 3. Shows lowest focus (optical section) ×1200. 4. Photomicrograph in polar view ×1200.

grains were formally described as heterocolpate or extraporate and actually they are normally porate. Some of these pores lie in the bottom of these fissures while others do not; on the other hand, there are some fissures without pores. Accordingly, the pollen grains of *C. angustifolius* are porate and the pores lie in the bottom of the fissures in the outer layer. Pollen tetrads of *Aspicarpa* show the enclosed grains without this outer layer which has to be formed later on (Fig. 4: 4). If we accept this view, therefore, the sexine is the inner thick layer carrying the small processes while the nexine is the thin innermost layer which extends to form the aperture membrane. It seems probable that the outer layer in *C. engleranum* is more fixed to the exine by the wedging process of the ridges into this layer.

This palynological resemblance between *Ctenolophon* and some malpighiaceous pollen grains finds a support in the morphological characters. Both of them have opposite stipulate leaves, clawed petals, ten stamens in two whorls which are basely attached and a nut or drupaceous fruit with non-endospermic seeds. However, certain anatomical features add further support to this relationship. From a study of the polliniferous material of *Ctenolophon*, characteristic unicellular branching hairs covering the floral parts were observed. These hairs are similar to some malpighiaceous ones. The internal anatomy of *Ctenolophon* shows cells with conspicuous gum-like contents and chambered crystals like those found in some malpighiaceous plants (Metcalfe and Chalk, 1950).

Conclusion

1. Morphologically, anatomically and palynologically, *Ctenolophon* is more related to Malpighiaceae than any other family.

2. *Ctenolophon* may be considered a genus related to Malpighiaceae.

3. The details of the pollen grains in *C. engleranum* (Angola) and *C. grandifolius* (Malaya) can not be advanced in favour of the very close relationship between these species.

Fig. 3. *Ctenolophon grandifolius*.

1. Palynogram in equatorial view.
2. Palynogram in polar view.
3. Photomicrograph in equatorial view $\times 1000$.
4. Diagramatic representation of cross section of non-acetolyzed grain passing through an aperture, showing intine (in), medine(m), nexine (n), outer layer (o) and sexine (s)
5. Cross section of acetolyzed grain showing sexine and outer layer.

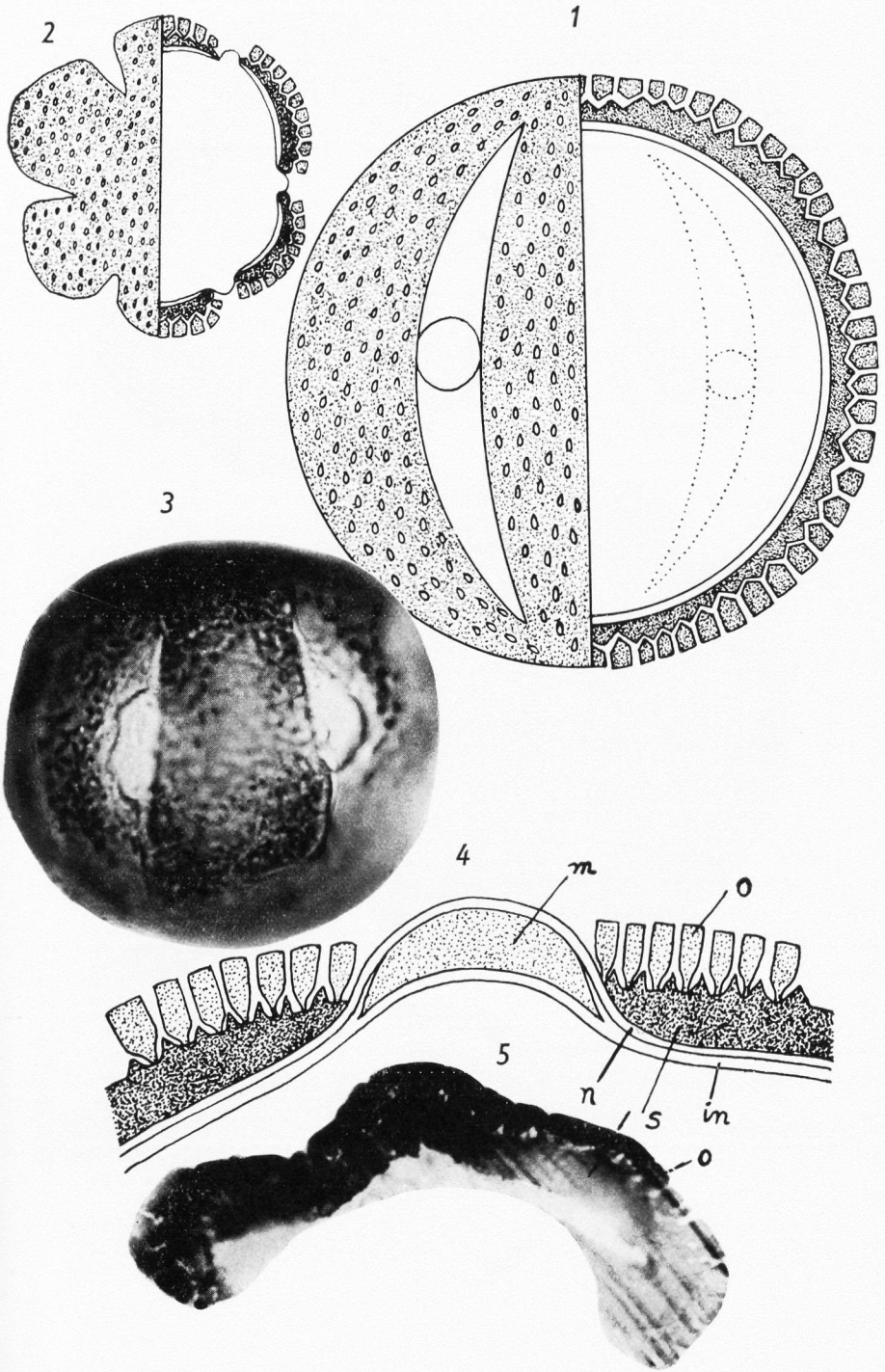

Fig. 3.

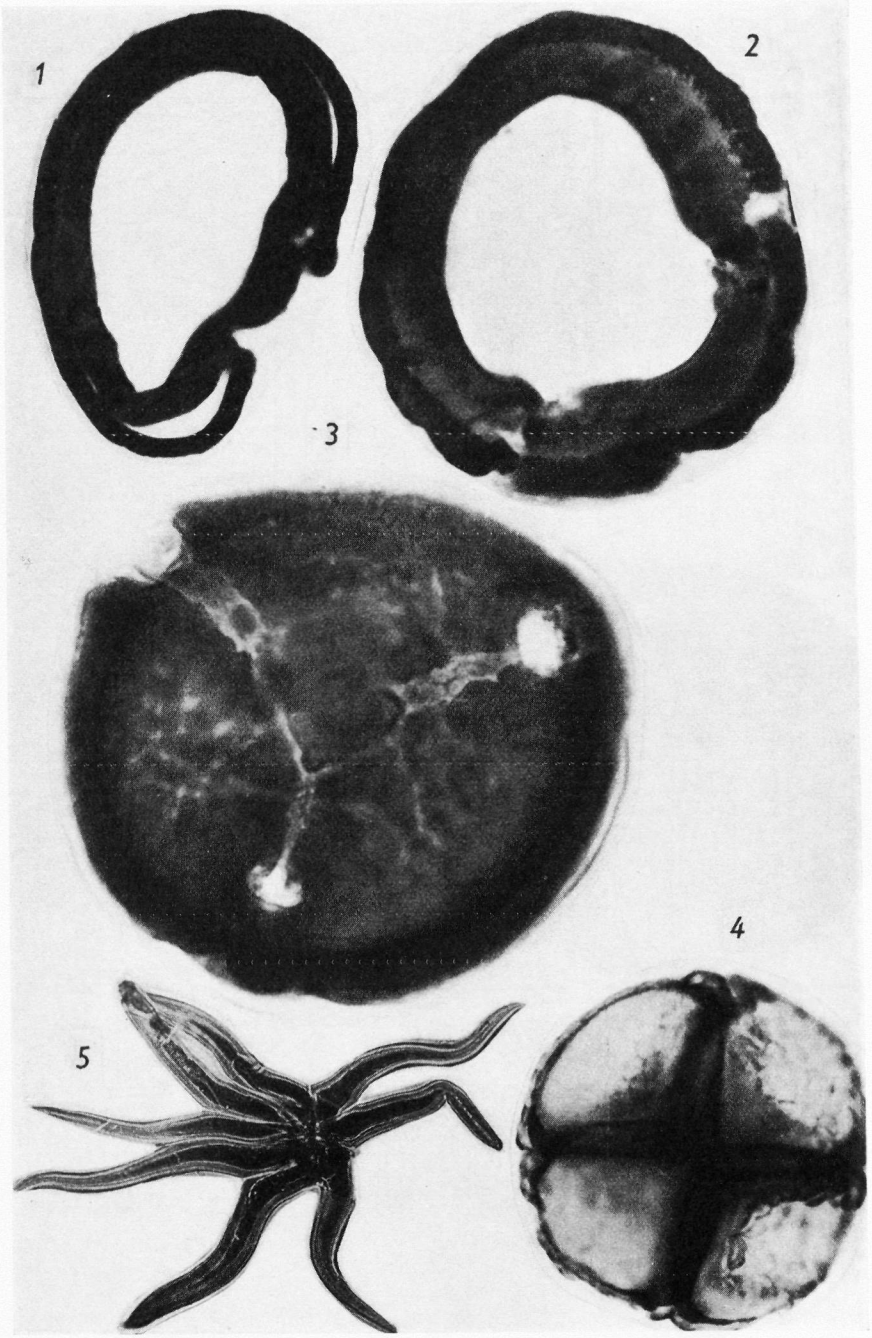

Fig. 4.

Acknowledgement

I wish to express my gratitude to Professor G. Erdtman, Head of the Palynological Laboratory, Solna, for his help and making the facilities available for this study. Thanks are also due to Mr. Exell, of the British Museum of Natural History, London, for providing the material for this investigation.

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Fig. 4.

1, 2. Cross sections of acetolyzed grains of *Dicella bracteosa* showing separation of outer layer ×1200.

3. Pollen grain of *Aspicarpa rosei* ×1200 showing fissures in the outer wall.

4. Pollen tetrad of *Aspicarpa rosei* ×500.

5. Unicellular branching hair found on floral parts of *Ctenolophon* ×1200.

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Cytotaxonomic Studies in the Genus Sonchus

4. The Generic Status of Some Species Earlier Treated as *Sonchus*

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In a previous paper, the writer (1960) listed certain species of *Sonchus* under the sub-title: "Excluded species", and expressed the opinion that some of them should be included in the genus *Launaea,* while for the others no particular genus was mentioned.

The present paper defines the generic status of some of these species as well as a few more which were earlier included in the genus *Sonchus.*

Launaea nanella (R. E. Fries) Boulos comb. nov.

Sonchus nanellus R. E. Fries, Wissensch. Ergebn. Schwed. Rhodesia-Kongo-Exped. 1911—1912. Bd. I, p. 351, fig. 40 a—f (1916).

Launaea pycnocephala (R. E. Fries) Boulos comb. nov.

Sonchus pycnocephalus R. E. Fries, Act. Hort. Berg. 8:6, p. 114, t. 3, fig. 3—4 (1925).

Launaea violacea (O. Hoffm.) Boulos comb. nov.

Sonchus violaceus O. Hoffm., Bot. Jahrb. 30, p. 443, fig. A—G (1910).

Launaea Elliotiana (Hiern) Boulos comb. nov.

Sonchus Elliotianus Hiern, Cat. Welw. Afr., pl. 1, p. 623 (1898). Other synonyms are listed in Fries (1925) under *S. Elliotianus.*

Launaea Fischeri (O. Hoffm.) Boulos comb. nov.

Sonchus Fischeri O. Hoffm. in Engl., Pflanzenwelt Ostafr. C, p. 421 (1895).

Launaea macer (S. Moore) Boulos comb. nov.

Sonchus macer S. Moore, Journ. Bot. 37, p. 404 (1899).

Launaea Verdickii (De Wild.) Boulos comb. nov.

Lactuca Verdickii De Wild., Ann. Mus. Congo, Bot. Sér. 4, p. 170, t. 28 (1903).
Sonchus Verdickii (De Wild.) R. E. Fries, Act. Hort. Berg. 8:6, p. 113 (1925).

Launaea Ledermannii (R. E. Fries) Boulos comb. nov.

Sonchus Ledermannii R. E. Fries, Act. Hort. Berg. 8: 6, p. 118 (1925).

Launaea rarifolia (Oliv. et Hiern) Boulos comb. nov.

Sonchus rarifolius Oliv. et Hiern in Oliv., Fl. Trop. Afr. 3, p. 460 (1877).

Launaea Rueppellii (Sch. Bip.) Amin ex Boulos comb. nov.
Amin, Taxonomic Studies in Launaea, M. Sc. thesis, Cairo Univ. (1957), unpublished work.

Dianthoseris Rüppellii Sch. Bip. in Flora p. 440 (1842).
Sonchus Rueppellii (Sch. Bip.) R. E. Fries, Act. Hort. Berg. 8: 6, p. 112, t. 1, fig. 6—7. Other synonyms are listed in Fries (1925) under *S. Rueppellii*.

Launaea exauriculata (Oliv. et Hiern) Amin (in sched.) ex Boulos comb. nov.

S. Bipontini Aschers. var. *exauriculatus* Oliv. et Hiern in Oliv., Fl. Trop. Afr. 3, p. 459 (1877).
Sonchus exauriculatus (Oliv. et Hiern) O. Hoffm. in Engl., Pflanzenwelt Ostafr. C, p. 421 (1895).
(*Sonchus Bipontini* Aschers. is a true *Sonchus*-species, while the variety *exauriculatus* belongs to *Launaea*.)

Launaea Brunneri (Webb) Amin (in sched.) ex Boulos comb. nov.

Rhabdotheca Brunneri Webb in Hooker Niger Fl., p. 147 (1849).
Microrhynchus Brunneri (Webb) Walp., Ann. 2, p. 976 (1851—52).
Sonchus Brunneri (Webb) Oliv. et Hiern in Oliv., Fl. Trop. Afr. 3, p. 459 (1877).

Prenanthes suberosa (Zohary et Davis) Boulos comb. nov.

Sonchus suberosus Zohary et Davis, Kew Bull. 2: 1, p. 87, fig. 1 (1947).

Prenanthes angustifolia Boulos nom. nov.

Sonchus dentatus Ledeb., Ic. Pl. Fl. Ross. Alt. Ill. 1, t. 87 (1829); Mey. et Bunge in Ledeb., Fl. Alt. 4, p. 141 (1833), descr.; non *Prenanthes dentata* Thunb., Fl. Jap. p. 301 (1784).

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A Contribution to the Bryophytic Flora of Spain and Morocco, Especially the Area between Gandía and Alcoy

By Svend Rungby

Botanical Museum, Copenhagen, Denmark

In the month of March 1961 I made some bryological excursions south of Valencia in the mountains between Gandía and Alcoy and around these two cities.

As these areas, as far as I can see, have not previously been bryologically investigated, I give a list of the species collected. The localities are: Gandía, Tabernes, Villalonga, Lorcha and Alcoy. The species referred to Villalonga and Lorcha were collected between these villages near the river Serpis.

To the list are added the bryological results of excursions made during a journey in the months of March and April 1960 to various regions of Spain and Morocco. The localities are: Denia, Algeciras, the forest of Almoraima north of Algeciras, Ronda, a mixed forest with *Abies pinsapo* south-east of Ronda, Alhambra, Maitena near Granada, Fuensanta near Murcia, Orihuela, Dehesa south of Valencia, Sagunto (the castle), Tarragona, Tibidabo near Barcelona, Zaragoza (Buena vista), Toledo, — Asni, Rabat, Monod (the forest of Mamora), Azrou, Volubilis, Fés.

In the list the localities are indicated in the order above by the first three letters of their names.

Omitted are localities for the species in question already stated by Allorge (1946), Casas (1956) and Gattefossé (1932). Some localities stated by Geheeb (1874) are indicated by a (G).

Detailed remarks on ecology and distribution are to be found for many of the species in Casas (1956) and Cortes (1953).

The frequent occurrence of *Barbula acuta* in the Gandía-Alcoy area

seems worth noting. Casas (1959) mentions this species as fairly common in Cataluña, but as otherwise rarely recorded from the Peninsula.

It might perhaps be mentioned as well that *Tortula muralis* here, too, in the places visited occurs everywhere on appropriate substrata.

The list mentions *Southbya stillicidiorum* as found in Almoraima. About this it should be noted that Allorge (1946) records *Gongylanthus ericetorum* from the same locality and that it is difficult to distinguish between these two species when they are in a sterile condition. Cortés (1953 p. 174—175) discusses the problem.

The samples are kept in the Botanical Museum of Copenhagen.

My thanks are due to Don Ignacio Docavo Alberti, Professor in the University of Valencia, for valuable information and for permission to study in the library of the Facultad de Ciencias.

Cephaloziella Baumgartneri Schiffner — Alc —.
Southbya nigrella (De Not.) Spruce — Gan — Alc —.
Southbya stillicidiorum (Raddi) Lindb. — Alm —.
Frullania dilatata (L.) Dum. — Alm —.
Frullania tamarisci (L.) Dum. — Alm —.
Porella rivularis (Nees) Lindb. — Azr —.
Fossombronia pusilla (L.) Dum. var. *decipiens* Corb. — Alm —.
Pellia Fabbroniana Raddi — Lor — Alc — Tar —.
Lunularia cruciata (L.) Dum. — Alc — Alm — Alh — Rab — Vol —.
Reboulia hemisphaerica (L.) Raddi — Lor —.
Targionia hypophylla L. — c.fr. Alm — Sag —.
Corsinia marchantioides Raddi — Alm —.
Riccia nigrella D.C. — Gan —.
Anthoceros dichotomus Raddi — c.fr. Alm —.
Fissidens taxifolius Hedw. — c.fr. Alm —.
Fissidens serratulus Brid. — Vil —.
Fissidens Bambergeri Schpr. — Alh —.
Anisothecium rufescens (Sm.) Lindb. — Alc —.
Anisothecium varium (Hedw.) Mitt. — Gan — Tab — c.fr. Vil — Lor — c.fr. Alg — Tib — Vol —.
Campylopus fragilis Turn. (Br. & Schl.) — Alm —.
Encalypta vulgaris Hedw. — c.fr. Ron —.
Weisia crispa (Hedw.) Mitt. — c.fr. Zar —.
Weisia controversa Hedw. — c.fr. Gan — c.fr. Tab — Lor —.
Gymnostomum calcareum Br. germ. — Vil — c.fr. Alc —.
Gymnostomum rupestre Schleich. — Lor — c.fr. Alc — Ron —.
Gymnostomum tenue Hedw. — Ron —.
Gyroweisia reflexa Schpr. — Gan — Vil — Den —.
Eucladium verticillatum Br. & Sch. — Lor — Alc —.
Trichostomum crispulum Bruch — Gan — Tab — Vil — Lor — Alg —.
Trichostomum mutabile Bruch — Vil — Lor — c.fr. Den — Fue — Tar —.
Trichostomum mutabile Bruch var. *densum* Schpr. — c.fr. Fue —.

Hyophila Ehrenbergii (Lrtz.) Brid. — Lor — Tar. In the deepest humid spot under the arches of the Roman Aqueduct.
Tortella nitida (Lindb.) Broth. — Alm —.
Tortella flavovirens (Bruch) Broth. — Gan — Tab — Vil — Lor — Den — c.fr. and in addition in a very yellow sterile form Deh (G) — Tar —.
Tortella tortuosa (Hedw.) Limpr. — Gan — Vil — Pin —.
Pleurochaete squarrosa (Brid.) Lindb. — Gan — Vil — Lor — Fue — Tar — Tol —.
Timmiella Barbula (Schwaegr.) Limpr. — Alm — Tar — Tol — c.fr. Vol —.
Barbula convoluta Hedw. — Sag — Tar — Azr —.
Barbula revoluta Brid. in Schrad. — c.fr. Mon —.
Barbula Hornschuchiana Schultz — Alm — Tar —.
Barbula unguiculata Hedw. — Vil — Alc — Tar — Zar — Asn —.
Barbula acuta (Brid.) Brid. — Gan — Tab — Vil — Lor — Alc —.
Barbula vinealis Brid. — Den — Tib —.
Barbula rigidula (Hedw.) Mitt. — Alg — Ron — c.fr. Alh — Mai — Fue — Sag — Tar — Zar — c.fr. Tol — c.fr. Rab — c.fr. Vol — c.fr. Fés —.
Barbula trifaria (Hedw.) Mitt. — Lor —.
Barbula tophacea (Brid.) Mitt. — Gan — Vil — c.fr. Lor — Den — Sag — Tar — Tib —.
Tortula marginata (Br.eur.) Spruce — c.fr. Alm —.
Tortula Vahliana (Schultz) De Not. — Asn —.
Tortula muralis Hedw. — Gan — Lor — c.fr. Alc — Alg (G) — c.fr. Ron — c.fr. Alh — c.fr. Tar — c.fr. Azr — c.fr. Vol — c.fr. Fés —.
Tortula muralis Hedw. var. *obcordata* Schpr. — Gan —.
Tortula montana (Nees) Lindb. — Ron —.
Tortula princeps De Not. — c.fr. Alm —.
Crossidium squamigerum (Viv.) Jur. — c.fr. Lor — c.fr. Alc — c.fr. Ron —.
Aloina ambigua (Br.eur.) Limpr. — c.fr. Gan — c.fr. Vil — c.fr. Lor — Ron — c.fr. Alh — c.fr. Mai — c.fr. Tar — c.fr. Mon — c.fr. Vol —.
Pottia Starkeana (Hedw.) C. Müll. — Gan — c.fr. Alh — c.fr. Tar (G) —.
Pottia lanceolata (Hedw.) C. Müll. — Zar —.
Grimmia pulvinata (Hedw.) Sm. — Vil — c.fr. Lor — Alc — c.fr. Tab — c.fr. Tib —.
Grimmia trichophylla Grev. — c.fr. Pin —.
Funaria dentata Crome — Alc — c.fr. Alm —.
Funaria mediterranea Lindb. — Sag (G) — c.fr. Rab —.
Funaria hygrometrica Hedw. — c.fr. Ron (G) — c.fr. Ori —.
Pohlia carnea Lindb. — c.fr. Tar — Vil —.
Bryum caespiticium Hedw. — Den —.
Bryum caespiticium Hedw. var. *Kunzei* (Hornsch.) Warnst. — Alh — Asn —.
Bryum caespiticium Hedw. var. *comense* (Schpr.) Husn. — Gan — Tab — Vil — Fue — Tar — Tol —.
Bryum cirratum Hoppe & Hornsch. — c.fr. Azr —.
Bryum bicolor Dicks. — c.fr. Gan — Den — c.fr. Ron — c.fr. Deh —.
Bryum torquescens Br. eur. — c.fr. Gan — c.fr. Lor — c.fr. Deh — c.fr. Vol —.
Bryum capillare Hedw. var. *meridionale* Schpr. — Vil — c.fr. Alm — Ron — Alh — Tar —.

Bryum argenteum Hedw. — Ron — Alh —.
Philonotis marchica (Hedw.) Brid. — Lor. sample very scanty.
Leucodon sciuroides (Hedw.) Schwaegr. — c.fr. Alm —.
Pterogonium gracile (Hedw.) Br. eur. — Pin —.
Cratoneurum filicinum (Hedw.) Roth — Vil — Alc —.
Amblystegium tenax (Hedw.) Dix. — Lor —.
Amblystegium riparium (Hedw.) Br. & Sch. — Gan — Vil —.
Amblystegium riparium (Hedw.) Br. & Sch. forma *longifolia* Br. eur. — Gan — Vil —.
Homalothecium sericeum (Hedw.) Br. & Sch. — Pin —.
Camptothecium aureum (Lagasca) Br. eur. — Lor — Tol —.
Brachythecium salebrosum (Web. et Mohr) Br. & Sch. — c.fr. Tib —.
Brachythecium rivulare Br. & Sch. — Gan —.
Brachythecium velutinum (Hedw.) Br. & Sch. — c.fr. Alm — c.fr. Tar —.
Scleropodium caespitosum (Wils.) Br. eur. — Alm —.
Scleropodium illecebrum (Hedw.) Br. & Sch. — Tib —.
Pseudoscleropodium purum (Hedw.) Fleisch. — Tib —.
Scorpiurum circinatum (Brid.) Flschr. & Loeske — Gan — Vil — Alm — Sag (G) — Tar (G) —.
Eurynchium Swartzii (Turn.) Curn. — Vil — Lor — Alc — Alh — Tar — Tib —.
Eurynchium Swartzii (Turn.) Curn. var. *meridionale* Boul. — Alh. Eur. Sw. is recorded from this locality by Allorge (1946) and Geheeb (1874).
Eurynchium striatum (Hedw.) Schimp. var. *meridionale* Schimp. — Gan —.
Rhynchostegium riparioides (Hedw.) C. Jens. — Gan — Alc —.
Rhynchostegium megapolitanum (Bland.) Br. & Sch. — Vil — Lor —.
Hypnum cupressiforme Hedw. — Alm — Tib —.

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Botaniska Notiser 1962 · Vol. 115 · Fasc. 1 · Lund

Tre nya Taraxacum-arter från Finland

Av Bernhard Saarsoo

S:t Sigfrids sjukhus, Växjö

I Finland har vid floristisk forskning ägnats stor uppmärksamhet åt det senaste världskrigets truppkoncentrationspunkter. En sådan punkt utgör omgivningen av Hyrynsalmi järnvägsstation i Ostrobottnia kajanensis, vilken under vinterkriget tjänstgjorde som avlastningsplats för i Suomussalmi-sektorn opererande finska trupper och senare (1941—1944) som avlastnings- och lägerplats för ansenliga tyska styrkor. De sistnämnda höll där också ett större bestånd av hästar och kreatur, för vilka föda importerades från Tyskland.

Den finske botanisten, kapten Lauri Heikkinen har under åratal utforskat dessa trakter och där upptäckt flera för landet främmande floraelement. Synnerligen grundligt har han undersökt *Taraxacum*-floran och gjort stora insamlingar där. Författaren av denna uppsats har under de senare åren haft förmånen att granska hans maskrossamlingar, varvid ett stort antal för Fennoskandien nya arter upptäckts. En del av dessa offentliggöres i ett annat sammanhang, medan 3 för vetenskapen nya arter beskrives här nedan. Samtliga hör till *Vulgaria*-gruppen.

Taraxacum saetigerum Saarsoo n. sp.

Planta 20—35 cm alta.

Folia obovato-lanceolata, glaucescenti-viridia, sparse, in nervo dorsali densius araneosa, petiolis sat angustis, araneosis, pallide rubro-violaceis. Folia intermedia lobis lateralibus distantibus, 4—5 utrimque, sat longis, deltoideis, acutis, ± patentibus, dorso recto vel convexulo, integro vel ad basin tenuissime denticulato. Lobus terminalis hastato-sagittatus, supra lobulos basales contractus et in apicem longum, acutiusculum, fere linearem vel lingulatum protractus et non raro in uno alterove latere lobulo acuto vel rotundato praeditus, lobulis basalibus patentibus, longis, acutis vel interdum in uno alterove latere rotundatis. Interlobia angusta, atro-marginata, dentibus

longis, subuliformibus sat dense munita. Folia exteriora brevius lobata, lobis plerumque integris. Folia interiora araneosa, intermediis similia, sed lobis plus approximatis, dorso convexis.

Scapi folia superantes, ± straminei, sparse, sub involucro dense araneosi.

Involucrum mediocre, sat aequilatum, olivaceo-viride, basi ovato-truncata. Squamae exteriores plurimae ovato-lanceolatae, 2—4 mm latae, interiores fere aequantes, arcuato-patentes, sensim in apicem obtusiusculum angustatae, conspicue marginatae, supra laete brunnescenti-virides, infimae longiores, fere lineares, retroflexae, interiores infra apicem atro-purpureum ut plurimum callosae vel breviter corniculatae.

Calathium sat obscure luteum, 30—45 mm diametro, sat plenum, ligulis marginalibus planis, sat brevibus, extus stria atro-violacea ornatis.

Antherae polliniferae.

Stigmata virescentia.

Achenium immaturum stramineum, 3,6—3,8 mm longum, superne crebre et argute spinulosum, inferne laeve, in pyramidem subconicam, 0,4—0,6 mm longam abiens.

Typus (fig. 1): Ostrobottnia kajanensis. Kajaani, idrottsplan, 7.VI.1961 leg. Lauri Heikkinen (in herbario Riksmuseum, Stockholm, asservatur).

Mellanbladen hos denna art är tämligen breda och slutar i en långt utdragen ändlob, vilken ibland på ena eller andra sidan är försedd med en rundad eller spetsig smålob. Även basalflikarna, vilka vanligen är långa och utstående, kan hos enstaka blad vara avrundade eller saknas helt och hållet på endera sidan. De deltoida sidoloberna är fåtaliga, har långa, utstående spetsar och är sparsamt fintandade på ryggen.

Karakteristiskt för arten är dess smala och långa interlobier, vilka oftast är utrustade med fina och långa tänder. Holken är medelstor och tämligen bred. Ytterfjällen är marginerade och orgelbundet nedböjda; de yttersta av dessa är ofta linjesmala och längre än andra. Innerfjällen har knölar eller korta hornutskott under spetsen.

Med hänseende till sina ändlober erinrar *T. saetigerum* mycket om *T. idiomorphum* Markl. Den sistnämnda skiljer sig dock bl.a. genom kortare änd- och sidolober, grövre tandning på loberna och interlobierna, genom avsaknad av knölar på innerfjällen och genom kortare frukt med längre näbb.

Arten har en viss likhet även med *T. acutifrons* Markl. och *T. longicuspis* Markl.

På typlokalen insamlade Heikkinen arten först 18.VI.1958. Dessutom har *T. saetigerum* av honom påträffats på följande lokaler: Kajaani, Lehtikangas, brandkårens gårdsplan, 8.VI.1961; Paltaniemi, Kirkkoniemi, 10.VI.1961; Hyrynsalmi, järnvägsstation, 11.VI.1960.

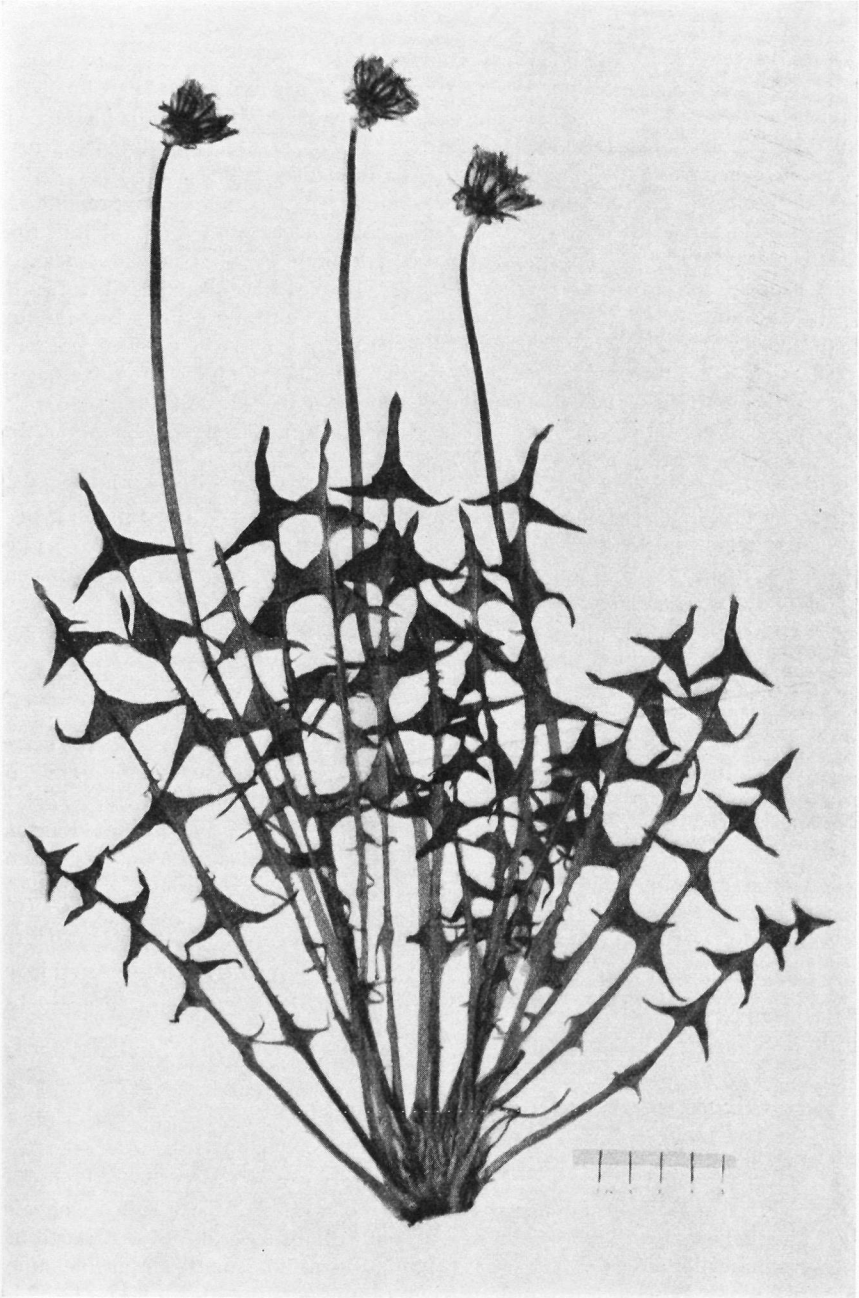

Fig. 1. *Taraxacum saetigerum* Saarsoo. Typus.

Taraxacum spurium Saarsoo n. sp.

Planta mediocris, 25—30 cm alta.

Folia laete canescenti-viridia, sparse araneosa, petiolis longis et angustis, aeque ac inferiore parte nervi mediani violascentibus. Folia intermedia lanceolata, 4—6-loba, lobis lateralibus mediocriter longis, acutis, in superiore parte folii ± approximatis, in inferiore valde distantibus, deltoideis-subhamatis, dorso convexo-subrecto integro vel dente unico praedito, in lobis inferioribus tenuissime denticulato. Lobi supremi non raro apicibus brevibus, rotundatis. Lobus terminalis parvus, lobulo apicali contracto, acutiusculo, marginibus non raro rotundato-incisis, lobulis basalibus brevibus, acutis vel in uno alterove latere rotundatis. Folia exteriora lobis brevioribus, deltoideis, ± integris, lobo terminali ± triangulari, interiora florendi tempore parum evoluta, intermediis ± similia. Interlobia angusta, atro-marginata, dentibus tenuissimis praedita.

Scapi folia superantes, straminei, superne brunnescentes, sparse, sub involucro densius araneosi.

Involucrum sat parvum, obscure viride, basi ovato-truncata. Squamae exteriores lanceolatae, recurvato-patentes, 1—3 mm latae, sat breves, supra laetius virides, sensim in apices obtusiusculos attenuatae, interiores numerosae, apicibus laceratis atro-violaceis, singulae infra apicem inconspicue callosae.

Calathium parvum, sat plenum, saturate luteum, ligulis marginalibus sat brevibus, planis, extus stria atra notatis.

Antherae polliniferae.

Stigmata excedentia, sicca sat obscura.

Achenium fusco-stramineum, 3,3—3,6 mm longum, superne sat dense et breve spinulosum, inferne tuberculatum vel ima basi laeve, in pyramidem subcylindricam, 0,7—1 mm longam sensim abiens.

Typus (fig. 2): Ostrobottnia kajanensis. Hyrynsalmi, Kangasjärvi, 15.VI.1961 leg. Lauri Heikkinen (in herbario Riksmuseum, Stockholm, asservatur).

Av finska arter påminner *T. spurium* mest om *T. constrictifrons* Markl., men skiljer sig från denna bl.a. genom bredare holkar med kortare och mindre starkt nedböjda yttre holkfjäll och genom närvaro av pollen och frukt med längre näbb.

Taraxacum subserratifrons Saarsoo n. sp.

Planta mediocris—sat alta, 20—40 cm.

Folia canescenti-viridia, sparsim vel in nervo mediano crebrius araneosa, petiolis subalatis et maxima parte nervi mediani sat intense rubro-violaceis. Folia intermedia 4—5-loba, lanceolata, lobis lateralibus ± distantibus, sat brevibus, deltoideis-subhamatis vel unguiformibus, acutis, margine superiore subrecto-convexo, ad basin dentibus tenuibus praedito, interlobiis subangustis-sat latis, marginibus piceis ± plicatis, sat crebre subulato-dentatis; lobus terminalis mediocris—sat magnus, sagittatus—hastato-sagittatus, saepe

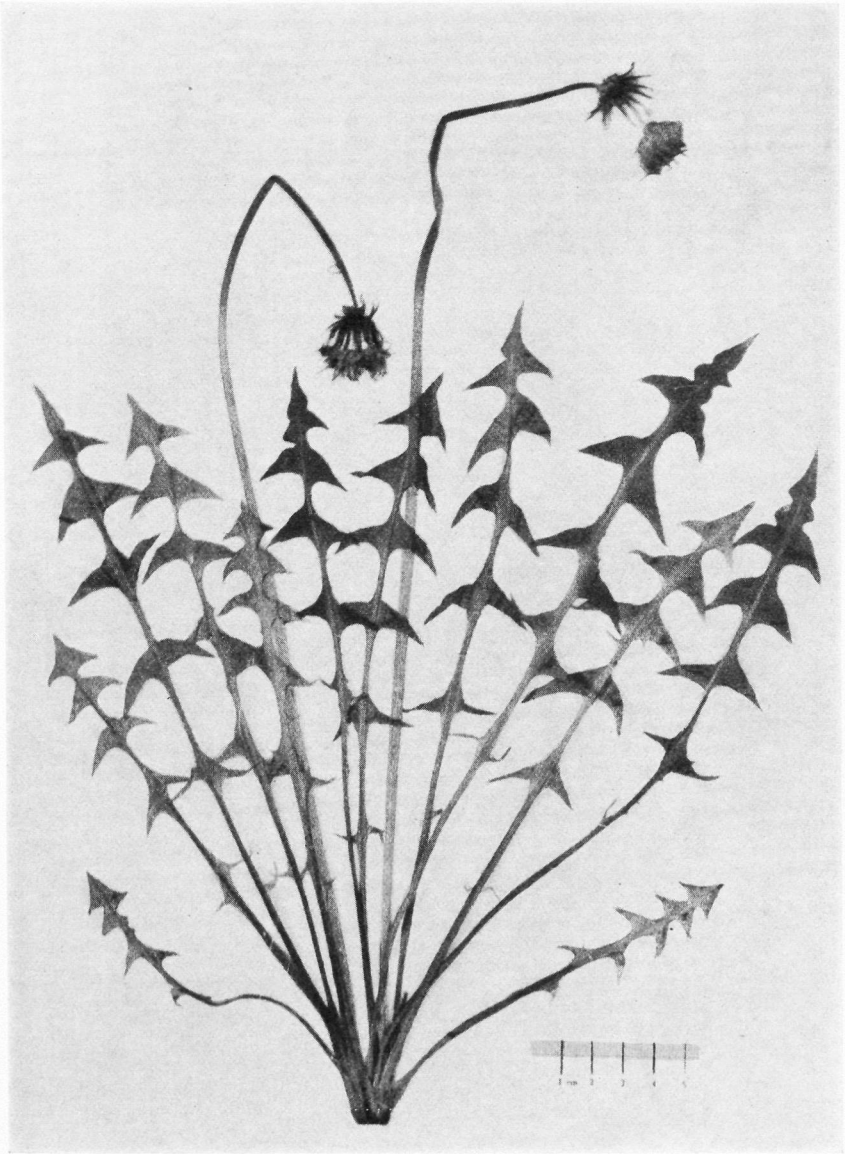

Fig. 2. *Taraxacum spurium* Saarsoo. Typus.

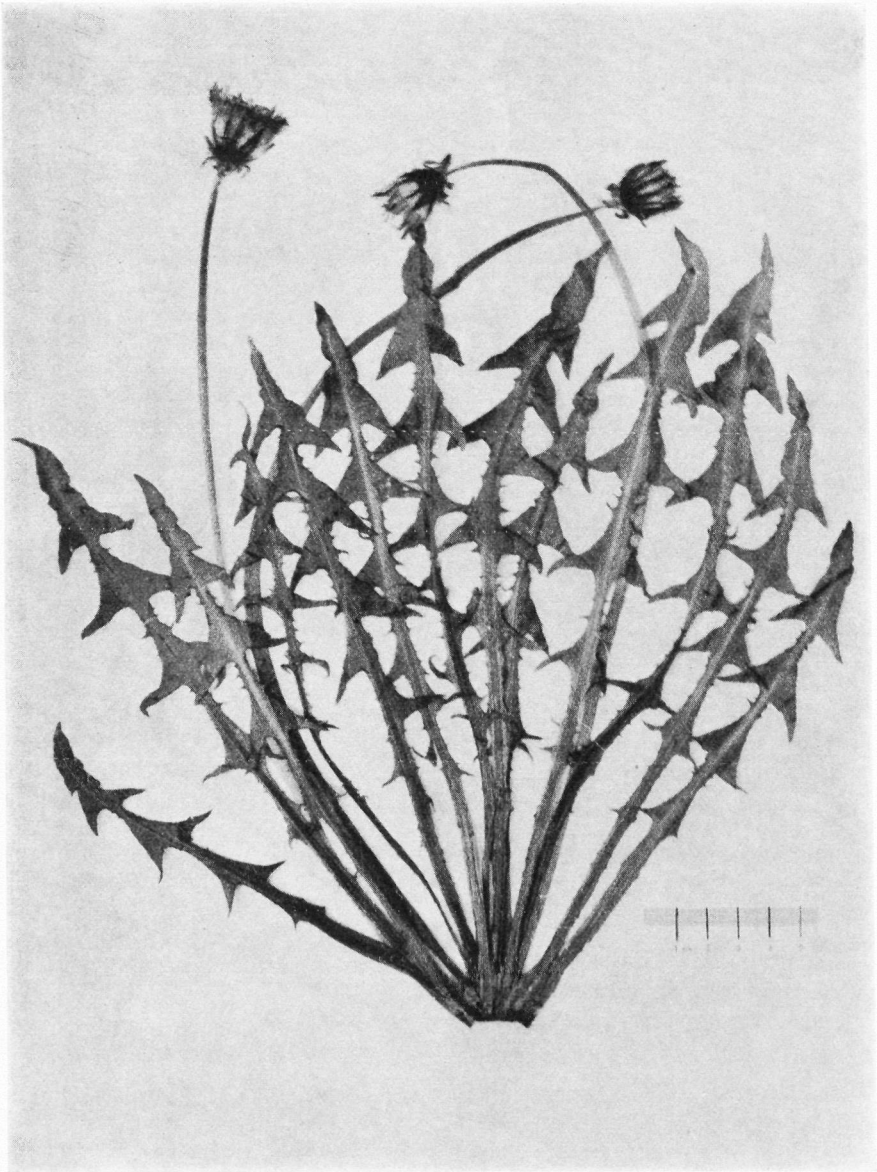

Fig. 3. *Taraxacum subserratifrons* Saarsoo. Typus.

plicatus et rotundato-incisus, ut plurimum in apicem longum, acutum vel mucronatum protractus et non raro in marginibus tenuissime denticulatus, lobulis basalibus ± hamatis vel unguiformibus, non raro in uno alterove latere apicibus rotundatis. Folia exteriora intermediis similia, sed breviora, paucilobata et lobis fere integris. Folia interiora obovato-lanceolata, lobo terminali magno, ovato, dentato et lobulato.

Scapi folia superantes, inferne straminei, superne brunneo-violascentes, ad basin leviter, apicem versus magis araneosi.

Involucrum mediocre, sat obscure olivaceo-viride, basi ovato-truncata. Squamae exteriores lanceolatae—ovato-lanceolatae, emarginatae, 2—4 mm latae, arcuato-patentes—±retroversae, supra subvirides, partim brunnescentes, apicem obtusiusculum versus atro-violaceae, interiores infra apicem atro-violaceum non raro callosae.

Calathium luteum, 30—40 mm diametro, sat plenum, radians, ligulis marginalibus planis, extus stria atro-violacea ornatis.

Antherae polliniferae.

Stigmata excedentia, sicca obscura.

Achenium fusco-stramineum, 3,6—4 mm longum, ca 1 mm latum, superne sparse et argute spinulosum, inferne leviter tuberculatum vel laeve, in pyramidem subcylindricam, 0,7—1 mm longam sensim abiens.

Typus (fig. 3): Ostrobottnia kajanensis. Hyrynsalmi, Kangsjärvi, 15.VI.1961 leg. Lauri Heikkinen (in herbario Riksmuseum, Stockholm, asservatur).

T. subserratifrons utmärker sig framför allt genom sina blad, vilka har långt utdragna, spetsiga eller mukronerade ändlober med vågiga kanter och på ena eller andra sidan avrundade basallober. Sidoloberna är vanligen deltoida med ± utstående spetsar, medan hos enstaka lober kan spetsarna vara klolikt nedböjda. Interlobier är tämligen breda, mörkkantade och försedda med ± täta, långa syltänder. De medelstora holkarna är tämligen mörkgröna och innerfjällen har ofta knölar under spetsen. Arten är pollenbärande och har nästan svarta märken.

Till sitt allmänna habitus påminner arten i vissa former mycket om *T. serratifrons* Florstr., men har mindre utpräglat mörkkantade interlobier med längre och tätare tandning. Dessutom är holkskaften mindre håriga, ytterfjällen bredare och ej så starkt nedböjda mot skaftet samt frukten större och med längre näbb.

Förutom typlokalen, där Heikkinen första gången insamlade arten 20.VI.1957, har han samlat *T. subserratifrons* på följande ställen i typlokalens närhet: Hyrynsalmi, järnvägsstationens bangård, avskrädeshög, 24.VI.1960 och 15.VI.1961; Hyrynsalmi, Kirkonkylä järnvägsstation, 15.VI.1961.

Summary

Three new species of Taraxacum from Finland

The author presents following 3 species of *Taraxacum* new to science from Finland: *T. saetigerum* Saarsoo, *T. spurium* Saarsoo and *T. subserratifrons* Saarsoo. All of them belong to the group of *Vulgaria*.

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Second Note on Swedish Freshwater Hyphomycetes

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In a previous paper (Nilsson, 1958) the author gave a preliminary survey of Swedish species of freshwater Hyphomycetes; for this 21 species as well as some conidia of unidentified species were described and pictured. After the publication of that paper, a more intensive study of this group of Hyphomycetes was started. Collections of decaying leaves, and other plant debris, foam and scum from different parts of Sweden were examined. The studies were concentrated on decaying and sceletonized leaves, which are the most suitable substrate. Several thousand samples of leaves and of foam and scum, in which a concentration of conidia usually occurs, were examined. This collecting and studying is continued and aims at giving a view of the total distribution of these fungi in Sweden. Besides, collections from other countries have been studied, and a report on those studies will be published in a future paper. In the present paper 14 species, not previously listed from Sweden, are described and pictured, among those 2 new species, *Flagellospora stricta* S. Nilss. and *Bacillispora aquatica* S. Nilss. gen. nov. et sp. nov. A new combination is made, *Dactylella submersa* (Ing.) S. Nilss. comb. nov. The total number of fungi of this group found in Sweden is higher than that reported from any other country. Only a description and a taxonomic treatment will be given here. A survey of the total distribution will be given in a forthcoming paper, where also some ecological, physiological and morphological problems will be discussed.

Actinospora megalospora Ing.

Trans. Brit. mycol. Soc. 35: 66—71 (1952).

Several conidia of this large fungus were observed in scum and foam samples from a stream in Småland. The morphology of the conidia

matches the description and picture of *Anguillospora*. Conidia (thallospores) hyaline to slightly brownish with a central part 25—40 µ in diam. From this part four arms originate in the same manner as in the genus *Lemonniera*. They are 100—160 µ long, 4—8 µ broad, tapering towards their ends. — Fig. 1.

Anguillospora crassa Ing.

Trans. Brit. mycol. Soc. 41: 367—369 (1958).

In scum and foam samples from different streams some thick *Anguillospora*-like conidia were always seen. Undoubtedly the same type of conidia was pictured in my previous paper (Nilsson 1958, fig. 12 d). The fungus was however never found growing. Ingold (1958) described a new species of *Anguillospora, A. crassa,* from culture, derived from isolated conidia in scum. He had never seen the fungus growing in nature. The conidia from scum samples in Sweden seemed to belong to above mentioned species of *Anguillospora*. The Swedish material had however less thick conidia. Ingold described the conidia as 15—20 µ wide on naturally occurring spores from scum but no conidium in his figure (Ingold 1958, fig. 3) reaches 15 µ. He stated, however, that spores in cultures tended to have a reduced width on cultured material. Webster (1961) gives 9—11 µ for the width. A high degree of variation in shape and size was observed on the Swedish collections.

Webster (1961) described in a very interesting paper a *Mollisia* perfect state of *A. crassa*. He also describes dark oval chlamydospores and small, hyaline phialospores (microconidia) occurring in his multispore isolates. This is the third report on perfect states found in aquatic Hyphomycetes. During the autumn 1961 I found some submerged wood that had a grayish mat of fungi that turned white when dry. This mat was identified as very dense and compact colonies of *Anguillospora crassa*. The way in which the conidia were produced did not however agree with that described by Ingold and does not occur in any other species of *Anguillospora*. The conidia were formed in the same way as in *Dactylella* (Ranzoni 1953, Tubaki 1957). The conidia are set free by a rounding-off process and the conidiophores elongates before a new conidium is initiated. It is possible that both this type and the normal *Anguillospora*-type, with conidia initiated from the same point, occur. It seems doubtful that the here described fungus

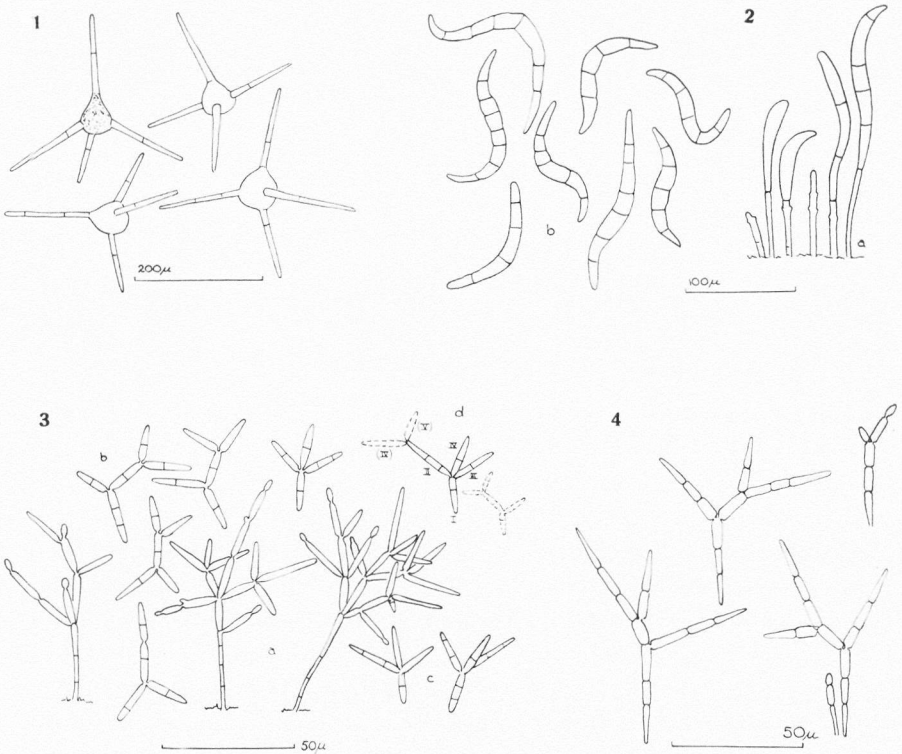

Fig. 1. Conidia of *Actinospora megalospora*. — Fig. 2. *Anguillospora crassa*. a, conidiophores with conidia in development; b, conidia (aleuriospores). — Fig. 3. *Articulospora tetracladia*. a, Conidiophores with conidia in various stages of development; b, conidia (aleuriospores) with five parts; c, typical conidia with four parts; d, conidium showing development of the different parts in both types of conidia. — Fig. 4. *Articulospora*. Conidia of unidentified species.

should belong to another species or genus. Thus the Swedish material is placed under *Anguillospora crassa*.

Mycelium hyaline, septated. Conidiophore hyaline, septate, short. Conidia (aleuriospores) initiated as a swelling at the end of the conidiophore. After that the first formed conidium is released the conidiophore elongates and a new conidium is formed. Thus an old conidiophore is more or less annellated — there are "rings" at the places where each conidium was liberated. Conidia hyaline, septate, more or less S-shaped 100—200 μ long, 8—12 μ broad in the middle region tapering towards the ends. — Fig. 2.

Articulospora tetracladia Ing.

Trans. Brit. mycol. Soc. 25: 339—417 (1942).

Syn.: *Articulospora angulata* Tubaki, Bull. Nat. Sci. Mus. Tokyo 41: 252—253 (1947).

Among the "conidia of unidentified species" pictured in my previous paper (S. Nilsson 1958, fig. 12) was a kind of "fivearmed" conidium (fig. 12 f). Ingold (in litt.) supposed they might be abnormal conidia of *Articulospora tetracladia*. Tubaki (1957) described a new species of *Articulospora*, *A. angulata*, with the same type of conidia. Later I have found *A. tetracladia* to be one of the most common species especially in ponds and lakes. Besides the typical conidia (fig. 3 c) the above mentioned aberrant ones were found (fig. 3 b), sometimes in abundance. It is now clear that those do not belong to another species. They are a special type of conidia, produced together with "normal" conidia or separately. On leaves collected from the bottom of streams those aberrant conidia are rare or absent. On black, slow decaying leaves from ponds and lakes, however, they are produced frequently. This type of conidia seems to be formed when the water is stagnant or insufficient. *A. tetracladia* has also been found together with typical so called aero-aquatic Hyphomycetes, such as species of *Helicomyces* and *Helicodendron*. Conidia formed aerial in moist chamber are mostly of the "abnormal" type. It seems clear that fungi with any of the above mentioned type of conidia should be placed in one and the same species. If specimens with typical conidia should be placed under A. and the aberrant type under *A. angulata*, where should specimens with both types of conidia be placed? Should they be regarded as *A. tetracladia* with abnormal conidia of *angulata*-type or as *A. angulata* with abnormal conidia of *tetracladia*-type? The special type of conidium, above discussed, is very similar to that of an undescribed fungus found by the author in North America. The conidia are formed in sporodochia and consist of several cells, the divergent arms resulted of acropetal development of component cells (fig. 4). Those conidia are also resembling conidia of *Speiropsis pedatospora* described by Tubaki (1958) and conidia from Rhodesia described by Ingold (1960). — The variation in form and size of conidia is very pronounced and interesting in species of the present group of fungi and will be discussed in a future paper. — Fig. 3—4.

Bacillispora aquatica S. Nilss. gen. et sp. nov,

This fungus occurred in ponds and small streams (ditches) in Uppsala, Uppland. On sceletonized leaves put in clean water a very dense growth occurred and masses of conidia were produced. It seems to me not possible to include the present fungus in any known genus. The conidia are very similar to those of species belonging to the genera *Fusarium, Cylindrocladium* and *Moeszia*. In the type of conidiophores and in the way the conidia are borned and released the present fungus however differs from the above mentioned fungi.

Submerged aquatic fungus with hyaline, branched, septate mycelium. Conidiophores hyaline, septate, simple or branched, slender and often very long. Conidia (aleuriospores) borne as a swelling at the end of the conidiophore in basipetal succession. Conidia (aleuriospores) aquatic, bacilliform, 25—50 µ long, 3—4 µ broad, liberated by a rounding off process. Conidia after liberation sometimes septate.

Hab.: On decaying leaves of *Salix* sp. in a small stream (ditch) in Uppsala, Uppland, Sweden. — Fig. 5.

Bacillispora gen. nov.

Fungi aquatici, mycelio hyalino, septato, ramoso. Conidiophora hyalina, erecta, septata, simplicia vel ramosa. Conidia aquatica (aleuriosporae) bacilliformia, hyalina e conidiophoro ex eodem loco deinceps evoluta.

Bacillispora aquatica sp. nov.

Fungus aquaticus, submersus, mycelio hyalino, ramoso, septato. Conidiophora hyalina, simplicia vel ramosa. Conidia (aleuriosporae) aquatica hyalina, terminalia, solitaria, bacilliformia, 25—50 µ longa, 3—4 µ lata. Conidia ex eodem loco deinceps evoluta, post liberationem septata vel nonseptata.

Habitat: In foliis putrescentibus *Salicis sp.* in torrente minore in Uppsala, Upplandia, Suecia. — Ut typus prep. et figura nostra Herb. UPS valet.

Species of *Culicidospora* R. H. Pet.

Bull. Torr. Bot. Club. 87: 342—347 (1960).

Conidia that seem to belong to a member of the genus *Culicidospora* described by R. H. Petersen (1960) from New York, U.S.A., have been observed several times in scum and foam samples from different parts of Sweden. They are similar to those of *C. aquatica* R. H. Pet. but are shorter and broader and more resembling conidia pictured by Ingold (1960) from Canada. The conidia occur sparsely.

Main axis of the conidia consisting of a thick, slightly brownish, curved central part, 30—50 µ long, 15—25 µ broad (broadest in the middle), with terminal and basal extensions (arms), 20—35 µ long. Two branches are produced from the main part, 25—40 µ long, constricted at the base, tapering towards the end. — Fig. 6.

Dactylella microaquatica Tubaki

Bull. Nat. Sci. Mus. Tokyo 41: 56—258 (1957).

Dactylella microaquatica was described from Japan by Tubaki (1957) and is according to him a common fungus in Japan. It has not previously been reported from other parts of the world. In Sweden it was found twice growing on sceletonized leaves of *Quercus robur*; in a lake in Småland and in a small stream in Gotland. About the taxonomic position see under *D. submersa*.

Mycelium hyaline, septate, branched. Conidiophore hyaline, simple, short and more or less straight. Formation of conidia (aleuriospores) is of two types clearly described by Tubaki (1957). In the first type the spore is initiated terminally, delimited by a septum and set free by a rounding off process. A new spore is initiated by elongation of the conidiophore to one side of its apex. In the other type the spore is produced as a swelling through the "scar" of the first spore. Thus an old conidiophore has several "scars" or "rings" (annellation). The distance between the "scars" varies. The liberated aleuriospore is obovate to globose, 10—16 µ long, 6—10 µ broad with one septum near its narrow end. The last mentioned type of spore formation was dominating in the Swedish material. — Fig. 9.

Dactylella submersa (Ing.) S. Nilss. comb. nov.

Syn: *Piricularia submersa* Ing., Trans. Brit. mycol. Soc. 27: 45—46 (1944).

This fungus has frequently been found growing on decaying leaves, and conidia often occur in scum samples. Ingold suggested that the two species *Piricularia aquatica* (=*Dactylella aquatica*) and *P. submersa* should be removed from *Piricularia* into a new genus. His suggestion might be right. Until more material has been studied (probably additional related species will be found) it seems however reasonable to keep the known species of water fungi, described under the genera *Piricularia* and *Dactylella*, together in the genus *Dactylella*. Although both above mentioned species of *Piricularia* resemble other species

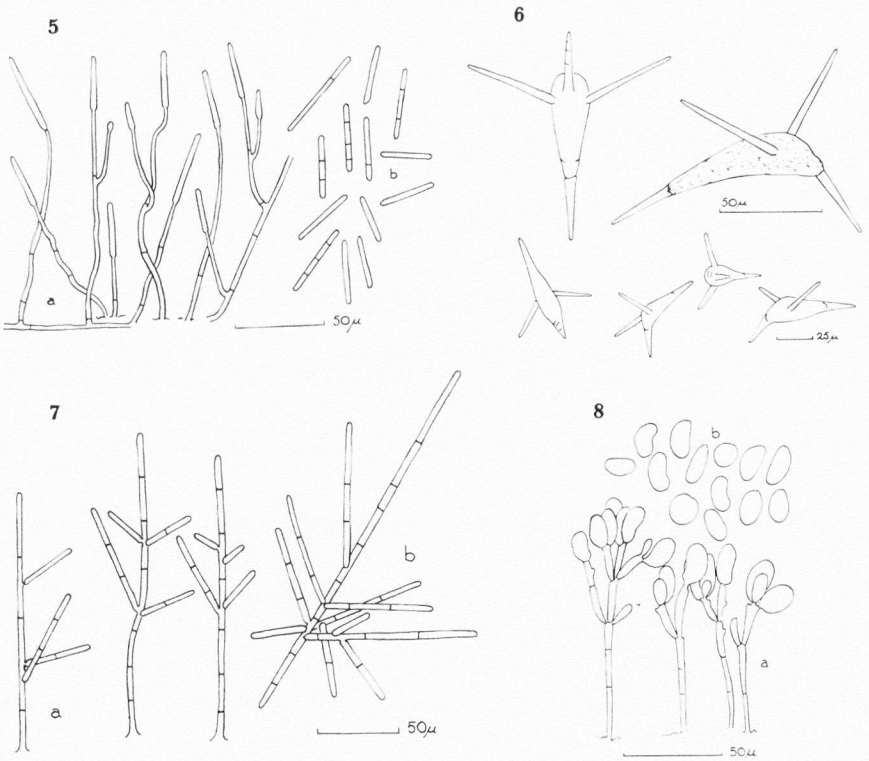

Fig. 5. *Bacillispora aquatica* gen. nov., sp. nov. a, conidiophores with conidia in various stages of development; b, conidia. — Fig. 6. Conidia of *Culicidospora* sp. — Fig. 7. *Dendrospora erecta*. a, conidiophores with conidia in development; b, conidium (aleuriospore). — Fig. 8. a—b, *Dimorphospora foliicola*. a, conidiophores with conidia attached; b, conidia (aleuriospores).

of the genus, there are several differences in shape, attachment and release of conidia. Some specimens of *Piricularia submersa* Ing. are very similar to species of nematode catching fungi of the genus *Dactylella*, described by Dreschler. Conidia of terrestrial species of *Piricularia* are usually broadest near the base and are attached on different places of the conidiophore. On an old conidiophore there are thus several small "scars", where the conidia have been attached. Ranzoni (1953) gives a detailed account of the differences between *Piricularia* and *Dactylella* in connection with his description of *Dactylella aquatica*.

Mycelium hyaline, septate, branched. Conidiophore hyaline, simple,

simple or sparingly branched mostly short. Conidia (aleuriospores) hyaline, terminal, solitary, rarely two together, septate or non septate. The form of aleuriospores is varying very much, usually straight, more or less clavate, broadest in the middle or near the apex and tapering towards the base; sometimes broadest in the middle and tapering towards both ends, 25—50 µ long, 5—10 µ broad. — Fig. 10.

Dendrospora erecta Ing.

Trans. Brit. mycol. Soc. 26: 104—107 (1943).

This peculiar fungus was found only twice: once in samples of scum and foam from a mountain stream in Jämtland, another time growing on submerged, sceletonized leaves in a small forest stream in Uppland. The growth and morphology of the fungus agrees with Ingold's description of *Dendrospora*. Tubaki (1958) describes and pictures the same fungus from Japan. From his drawings and descriptions (size of conidia etc.) it seems to me that his fungus might be another species, perhaps the same as pictured by Ingold (1960) from Canada.

Mycelium hyaline, septate, branched. Conidiophores hyaline, septate, simple and relatively short. Conidia (aleuriospores) more or less complex, branched, septate, consisting of a main axis, 150—400 µ long, 3—4 µ broad septate. From the lower part of the axis several branches are inserted to form a treelike conidium 50—200 µ long, 3—4 µ broad, not tapering towards their ends but constricted at the base. — Fig. 7.

Dimorphospora foliicola Tubaki

Journ. Hatt. Bot. Lab. 20: 156—158 (1958).

Syn: *Fluminispora ovalis* Ing., Trans. Brit. mycol. Soc. 41: 369—370 (1958).

This fungus was found sparsely on decaying black leaves of *Betula* from the bottom of a small pond in Uppland. It was identified as *Dimorphospora foliicola,* described by Tubaki (1958) from Japan and soon after under the name *Fluminispora ovalis* by Ingold (1958). (Ingold's manuscript was delivered before Tubakis publication appeared). The fungus has two different types of conidia: phialospores, small and round, produced in air and thallospores, bigger, rounded to oval or reniform, produced in water. The present author has not observed phialospores on Swedish material.

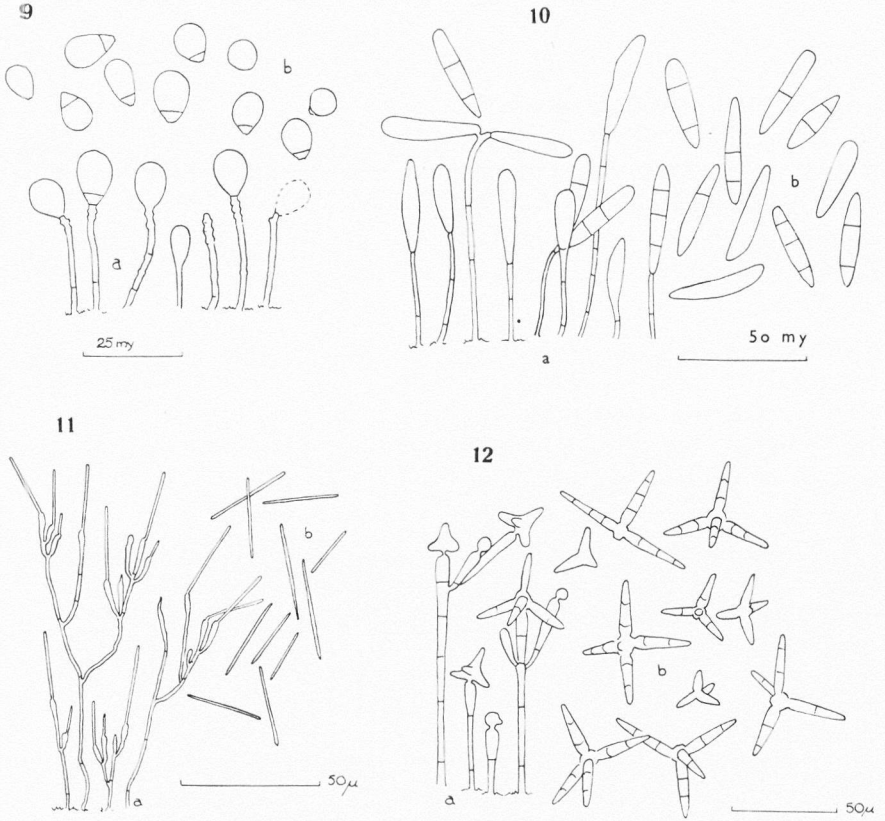

Fig. 9. a—b, *Dactylella microaquatica*. a, conidiophores with conidia in various stages of development; b, conidia. — Fig. 10. *Dactylella submersa* comb. nov. a, conidiophore with conidia attached; b, conidia (aleuriospores). — Fig. 11. *Flagellospora stricta* sp. nov. a, conidiophores with phialides and conidia in various stages of development; b, conidia (phialospores). — Fig. 12. *Lemonniera brachycladia*. a, conidiophores with conidia in various stages of development; b, conidia (phialospores) of different types; c, abnormal conidium.

Mycelium hyaline, spetate, branched. Conidiophore hyaline, branched, septate, relatively short, forming thallospores. Thallospores oval to rounded or slightly reniform, 8—20 μ long, 5—8 μ broad. When first conidium is formed, another is initiated close to the first one. Usually two thallospores in different stages of development are found at the end of each branch of the conidiophore. Phialosporeformation: see Tubaki (1958) and Ingold (1958). — Fig. 8.

Flagellospora stricta S. Nilss. sp. nov.

This fungus was found on sceletonized leaves from a stream in Uppland. It is inconspicous and may have been overlooked. Conidiophores and conidia resemble very much those of F. described by Ingold (1942). The present fungus is however smaller and the conidia are straight and shorter. The morphology of the fungus, the type of conidia and liberation of conidia makes it reasonable to place this fungus in the genus *Flagellospora* as a new species.

Submerged aquatic fungus with hyaline, branched, septate mycelium. Conidiophore hyaline, branched, forming a group of phialides. Each phialide is more or less clavate, producing conidia (phialospores) in basipetal succession. Phialospores hyaline, filiform, straight, 25—40 µ long, 1—1.5 µ broad, slightly tapering to its ends.

Hab.: On submerged decaying leaves from a forest stream to lake Ramsjön, South of Åland, Uppland, Sweden. — Fig. 11.

Fungus aquaticus, mycelio hyalino, septato, ramoso. Conidiophora hyalina apice ramosa, phialides clavatas gerentia. Conidia (phialosporae) hyalina, filiformia, stricta, 25—40 µ longa, 1—1,5 µ lata, ex eadem phialide deinceps evoluta.

Habitat: In foliis putrescentibus in torrente minore, Ramsjön, Upplandia, Suecia. — Ut typus prep. et figura nostra Herb. UPS valet.

Lemonniera brachycladia Ing.

Trans. Brit. mycol. Soc. 41: 365—366 (1958).

Conidia of *L. aquatica* are usually found in every sample of scum taken in any stream, and it is one of the most common of all aquatic Hyphomycetes in Sweden (Nilsson 1958). In some samples conidia of a somewhat different type were observed. They were identified as conidia of *L. brachycladia* described by Ingold (1958). In Sweden the fungus has been found growing only once: on decaying leaves from a small stream in Uppland. Conidia, however, have been found in scum from streams in different parts of the country. *L. brachycladia* differs from *L. aquatica* by the broader more compact and dark coloured (brownish) conidia. Tubaki (1958) described a species *L. terrestris* that could be the same species. The conidia are very similar in shape and size. The same author also pictured some unidentified conidia from snow (Tubaki 1960, fig. 3 A). The same type of three-armed conidia, that is shown in his figure, the author found to be produced by *L. brachycladia* (abnormal conidia).

Mycelium hyaline to brownish, branched, septate, giving rise to

simple or mostly branched, septate conidiophores with one or several phialides producing phialospores. Phialospores hyaline to light brownish, septate, consisting of four divergent arms, 10—50 µ long, 4—6 µ broad, tapering towards the base and apex. The arm in continuation of the longitudinal axis of the phialide is often longer than the other. Phialospores are inserted and liberated in the same way as that of *L. aquatica*. — Fig. 12.

Lunulospora curvula Ing.

Trans. Brit. mycol. Soc. 25: 404—409 (1942).

Conidia of this species were reported from Uppland in a previous paper (Nilsson 1958). It has now been found growing on leaves in streams in different parts of Sweden, e.g. Småland and Gotland. It seems however to be a less common species. No dense vegetation has been observed. The conidia found in some lakes in Uppland (Nilsson 1958, Willén 1958) seem to be of a slightly different type. They were shorter and broader. The specimens found growing, e.g. in Småland, have slender conidia with very long and spiny ends.

Mycelium hyaline, branched, septate, Conidiophore simple or rarely branched. Conidia (aleuriospores) produced on a short, stalklike cell, 3—5 µ long. They are unicellular, curved (crescent-shaped) often three-dimentionally bent or rarely sigmoid, 60—100 µ long, 3—5 µ broad in the middle, tapering very much to its ends. The aleuriospore is liberated by the breakdown of the above mentioned stalk cell. — Fig. 13.

Tricladium angulatum Ing.

Trans. Brit. mycol. Soc. 25: 389—393 (1942).

Conidia of this species have been observed several times in scum and foam from a couple of fast running streams but the fungus was found growing only twice: in the river Fyris, Uppland and in a small stream at Lummelunda, Gotland. Ingold (1942) and Ranzoni (1953) reported it as a common fungus. In Sweden it seems to be quite rare. If conidia occur in scum they are very sparse. They are mostly smaller than those described and pictured by Ingold, but there is no difference in morphology and development.

Mycelium hyaline, branched, septate. Conidiophore simple or mostly branched. Conidia (aleuriospores) hyaline, branched, septate with a strongly bent main axis, 50—100 µ long, 3—4 µ broad at its widest part, tapering towards the ends. Two divergent arms are formed, 20—

50 µ long, 2—4 µ broad at the base, tapering towards the end. The arms are not constricted at the base in contrast to those of *T. splendens*. The distance between the points where the arms are inserted is 10—25 µ. — Fig. 14.

Tricladium gracile Ing.

Trans. Brit. mycol. Soc. 27: 39—46 (1944).

T. gracile is the fourth species of the genus *Tricladium* that has been found and reported from Sweden. Single conidia were observed now and then in scum samples, but the fungus has been collected growing on leaves only once from a stream in Småland. Conidia of this species might be confused with such of *T. angulatum*. Conidia of the present fungus are however solitary, bigger and more slender with arms uniform in width.

Mycelium hyaline, branched, septate with hyaline, simple conidiophores. Conidia (aleuriospores) terminal, solitary, septate, consisting of a curved main axis, that is often bent threedimentionally, and two branches or arms. Main axis is 100—170 µ long, 2—3 µ broad in the middle, tapering towards the apex and slightly towards the base. Branches more or less straight, 50—90 µ long, 1—2 µ broad, not or slightly tapering. — Fig. 15.

The fungus shown in fig. 16 has been observed growing on decaying leaves in the river Fyris in Uppland. Conidia, however, occur frequently in scum samples from different types of streams. It does not fit to any described genus of Hyphomycetes and is certainly a new species. Until further material has been found I have only described it here without giving any name to it. R. H. Haskins (1958) described the new genus *Volucrispora*. The present fungus resembles to some extent fungi placed under that genus (Haskins 1958, plate 1, fig. 2). In conidia of species belonging to *Volucrispora* there is however a narrow isthmus between the basal part and the apical and lateral parts (arms). Conidia of *V.* are also smaller than in the present fungus. The here described fungus also resembles very much the twocelled "abnormal" conidium of *Articulospora moniliforma* described and pictured by Ranzoni (1955). Undoubtedly the same conidium was pictured by De Wildeman (1893) as a conidium of *Tetracladium marchalianum*.

Mycelium hyaline, septate. Conidophores hyaline, simple, very short. Conidia 20—25 µ long, consisting of a basal part, 8—12 µ long, 2—3 µ

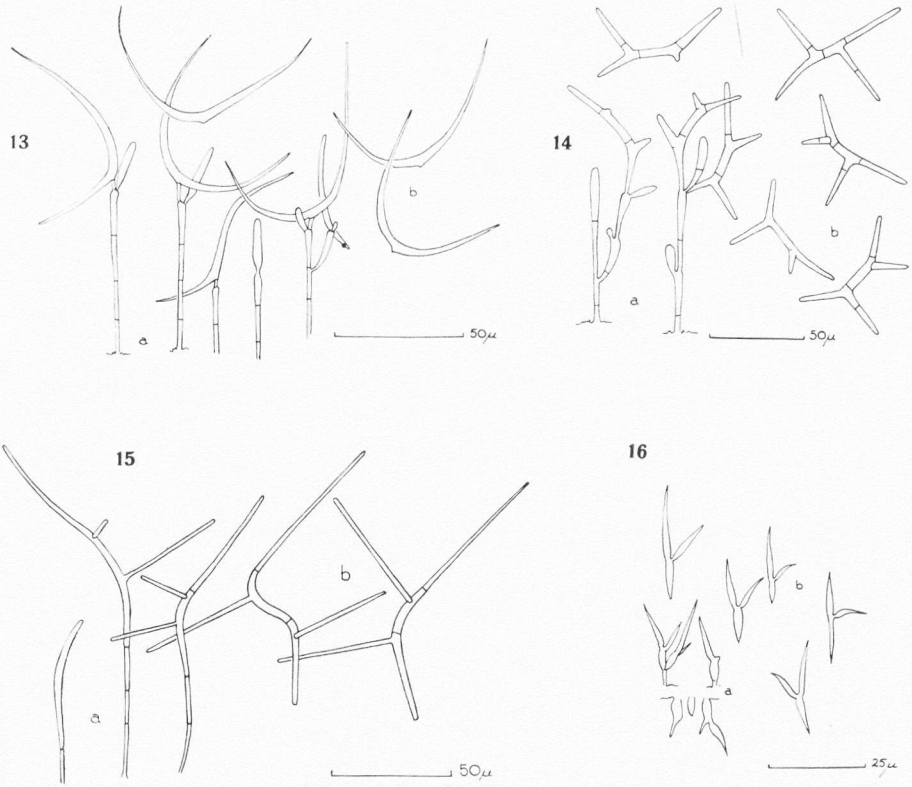

Fig. 13. *Lunulospora curvula*. a, conidiophores with conidia in development; b, conidia (aleuriospores). — Fig. 14. *Tricladium angulatum*. a, conidiophores with conidia in various stages of development; b, conidia (aleuriospores). Fig. 15. *Tricladium gracile*. a, conidiophores with conidia attached; b, conidia (aleuriospores). — Fig. 16. Unidentified species of aquatic Hyphomycetes. a, conidiophores with conidia attached; b, conidia.

broad, continuing in an apical arm, 8—15 μ long, 2—3 μ broad. A lateral branch is inserted to the side of the apical branch. The basal part and the branches are tapering very much towards their ends and their joining point. — Fig. 16.

Acknowledgement

The investigations have been carried out at the Institute of Systematic Botany, Uppsala. I wish to express my deep thanks to its Director, Professor J. A. Nannfeldt, for valuable advice. It is impossible for me to mention here all persons who have kindly placed valuable collections of leaves etc. to my

disposal. To Fil. kand. Ivar Ottosson, Uppsala, I am however indebted for rich collections of interesting material from Småland.

My investigations have been supported by grants from the Swedish Natural Science Research Council, Liljewalchs stipendiefond and the Faculty of Matematics and Natural Science of the University of Uppsala.

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Corrections

Following corrections are made to my previous paper (Sv. Bot. Tidskr. 1958: 2): p. 291 *Clavaripopsis*=*Clavariopsis*, p. 291 a.o. *Lemmeniera*=*Lemonniera*, p. 292 *Varicosporium elodae*=*Varicosporium elodeae*, p. 294 **Veuillemin**=**Vuillemin,** p. 302 *Magaritispora*=*Margaritispora*, p. 317 Ann. Soc. Belge Microsc. 27 and 29=17 and 19, p. 317 Trans. Brit. mycol. Soc. 25=Trans. Brit. mycol. Soc. 35.

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Chromosome Studies in Some Arctic Alaskan Leguminosae

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Within the arctic flora of North America a large number of species of Leguminosae has been described, the majority belonging to the genera *Oxytropis* and *Astragalus*.

On the Arctic Slope of Alaska the family has about 20 species, of which several are critical. Especially the genus *Oxytropis* seems to need a cytotaxonomical survey. In the summer of 1961 the author spent a part of his time collecting material for chromosome counting in some groups of flowering plants in arctic Alaska, and below is reported the chromosome number of 11 species of Leguminosae. Although this represents only a small contribution, these few counts reveal, that a cytotaxonomical investigation of this group may be rewarding.

The material for the present studies has with few exceptions been collected in the field, where root tips were fixed in Navashin-Karpeschenko's fixative. Slides were later prepared and stained in fuchsin at the laboratory in Copenhagen.

Astragalus alpinus L. 2n=32 (Fig. 1 a).

Material collected at Liberator Lake, De Long Mts., Brooks Range July 22. 1961. No. 906. Mitosis in RT showed 2n=32. The chromosomes of the species have previously been studied. Favarger (1949 and 1959) reports 2n=16 from two different localities in the Alps and 2n=32 for a population in Czechoslovakia. In North America both diploids and tetraploids have been found by Ledingham (1960). The tetraploid was found in Yukon, while three populations from southwestern Canada proved to be diploids. The large variation within this species is well known, and it should certainly be worth while to find out, if

there is a clear morphological variation corresponding to the chromosome numbers.

Astragalus lepagei Hult. 2n=32 (Fig. 1 b).

This species seems to be quite common in arctic Alaska occurring on rubble slopes. The material for chromosome counts was collected at Liberator Lake, Brooks Range. July 22, 1961. No. 904.

The chromosome number of this species seems not to have been reported previously. A related species, *A. aboriginorum,* which also occurs in NW North America, has been studied by Ledingham (1957), who reports n=8.

Astragalus polaris (Seem.) Benth. 2n=24 (Fig. 1 c).

A. polaris is a rare species in Alaska; it is usually growing on moist sandbars along rivers. A population at Feniak Lake, Noatak River drainage on the south slope of Brooks Range has been studied. Material collected August 1, 1961. No. 903. The chromosome number seems previously unknown.

Astragalus umbellatus Bunge 2n=16 (Fig. 1 d).

This quite common arctic American species has been studied by Ledingham (1960), who found 2n=16 in Alaskan material. I found the same number in plants from Liberator Lake, North Slope of Brooks Range. July 1961. No. 905.

Material from Siberia, collected at Tiksi near the mouth of Lena River, has been studied by Sokolovskaja and Strelkova (1960). Their material had also this number.

The closely related European species *A. frigidus*, has also 2n=16, reported by several authors (Cp. Löve & Löve, 1961).

Oxytropis koyukukensis A. E. Pors. 2n=48.

In his Flora of Alaska Anderson (1959, p. 322) refers, with some doubt, a number of specimens found on the North Slope of Brooks Range to *O. erecta* Kom. As appears in Hultén (1950, p. 1763) one of the specimens was collected by Spetzman at Umiat. The material for this study originates also from Umiat, where I collected it in August 1960. No. 60-1448, and it belongs without any doubt in the same taxon.

The problem on the existence of the asiatic *O. erecta* in Alaska has,

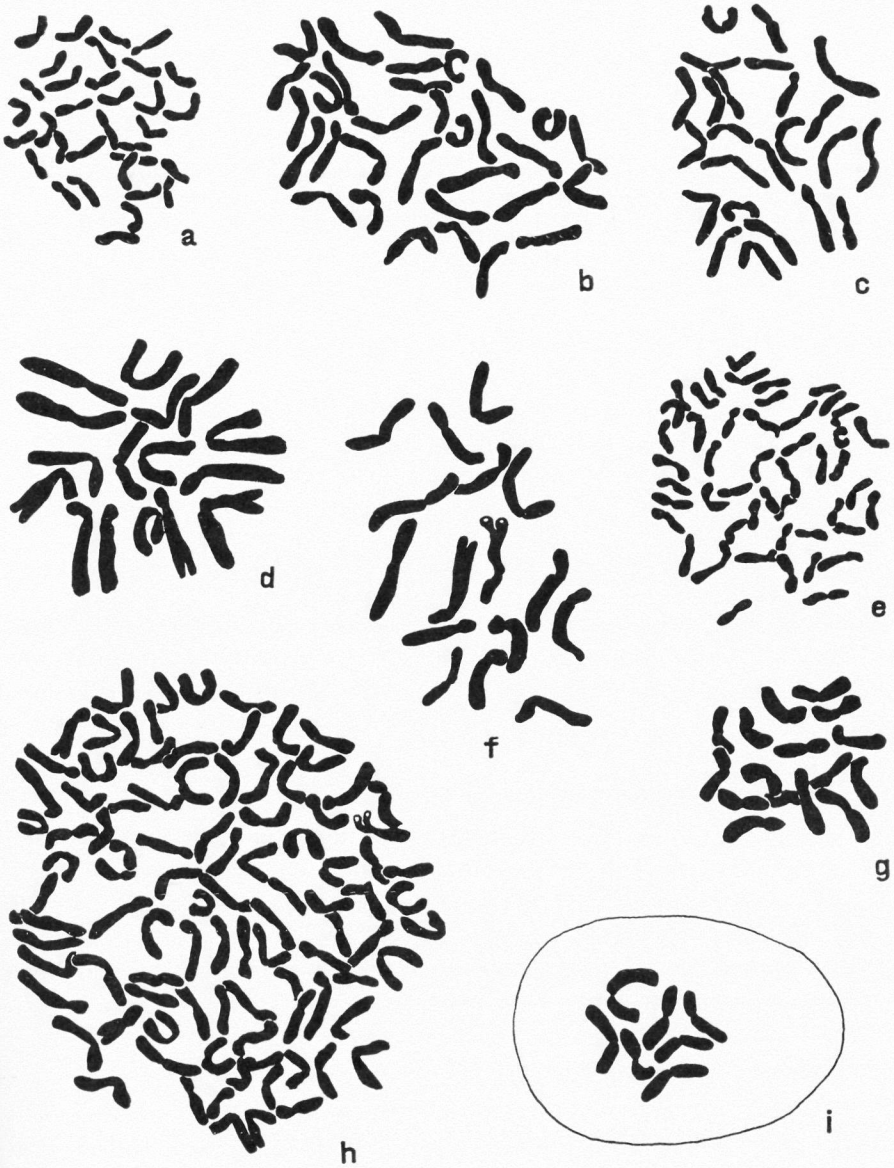

Fig. 1. a—h. Mitosis in RT. a. *Astragalus alpinus* — b. *A. lepagei* — c. *A. polaris* — d. *A. umbellatus* — e. *Oxytropis leucantha* — f. *O. mertensiana* — g. *O. nigrescens* — h. *O. maydelliana*. — i. Mitosis in pollen-grain of *Hedysarum alpinum*. Magnification: 3800×.

however, been solved by Porsild (1951). He demonstrates, that the Alaskan specimens belong to an undescribed species, different from *O. erecta,* and calls it *O. koyukukensis.* Seeds from my Umiat specimen were germinated in a glass-dish. Root-tips were treated in 8-hydroxyquinoline. Fixed in 30 % alcohol added 1 % lactic acid. Stained in fuchsin (Feulgen's method) and finally squashed in orcein-acetic-acid. It could be stated, that chromosome number of the mitosis was on the hexaploid level, most likely being 2n=48.

Oxytropis leucantha (Pall.) Bunge 2n=48 (Fig. 1 e).

One of the commonest species in arctic Alaska and often abundant in *Salix*-shrubs along rivers. The material studied here originates from Lake Peters in the eastern part of the Brooks Range. Collected July 9, 1961. No. 910. Mitosis in RT showed 2n=48. A related species, *O. viscida,* has according to Ledingham (1958) 2n=16, being diploid.

Oxytropis maydelliana Trautv. 2n=96 (Fig. h).

RT of this species were collected at Liberator Lake, North Slope of Brooks Range, July 22, 1961. No. 907. Chromosome number was difficult to state with certainty, but 2n=96 seems to be the most likely.

Oxytropis mertensiana Turcz. 2n=16 (Fig. 1 f).

This small and very characteristic species occurs in arctic Alaska often on sandbars. The chromosome number was determined on material from Feniak Lake on the South Slope of Brooks Range. July 30, 1961. No. 908. The species is diploid, 2n=16.

This number was previously found by Sokolovskaja and Strelkova (1960) in plants from Tiksi, Siberia.

Oxytropis nigrescens (Pall.) Fisch. 2n=16 (Fig. 1 g).

This species is very common on dry gravel bars and mountain slopes throughout arctic Alaska. Material for this study was collected at Feniak Lake, Brooks Range in the Noatak River drainage. August 2, 1961. No. 61-1442. The chromosome number 2n=16 seems hitherto unknown. It was determined from mitosis in RT.

The species is known to be very variable. In his Alaska Flora Hultén (1947) mentions three subspecies; of these the present plants are best referred to ssp. *bryophila* Hult.

Hedysarum alpinum L. n = 7 (Fig. 1 i).

The ssp. *americanum* (Michx.) Fedtsch. is common throughout Alaska. The material for this study was collected at Lake Peters in the eastern Brooks Range. July 5, 1961, No. 911. Flower buds were fixed, and the chromosome number n=7 was found in mitosis of pollen grains. The same ssp. was previously studied by Ledingham (1957), who also reported this number. In another subspecies, ssp. *sibiricum* (Ledeb.) Fedtsch. Larsen (1955) found the same number.

Lupinus arcticus Wats. 2n = 48.

Seeds of this species were collected at Umiat. Aug. 1960. RT from germinated seeds were fixed and studied. Mitosis showed 2n=48. This record seems new. According to existing chromosome lists 48 seems to be the commonest number in this genus. It is also the number of another, closely related, Alaskan species *L. nootkatensis* Donn (Cp. Löve & Löve, 1961).

The chromosome numbers of eleven species of Arctic Alaskan Leguminosae have thus been determined. Of these seven seem not previously known, i.e. *Astragalus lepagei* (2n=32), *A. polaris* (2n=24), *Oxytropis koyukukensis* (2n=ca. 48), *O. leucantha* (2n=48), *O. maydelliana* (2n=ca. 96), *O. nigrescens* (2n=16), and *Lupinus arcticus* (2n=48).

The species of *Astragalus* all belong to a series with the basic number x=8. These numbers support the ideas discussed in Ledingham (1960, p. 123—127). It has there been demonstrated, that as to the chromosome numbers the species of *Astragalus* of northern North America show a relationship to the species of the Old World, all or almost all having the same basic number (x=8). In the southern parts of the New World species with other basic numbers (as 11, 12 and 13) are prevailing, while species of the 8-series are rare.

Including the present counts all known chromosome numbers of the genus *Oxytropis* belong to an 8-series. There is accordingly still cytological evidence for the suggestions, that the genus *Oxytropis* is closer related to the species group of *Astragalus* having the basic number x=8, than to other species groups of this genus. And even that the *Astragalus* of the 8-series are closer to *Oxytropis* than to the other species of *Astragalus*. As *Oxytropis* seems to be a clear genus, the genus *Astragalus* consequently may need a division into more genera. This has from time to time been made, but it has not been accepted generally by the taxonomists.

Acknowledgements

I wish to express my gratitude to the Arctic Institute of North America, to the Arctic Research Laboratory at Barrow, and to Carlsbergfondet, Denmark for financial aid and facilities. And to Mrs. E. Jacobsen, Institute of Cytology, Copenhagen for valuable technical assistance.

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Från Lunds Botaniska Förenings förhandlingar 1961

16 februari. Amanuens Örjan Nilsson talade om olika svenska typer av släktet *Montia*.

Amanuens Kjell Georgson demonstrerade material av *Luzula congesta* och *Luzula multiflora* från Skåne.

Professor H. Weimarck talade om inventeringen av Skånes flora. När denna startade, 1938, avsåg man att den skulle genomföras på 10 år. Flera omständigheter, där både praktiska och vetenskapliga förhållanden spelat in, hade emellertid gjort, att det ursprungliga tidsschemat blivit förskjutet. Som en stimulans och kanske också som ett nödvändigt hjälpmedel för det fortsatta arbetet hade professor Weimarck för avsikt att utge en skånsk exkursionsflora, vilken demonstrerades i form av ett korrektur på fam. Juncaceae. Professor Weimarck redogjorde för principerna för florans utformning och uppställning, varefter följde diskussion kring dessa principer.

28 april. Docent Hans Luther, Helsingfors, höll föredrag om »Utskärskobbarnas flora i Tvärminne under ett halvsekel».

För studier över florans invandring är skärgårdsområden i Östersjön speciellt väl lämpade. Genom den fortgående landhöjningen nybildas små skär, som så småningom tillväxa till större holmar för att slutligen övergå till fastland. Med kännedom om den årliga landhöjningen kan en ös ålder bestämmas, vilket möjliggör jämförande studier av florans sammansättning på öar av olika ålder.

Utanför den biologiska stationen i Tvärminne vid Finska viken hade E. Häyrén vid seklets början undersökt floran på ett stort antal skär. Föredragshållaren hade under 1930-talet påbörjat en nyinventering av dessa skär, ett arbete som fullföljdes under åren 1948—49 och 1960. I en utförlig redogörelse visades de förändringar och växlingar som floran undergått inom området under dessa 50 år. De topografiska detaljerna på ett skär spelar stor roll för florans invandring och utveckling, t.ex. hällkar, som så småningom kan utfyllas och utvecklas till strandängsfragment. På större holmar växer hällkaren igen till hällkarsmyrar, vilka i sin tur genom ytterligare igenväxning övergår till rished. När risheden blivit dominerande på en holme kan träd börja invandra i större utsträckning.

Under 1950-talet har ett nytt element börjat uppträda på skären, nämligen sädesslagen havre och vete samt ogräsarter som *Lapsana communis* och

ruderatformer av *Plantago major* och *Polygonum aviculare*. Dessa arter har tillförts skärgårdsfloran av måsar som söker sin föda på minkfarmernas avfallshögar eller på andra avskrädeshögar. Som magborstare använder de härvid fruktställningar av sädesslag och ogräs. Måsarnas spybollar, som innehåller dessa fruktställningar, kommer härigenom att ingå som ett viktigt led i ett effektivt fröspridningssystem. (I övrigt hänvisas till H. Luther 1961, Veränderungen in der Gefässpflanzenflora der Meeresfelsen von Tvärminne. Acta Bot. Fennica 62.)

12—13 juni. Exkursion till Halland med amanuens Örjan Nilsson som exkursionsledare. I exkursionen deltog en större grupp danskar med professor Morten Lange i spetsen.

På väg norrut genom Halland gjordes ett kort uppehåll i Holm, där den sedan 1870-talet kända *Phyllitis scolopendrium*-lokalen besöktes. Brunnen, där hjorttungan växer, fyller numera ingen annan funktion än att vara ståndort för denna raritet. Ungefär en meter nere i brunnen satt de större exemplaren (ett tiotal) samlade, huvudsakligen på den åt söder exponerade sidan, längre ned såg man många småindivid (kanske ett par hundra).

Dagens huvudmål var Örmanäshalvön, där under en längre vandring hed- och hällmarker samt olika typer av strandvegetation studerades.

På hällmarkerna växte i torrare skrevor bl.a. *Silene rupestris, Spergula vernalis, Agrostis canina* ssp. *montana, Polytrichum piliferum, Cladonia impexa* och *Cornicularia aculeata.*

I fuktigare stråk mellan bergknallarna fanns en typ av fukthed med bl.a. *Calluna vulgaris, Erica tetralix, Salix repens, Potentilla erecta, Molinia coerulea, Trichophorum germanicum, Hypnum cupressiforme* och *Sphagnum compactum.*

I sandfläckar på klippgrund kunde man finna *Armeria maritima, Rumex tenuifolius, Sagina subulata, Scleranthus perennis, Viscaria alpina, Festuca ovina* och *Hypnum cupressiforme.*

Invid en hällyta på en fläck med åtminstone periodvis fuktig mark, som så gott som saknade annan högre vegetation, växte *Crassula aquatica* tillsammans med *Sagina subulata* och *Radiola linoides.*

Ett litet parti med sandstrand fanns också, där *Honckenya peploides* och *Cakile maritima* förekom nedanför dynerna, som kläddes med *Ammophila arenaria* och *Elymus arenarius.*

Längre ut på halvön fanns stora områden med klapperstrand. I nedre delen av denna sågs på en del ställen mycket vackra bestånd av *Crambe maritima.* I övre delen av klappern bildade *Hedera helix* stundom en matta över stenarna strax nedanför den slutna hedvegetationen. I den senare ingick *Juniperus communis, Calluna vulgaris, Empetrum nigrum, Armeria maritima, Campanula rotundifolia, Galium verum, Hieracium pilosella, Lotus corniculatus, Thymus serpyllum, Veronica officinalis, Agrostis canina* ssp. *montana, Deschampsia flexuosa, Festuca ovina, F. rubra, Dicranum scoparium* och *Cladonia silvatica.* I sluttningen mot en del kärrområden, i vilka *Carex elata* var rikligt förekommande, övergick den torra *Calluna*-heden i en fuktigare typ, där *Cornus suecica* ofta var allmänt företrädd. Från dessa fukthedsfragment

Fig. 1. Exkursionen i terrängen öster om Furåsen i Ölmevalla socken.

kan vidare nämnas *Juncus conglomeratus, Molinia coerulea, Nardus stricta* och *Trichophorum germanicum.*

Från Örmanäshalvön återstår att nämna dagens floristiska sensation: I kanten av ett albestånd kunde exkursionsledaren demonstrera ett 2 1/2 m högt exemplar av *Tilia platyphylla,* troligen ett stubbskott från ett gammalt träd (jfr medd. av Örjan Nilsson i Bot. Not. vol. 114: 4).

Första dagen avslutades vid Åsa, där *Lonicera periclymenum* blommade i klippbranten, och där tillfälle till jämförande studier av *Cotoneaster integerrimus* och *melanocarpus* gavs.

Övernattning skedde i Varberg.

Andra dagen bjöd först på en längre vandring i de inre, östligaste delarna av Ölmevalla sn, i området öster om Furåsen. Terrängen utgjordes av rundade urbergsryggar med större eller mindre svackor emellan. Berggrunden gick ofta i dagen i kala hällar; de lösa jordlagren var i regel så tunna att skogsväxten blev dålig eller ingen, och stora områden täcktes av ljunghed. I de blötare svackorna fanns en ofta ganska tuvig kärrvegetation med bl.a. *Myrica*

gale, Andromeda polifolia, Calluna vulgaris, Erica tetralix, Drosera rotundifolia, Narthecium ossifragum, Potentilla erecta, Viola palustris, Eriophorum angustifolium, E. vaginatum, Molinia coerulea, Leucobryum glaucum, Sphagnum-arter och *Cladonia impexa.*

Som ett exempel på ljungheden från detta område kan följande artlista från ett parti med halvmeterhög ljung anföras: *Juniperus communis, Rhamnus frangula, Rubus plicatus, Calluna vulgaris, Vaccinium vitis-idaea, Anemone nemorosa, Cornus suecica, Hieracium vulgatum, Hypericum maculatum, Potentilla erecta, Pteridium aquilinum, Solidago virgaurea, Trientalis europaea, Agrostis canina* ssp. *montana, Carex pilulifera, Molinia coerulea, Hypnum cupressiforme* och *Pleurozium schreberi.*

Vändpunkten för denna vandring över halländska fattigmarker utgjordes av en sydbrant, där floran företedde en påtaglig yppighet. En praktfull murgröna klädde en del av bergväggen och i och nedanför branten noterades bl.a. *Populus tremula, Sorbus aucuparia, Tilia cordata, Juniperus communis, Lonicera periclymenum, Prunus spinosa, Rosa canina, Asplenium septentrionale, A. trichomanes, Polypodium vulgare, Woodsia ilvensis, Alchemilla glaucescens, Clinopodium vulgare, Linaria vulgaris, Polygala vulgaris, Ranunculus bulbosus, Sedum rupestre, Trifolium medium, Verbascum thapsus, Viscaria vulgaris, Melica nutans* och *Poa nemoralis.*

Exkursionsbussen förde oss åter ut till havet, till ett strandparti vid en liten vik norr om Örmanäs säteri. *Carex paleacea* växte där.

Så avslutades andra dagens exkursion med en rundvandring kring Tjolöholm, där vegetationen stundom tedde sig mera naturenlig, stundom mera parkartad.

I en ängsskogslund med ask, bok, ek och lönn, *Melandrium rubrum, Stachys silvatica* och *Festuca gigantea* ingick även hästkastanj i trädskiktet.

Ormbunken *Dennstaedtia punctilobula* beundrades vederbörligen på den av exkursionsledaren tidigare upptäckta lokalen (jfr medd. av Örjan Nilsson i Bot. Not. vol. 109: 2).

Vandringen gick genom ekskog med *Quercus petraea, Convallaria majalis, Melampyrum pratense, Platanthera bifolia, Deschampsia flexuosa, Festuca ovina* och *Luzula pilosa.*

I parken kunde även sådana speciella parkinkomlingar, som *Luzula luzuloides* och *Poa Chaixii* demonstreras.

17 september. Exkursion till östra Skåne. Exkursionsledare: Amanuens Örjan Nilsson. Route: Lund—Sjöbo—Vanstad—Tranås—Fågeltofta—Kronovall—S:t Olof—Smedstorp—Listarum—Ö. Vemmerlöv—Rörum—S. Mellby—Kivik—Vitemölla—Ravlunda—Vitaby—Lund.

Dagens första anhalt gjordes vid Kronovall, där deltagarna plaskade omkring i kärr med ovanligt högt vattenstånd. I vegetationen ingick bl.a. *Achillea ptarmica, Cirsium palustre, Filipendula ulmaria, Geum rivale, Orchis incarnata, Peucedanum palustre, Potentilla erecta, Succisa pratensis, Triglochin palustre, Valeriana dioeca, Anthoxanthum odoratum, Briza media, Carex echinata, C. rostrata, Juncus conglomeratus, J. effusus, Molinia coerulea.*

I bokskogen i närheten fanns partier med en ganska rik örtflora, varifrån bl.a. noterades: *Aegopodium podagraria, Circaea lutetiana, Galium odoratum,*

Geum urbanum, Lamium galeobdolon, Melandrium rubrum, Pulmonaria officinalis, Stachys silvatica, Agropyron caninum, Festuca gigantea, Melica uniflora, Milium effusum och *Poa nemoralis.*

I Smedstorps sn c. 1,3 km NNO kyrkan besöktes en betesmark, som sträckte sig utmed en liten å. De öppna betesytorna avbröts här och var av buskage, enstaka träd eller lundfragment. I de senare kunde man hitta *Pulmonaria officinalis* ssp. *maculosa* tillsammans med bl.a. *Campanula trachelium, Lamium galeobdolon* och *Hedera helix.* I ett par grunda gölar i närheten av ån växte *Oenanthe fistulosa* och *Polygonum minus.*

För att belysa vegetationen på de torra backarna inom betesmarken kan nämnas *Anemone pulsatilla, Chrysanthemum leucanthemum, Cirsium acaule, Helianthemum ovatum, Hieracium pilosella, Senecio jacobaea, Thymus serpyllum, Agrostis tenuis* och *Festuca ovina.*

Vid Listarum i Smedstorps sn studerades floran på rullstensåsen. På det åsparti, som ligger söder om landsvägen, framträdde tydligt skillnaden i vegetation på nord- resp. sydsida. Åt söder fanns en torräng med bl.a. *Armeria maritima, Euphrasia brevipila, Filipendula vulgaris, Helianthemum ovatum, Peucedanum oreoselinum, Scabiosa columbaria, Viscaria vulgaris, Avena pratensis* och *Festuca ovina,* medan nordsidan hade ljunghedskaraktär med bl.a. ljung (*Calluna*), blåbär, *Campanula rotundifolia, Hypochoeris radicata, Lathyrus montanus, Potentilla erecta* och *Viola canina* samt som allmänt förekommande i bottenskiktet *Dicranum scoparium, Hylocomium splendens* och *Pleurozium schreberi.*

En del av åsen var trädbevuxen och i lundvegetationen här förekom *Quercus robur, Corylus avellana, Lonicera xylosteum, Ulmus scabra, Crataegus oxyacantha, Hedera helix, Anemone hepatica, Aegopodium podagraria, Campanula trachelium, Galium odoratum, Geum urbanum, Pulmonaria, Lamium galeobdolon* och *Mnium undulatum.*

Norr om Kivik nedanför (öster om) marknadsplatsen, där stora mängder sand och jord spolades ut vid ett skyfall sommaren 1960, kunde nykoloniseringen av dessa avlagringar studeras. Där växte t.ex. *Scirpus setaceus* och *Glyceria declinata.*

En halv kilometer norr om Ravlunda kyrka avslutades dagens botaniska övningar med *Ornithopus perpusillus,* som växte inom ett ljungdominerat område av en betesmark, där även *Hieracium pilosella, Lotus corniculatus, Trifolium arvense, Agrostis tenuis, Anthoxanthum odoratum, Festuca ovina, F. rubra, Hypnum cupressiforme, Cladonia impexa* och *Cladonia silvatica* förekom.

2 oktober. Professor, Dr K. H. Rechinger, Wien, höll föredrag »Über botanische Forschungen in Griechenland».

Med hjälp av kartbilder, där gränslinjer för olika arter inom ett släkte eller inom en artgrupp inlagts, demonstrerades Greklands växtgeografiska indelning. Särskilt framträdande var de förhållandevis skarpa gränslinjerna mellan olika ögrupper i Egeiska havet, t.ex. mellan Kykladerna och Turkiet. På en karta över endemer visade Kreta och kringliggande öar en särställning.

I en mera ingående skildring av några släkten berördes först *Verbascum,* vars

på fastlandet förekommande arter i mycket ringa utsträckning finns på de egeiska öarna.

Av släktet *Amaracus* finnes många endemiska arter i Grekland, och det är även representerat med en endemisk art på Cyrenaika i Nordafrika. Också andra ostmediterrana grupper har denna utbredningstyp.

Bilder från en botanisk forskningsresa visade ett tvärsnitt av grekisk flora och terräng. Från olika områden med serpentin visades vackra exempel på den ofta mycket speciella flora, som uppträder där, t.ex. *Onosma* och *Centaurea monacantha*. *Odontarrhena*, som är utmärkande för serpentin, kan uppträda även där inslaget av serpentin är ringa, exempelvis i flodtransporterat grus.

20 november. Revisionsberättelse föredrogs. Revisorerna föreslog full ansvarsfrihet för kassörernas och redaktörens förvaltning, vilket beviljades.

Till styrelse för 1962 valdes: Professor H. Weimarck, ordf.; docent O. Almborn, v. ordf.; fil. mag. J. Ericson, sekr.; fil. kand. H. E. Lindskog, v. sekr.; docent B. Lövkvist, fil. lic. S. O. Falk, fil. mag. S. O. Strandhede och fil. kand. F. Andersson genom omval, samt nyvaldes docent Börje Norén.

Till revisorer utsågs fil. lic. N. Malmer och fil. lic. S. Snogerup, samt som revisorssuppleanter docent P. Halldal och fil. mag. S. Pettersson.

Med anledning av en skrivelse från Skånes Naturskyddsförening diskuterades vilka områden vid Skånes västkust, som ur botanisk synpunkt kunde anses skyddsvärda.

Dr Ahmed A. Fadeel höll föredrag om »Chlorophyll formation and photosynthesis in roots».

Man har funnit att många växter bildar klorofyll i rötterna om dessa växer i ljus. Tillväxthämmande ämnen gynnar klorofyllbildningen hos rötter.

Genom att göra odlingsförsök med hela plantor kunde jämförelse mellan klorofyllhalten i blad och i rötter göras. Uträknat pr friskvikt var klorofyllhalten hos vete 40 gånger så stor i bladen som i rötterna.

Totalspektrum från blad och rötter jämfördes. De skillnader, som förekom, berodde i första hand på en högre halt av karotinoider i rötterna. En närmare analys av klorofyllspektra och karotinoidspektra från blad och rötter av vete visade, att rötterna innehöll två speciella pigment, som saknades i bladen.

För att få en uppfattning om klorofyllförande rötter kunde konstateras ha någon fotosyntes, hade jämförande undersökningar gjorts, dels med rötter innehållande klorofyll, dels med rötter, som saknade klorofyll. Dessa försök utvisade, att fotosyntesen hos belysta, klorofyllhaltiga rötter är av mätbar storlek. (Se i övrigt A. A. Fadeel, 1962, Physiologia Plantarum vol. 15.)

Fil. mag. Tore Karlsson höll föredrag om *Cladium mariscus* i Skåne. Jämför man utbredningen av *Cladium mariscus* i Skandinavien nu med dess kända fossila förekomster synes frekvensen av arten ha starkt avtagit. Under Ancylustid och under äldre Litorina-tid var *Cladium* lika vanlig i Skåne som den ännu är på Öland och Gotland, men efter subboreal tid är *Cladium* inte känd som fossil i lagerföljden från Skåne. L. von Post ansåg att det kontinentalare klimatet bidrog till minskningen av *Cladium* i subboreal tid.

Vid undersökning av de recenta skånska *Cladium*-lokalerna har det visat sig, att dessa, som har sin största frekvens i backlandet sydväst om Romeleåsen, till mycket stor del utgöres av gamla torvgravar. *Cladium* företer här god

vitalitet och fertilitet. På en del av dessa lokaler hade föredragshållaren gjort torvgeologiska studier. Genom att undersöka förekommande makrofossil hade modersamhällena, som bildat de olika torvlagren, kunnat fastställas. Och föredragshållaren kunde mycket vackert belysa utvecklingen från en igenväxande fornsjö med *Equisetum*-torv över stadier med högstarrtorv och *Sphagnum*-torv av rikkärrskaraktär till högmossetorv. I sistnämnda torvlager hade de torvgravar upptagits, som gett *Cladium* möjlighet att invandra.

14 december. Docent Bengt Pettersson, Uppsala, höll föredrag om »Kalkväxter i Sydeuropa och vid Östersjön», illustrerat av talrika färgbilder.

Autoreferat av föredragshållaren:

En del resultat och synpunkter från sex resor i Sydeuropa (Spanien, Sydfrankrike, Italien, Österrike, Jugoslavien) åren 1952—61 meddelades.

Inledningsvis diskuterades Frenzels schematiska översiktskarta över Eurasiens vegetationsregioner under den senaste högglacialen; det kunde anses säkert, att åtskilliga element i den sydsvenska kalkfloran (särskilt på Öland och Gotland) överlevt på Mellaneuropas tundror, såsom hävdats av speciellt Erdtman och Iversen. Att de sydsvenska kalköarna äger ett starkt inslag av sådana växter, beror på främst pedologiska faktorer, särskilt uppfrysningsfenomen, som skapar ytor fria för kolonisation av konkurrenssvaga arter, exempelvis *Artemisia oelandica* och *A. rupestris* (den senare även adventiv i Östfennoskandien).

Talrika arter (exv. *Schoenus ferrugineus, Orchis sambucina, Sesleria coerulea, Euphrasia salisburgensis*), vilkas utbredning är inskränkt till Europa, torde sålunda ha överlevt söderut inom denna världsdel. Den disjunkta utbredningen av *Globularia vulgaris* kan förklaras genom att arten tidigare haft en större areal.

Det är emellertid svårt att avgöra vilka arter det är som tillhört den ursprungliga floran och vilka det är som invandrat under senare tid. För kryptogamerna med sina lätta diasporer är en invandring möjlig under vilken tid som helst, exv. *Trochobryum* och de sydliga *Riccia*-arterna (*R. ciliata, R. ciliifera, R. subbifurca*). Särskilt gäller detta svamparna, exv. *Phlogiotis helvelloides* och *Tulostoma brumale*.

En del sydliga fanerogamer är säkert nyinvandrade, exv. *Potentilla bifurca* (från trakterna norr om Svarta havet). *Veronica praecox* och *Apera interrupta* kan ha kommit först under åkerbrukets tid, och inte heller för *Adonis vernalis* kan man bortse från kulturspridning. Strandväxten *Eryngium maritimum* har en kontinuerlig utbredning från Medelhavet till Sydskandinavien och kan, ehuru fullt spontan, ha invandrat successivt under postglacial tid — någon morfologisk skillnad mellan den sydspanska och den baltiska populationen har inte kunnat fastställas. I Sierra Nevada växer en närstående endemisk art.

Det sydspanska landskapet kännetecknas av långtgående ödeläggelse av skogslandskapet även i högre bergstrakter. Detta har medfört, att vissa arter, som är härdiga mot betesgång, exv. taggiga *Genista*-arter och *Erinacea pungens*, fått ökad utbredning. Dock finns skogsrester kvar av bl.a. *Pinus pinaster*- och *P. laricio*-skogar. Här växer en del sydsvenska kalkarter, exv. *Cephalanthera damasonium, C. rubra* och *Orchis spitzelii*. Den senare uppträder i en svagt

differentierad spansk form, som hittills benämnts *O. patens* var. *brevicornis*. Efter odling i Sverige kunde formens nära anslutning till *O. spitzelii* fastställas. I samband härmed visades en reviderad karta över utbredningen av *O. spitzelii*, som är avgjort mediterran.

Ståndortsbilder från skilda delar av utbredningsområdet visades. En följeväxt till *O. spitzelii* är ofta *Arctostaphylos uva-ursi*. I Jugoslavien hade fyra ståndorter undersökts och dessa skilde sig avsevärt från varandra, under det att artens morfologi förblev likartad och i stort sett överensstämmande med den svenska. Endast från Gotland är hybrider med *O. mascula*-komplexet kända. Den senare arten företrädes i de berg, som besöktes, oftast av ssp. *signifera* (*O. speciosa*), t.ex. i Bosnien och i Velebitområdet.

Orchis maculata coll. har i Bosnien en avvikande variationsamplitud. Den endemiska *O. bosniaca* tillhör det svårutredda *majalis-traunsteineri*-komplexet. För övrigt kunde tydliga morfologiska skillnader mellan nordiska och sydliga former observeras inom ett flertal arter, exv. *Orchis morio, O. militaris, O. ustulata, O. palustris* och *Anacamptis*. Utbrytningen av *Dactylorchis* ur *Orchis* torde vara olämplig av flera skäl.

Inom *Epipactis* hade former av *E. phyllanthes* coll. påträffats på flera lokaler i Jugoslavien. *E. atrorubens* är polymorf i de mediterrana bergen och uppträder i former, som bestämt avviker från de nordiska, bl.a. i Sydspanien och i Hercegovina (Prenj-massivet).

Inula ensifolia karakteriseras, såsom på Gotland, av morfologiskt tydligt skilda kloner, men den nordiska formkedjan avviker bestämt från den sydliga.

Inom *Euphrasia* hade *Angustifoliae*-gruppen studerats inom skilda delar av utbredningsområdet, särskilt den polymorfa *E. salisburgensis*. Gruppens former växer i Sydeuropa alltid på torr mark.

I Pyrenéerna hade såväl av blåsippa som gullviva påträffats former, som efter odling i Sverige visade sig vara markant skilda från de nordiska, och man kan dra den slutsatsen, att dessa arter inte är ekologiskt ekvivalenta inom utbredningsområdet. Betydelsen härav från växtsociologisk synpunkt diskuterades.

Från olika bergstrakter belystes även skilda former av kulturpåverkan, som dock mångenstädes upphört. Landskapet har därigenom erhållit nya drag, t.ex. genom skogsplantering och betesfred. Det kan inte betvivlas, att kulturfaktorerna bidragit till att skapa nya ekologiska nischer i landskapet, varigenom många arter vidgat sitt utbredningsområde.

JAN ERICSON

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Smärre uppsatser och meddelanden

Ett par skånska hieracier av dansk härkomst

Den inhemska skånska *Archieracium*-floran är som bekant ej särskilt artrik, i varje fall underlägsen grannprovinsernas (frånsett Bornholm). Av *Silvaticiformia* har hittills påvisats ett dussin, alla m.el.m. sällsynta. *Vulgatiformia* äro dubbelt så många, och dit höra de få som kvantitativt spela större roll (förutom *Hieracium umbellatum* L.), nämligen *H. cruentifolium* Dahlst. & Lüb., *H. pinnatifidum* Lönnr. och *H. vulgatum* (Fr.) Almqu. samt — åtminstone vad Söderåsen med grannskap angår — *H. austrinum* Stenstr. (=*H. scanicum* Dahlst. p.p.). De båda nämnda grupperna, liksom också de föga kända *Tridentata* (omkr. 10 småarter), företrädas i alla händelser mest av utposter från det övriga Götalands artbestånd. Man kunde ju tycka, att även danska småarter borde ha utposter i Skåne, helst som flera svenska därifrån övergått Sundet (exv. *H. cruentifolium*). Att utbyte skett även i motsatt riktning har dock ej hittills varit känt men framgår nu av det följande.

Under ett uppehåll i Åstorp den 30 juni 1961 gick jag över den invid köpingen belägna Björnekulla klint (=Söderåsens västra spets). Dess m.el.m. gräsrika kulturskog hyste rikliga *Vulgatiformia*, såvitt jag hann se dock endast *H. austrinum*, *H. pinnatifidum* och *H. vulgatum* samt en fjärde, mig obekant. Den utmärktes av något blågrön färg, långa syllika bladtänder och synnerligen små holkar, tätt klädda (liksom skaften) av långa men späda glandelhår.

Nedanför klinten fanns en annan för mig okänd, mångbladig och snarlik *H. macrotonum* Dahlst. men med nästan rent glandulösa holkar och svartgröna märken. Där jag först såg den (i gräsvall etc. kring landsvägen vid makadamfabriken), saknades bladrosett, men med väl bibehållen sådan växte densamma på järnvägsområdet (S om Åstorps bangård) samt — i mera småbladiga modifikationer — utmed en gångstig på torrt hygge längs kanten av det stora stenbrottet (bortåt folkparken). Även denna var tydligen en *Vulgatiformia* tillhörig småart.

När jag under hösten försökte bestämma dem, blev det strax klart, att båda måste vara för landet nya. Och jag resignerade, i tanke att de troligen voro inkomlingar — vilket ej motsades av lokalbeskaffenheten — och desto mer som jag i Åstorp såg ytterligare minst en adventiv småart av samma grupp (i den gräsklippta parkanläggningen intill viadukten, ej i bestämbart skick).

Emellertid gjorde jag för säkerhets skull en jämförelse med de danska småarter, varav Riksmuseet äger material, och då löstes frågan oväntat lätt. Den småholkiga från klinten befanns vara *H. subaustrinum* Keld & Wiinst. (Dansk

Bot. Arkiv 1926), medan den mångbladiga var *H. farumense* Dahlst. (Bot. Tidsskr. 1922). Den förra beskrives visserligen som mörkgrön (ej blågrön), men färguppfattningen kan ju vara subjektiv; identiteten är i varje fall klar. Arten är vitt spridd i Danmark, mera på Jylland än på öarna. *H. farumense* är endemisk på Själland med bl.a. en rik lokalgrupp i nordöst. Båda ha kartlagts av Wiinstedt (Bot. Tidsskr. 1939).

Upptäckten av dessa båda i Skåne kan ingalunda kallas överraskande men har ju visst intresse som den första i sitt slag. Särskilt utmed Söderåsen kan man troligen räkna med nya liknande fynd.

Emedan de flesta danska småarter klarlagts först i vår tid (efter 1920), torde sådana identifieringsförsök i övrigt knappast ha gjorts (frånsett »parkhieracier»). Det enda, jag f.ö. minns mig ha sett, är ett ark av »*H. luxurians* Wiinst.?» från en avskrädeshög i Ystads sandskog (1943 C. Sandberg, hb. Lund). Bestämningen är svårbestridd, men exemplaret kan lika väl vara en av ståndorten modifierad *H. pinnatifidum,* vilken den förra står mycket nära (om ens artskild?). Den anses endemisk på Bornholm.

Ett äldre, mindre lyckat försök har gjorts i Uppsala bot. museum, där en föregiven skånsk *cymosum*-form åsatts namnet *H. selandicum* (en själländsk småart). Bestämningen tillskrives H. Dahlstedt (1906), som dock ej själv har skrivit bestämningslappen. Denna väcker undran, ty växten är varken det ena eller andra. Den är visserligen rätt långhårig och saknar i det närmaste glandler (t.o.m. på holkfjällspetsarna), men den har ej heller några stjärnhår på bladen (frånsett stjälkbladets undersida). En så beskaffad svensk fibbla torde väl knappast existera; det är tvivelsutan en utländsk form av annan grupp. Arket, som tillhört herb. E. Fries, är efter vanligheten etiketterat av honom själv på äldre dagar och utan tidsuppgift (»Hieracium cymosum v. hispidum. Scania. Ifvö Sn.»). Den enda plats i Skåne, där Fries hade sett *H. cymosum,* var emellertid Råby backe i Ivetofta (Flora scan. 1835), och något senare besök i trakten gjorde han säkert aldrig. Från Råby föreligger ett gammalt ex. (taget av »v. Düben», hb. Lund), som bättre motsvarar vad Fries därifrån omtalar. Det är av S. Almquist bestämt till *H. stiptotrichum* Almqu. men synes mig snarare vara *H. setigeriforme* Dahlst. De s.k. småarterna av *H. cymosum* äro dock hos oss alltid svårbegränsade och föga enhetliga.

ERIK ALMQUIST

Juncus maritimus vid Skanör. En ny medborgare i Skånes flora

Som ledare för en av föreningen Landskrona-traktens natur anordnad ornitologisk exkursion till Falsterbo-Skanöområdet söndagen den 24 sept. 1961 vandrade undertecknad norrut på den sandrevel, som avgränsar havet från den långsmala lagunlika s.k. Flommen där innanför. Då vi passerat de sista badhytterna iakttog jag i Flommens här låg- och glesvuxna *Scirpus maritimus*-samhällen en högvuxen, mörkt grön *Juncus*-art, som jag inte kände igen. Den påminde i någon mån om *J. effusus* men hade mera oregelbundna och glesare tuvor samt en mattare grön stråfärg. Tiden medgav inte ett närmare studium på platsen, och därför stoppade jag ett strå av växten i fickan för bestämning vid hemkomsten. Det visade sig därvid, att växten var *J. maritimus* Lam., en

Fig. 1. *Juncus maritimus* vid Skanör. — Foto H. Weimarck 13/10 1961.

art, som enligt flororna inte var känd från Skåne och som i Hulténs (1950) atlas inte heller var markerad för vår provins. För att ytterligare kontrollera dessa uppgifter kontaktade jag därefter prof. Weimarck, Lund, som bekräftade att denna *Juncus*-art icke tidigare var funnen i provinsen, och då han personligen var intresserad av denna nya Skåne-art överenskoms, att vi tillsammans skulle besöka lokalen.

Tillsammans med fil. mag. Ebbe Kjellqvist genomfördes denna exkursion fredagen den 13 oktober, och vi konstaterade snart, att den nya Skåne-växten fanns på båda sidor om ovan nämnda lagun, Flommen, ehuru talrikast på den västra åt havet vettande sidan. Den växer i spridda, yngre och äldre tuvor på en flera hundra meter lång sträcka. På den västra, åt havet vettande sidan av »lagunen» noterades i allt 25 tuvor i olika åldrar, och mitt emot på inlandssidan ett 10-tal. I allt funno vi alltså ca 35 exemplar spridda vid Flom-

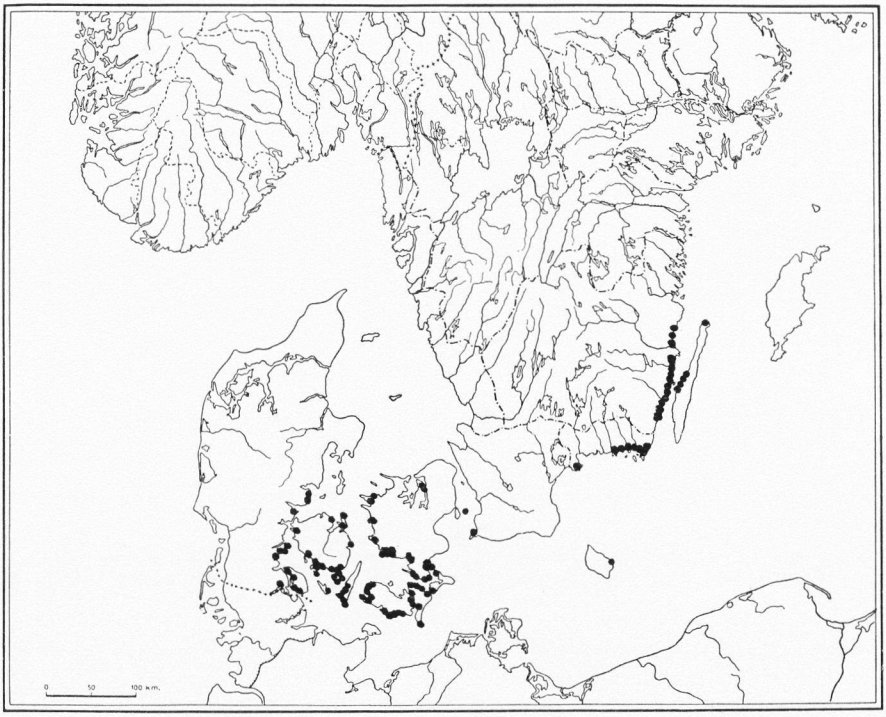

Fig. 2. *Juncus maritimus*' ungefärliga utbredning i Danmark och Sverige efter Hultén (1950) och Wiinstedt (1937), med tillägg av den nya lokalen vid Skanör.

mens stränder. De minsta av dessa plantor bestodo av några få, ca 25 cm höga skott, medan däremot den största och förmodligen äldsta tuvan på östra sidan bar 215 stjälkar och mätte ca 1 m i omkrets. Som medkomponenter i det *Scirpus maritimus*-samhälle vari *J. maritimus* växte noterades:

Agrostis canina L. ssp. fascicularis (Curt.) Hyl.
A. stolonifera L.
Artemisia maritima L. (enstaka)
Aster tripolium L.
Carex distans L. (enstaka)
C. extensa Good. (enstaka)
Cochlearia officinalis L. (enstaka)
Festuca rubra L.
Glaux maritima L. (talrik)
Juncus compressus Jacq.
J. Gerardi Lois. (talrik)
Lepidium latifolium L. (enstaka bestånd)
Phragmites communis Trin. (glesa, slutna bestånd)
Plantago maritima L. ssp. eumaritima Hyl.
Scirpus Tabernaemontani C. C. Gmel. (spridda bestånd)
Triglochin maritimus L.

Trots ivrigt sökande lyckades det oss icke att konstatera *J. maritimus* på övriga delar av området och icke heller på angränsande stränder. På återvägen besökte vi emellertid strandpartierna norr om Skanörs kyrka och här möttes vi av den verkliga överraskningen: *J. maritimus* i 100-tals, mestadels sammanhängande tuvor, delvis stående så tätt, att praktiskt taget ingen annan vegetation fick rum mellan dem.

J. maritimus-samhället har här etablerat sig i själva övergångsbältet mellan det högre liggande strandpartiet och vassamhällena där utanför. Med undantag för några enstaka tuvor på stranden i omedelbar närhet av moderbeståndet lyckades det oss inte, att upptäcka flera exemplar på de några hundra meter av strandremsan öster- och västerut, som vi undersökte. Kanske kommer undersökningar av kusten österut kring Höllviken och Foteviken och norrut att blotta ännu några bestånd eller enstaka tuvor.

Så återstår frågan varifrån och när växten har invandrat till halvön. Säkerligen har den direkt samband med artens danska utbredningsområde. *J. maritimus* är nämligen vitt utbredd på kusterna av södra och sydöstra Danmark. Närmaste förekomst är Saltholm, och det är antagligen just därifrån arten har invandrat till den närliggande kusten vid Skanör. Den har alltså i så fall ungefär samma invandringshistoria som den under senare tid till Skåne-kusten inkomna Saltholms-växten *Iris spuria* L. *J. maritimus* förefaller att fortfarande vara under spridning inom och utanför sedan gammalt kända utbredningsområden. Wiinstedt (1937) meddelar t.ex. »at den stadig, om end langsamt, foröger sit Omraade» och Sterner säger i sin Ölands-flora (1938): »Wahrscheinlich ist die Art neulich nach Öland eingewandert und verbreitet sich hier immerfort gleich wie am gegenüberliegenden Ufer des Kalmarsunds.»

Hur gammal *J. maritimus* är på sina nyupptäckta Skanör-lokaler är svårt för att inte säga omöjligt att avgöra. Det förefaller onekligen egendomligt, att den inte långt tidigare har upptäckts av de botanister, som strövat inom detta högintressanta område, så iögonfallande som arten är i fullvuxet tillstånd. Det stora beståndet på kusten norr om Skanörs kyrka tyder på, att växten kan ha funnits därstädes åtminstone under något 10-tal år, och därifrån har den förmodligen spritt sig till Flommen. De enstaka, delvis mycket unga tuvorna på Flommens stränder tyder i varje fall på sen och ännu fortgående invandring. Arten finnes inte upptagen i Gunnarssons (1932) ortsflora, något som kan tyda på, att den har invaderat Skanör-området någon gång på 1930-talet eller senare.

ARVID NILSSON

Citerad litteratur

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Dipsacus pilosus L. findes næppe i Sverige

Kort no. 1655 i E. Hultén's »Atlas över Växternas Utbredning i Norden», 1950, viser udbredelsen i Syd- og Mellemsverige af såkaldt *Dipsacus pilosus* L. De fleste af de iøvrigt fåtallige findesteder, der er angivet på kortet, er beliggende i Skåne — resten er i grove træk fra Väster- og Östergötland, Södermanland, Västmanland og Uppland. Alle forfattere af svenske floraværker, der nævner denne art, bemærker dog, at den er »införd», eller findes på »odlade ställen», »tomter», »snår», er »förvildad» o.s.v., man er altså klar over, at arten i k k e er s p o n t a n i Sverige.

En revision af herbariemateriale fra de Bot. Museer i Lund og Uppsala har givet til resultat, at det svenske materiale indsamlet under navnet »*pilosus*» udelukkende er identisk med arten *Dipsacus strigosus* Willd., der er hjemmehørende i Europæisk Ruslands sydl. og sydøstl. dele, i Kaukasus, Lilleasien, Armenien, Kurdistan—Iran (se Bobrov, Flora SSSR. *24*, p. 25, 1957). Den står nær *D. pilosus* og har således været kaldt *D. pilosus* var. *strigosus* Ledeb., men de to arter kan let adskilles på bl.a. følgende karakterer:

	D. strigosus	D. pilosus
Dimension af afblomstrede hoveder (diameter)	20—30 mm	12—17 mm
Avnernes form	Bredt omvendt-ægformede	Kileformede
Længden af avnernes brod	Længere end selve avnen	Højst så lang som selve avnen
Længden af avne+brod ..	15—20 mm	10—12 mm

Desuden er hos *D. strigosus* blomsterantallet og dermed antallet af avner pr. hoved større end hos *D. pilosus*, mens avnerne hos *D. pilosus* er forsynet med langt flere kambørster end hos *D. strigosus*, hvilket giver hovederne hos *D. pilosus* et mere låddent udseende.

D. pilosus er en centraleuropæisk-vestasiatisk art, der har en del af sin nordgrænse i Danmark, hvor den forekommer sparsomt på fugtig muldbund i skove på Øerne (se kort hos A. Hansen, TBU. 17, Bot. Tids. *47*, 1951 — en del af de anførte findesteder refererer sig dog til fund af *D. strigosus*). Den må således betragtes som fuldt spontan i Danmark, hvorfor Hylander's angivelse i »Fört. ö. Nordens Växter» 1955 er misvisende.

D. strigosus' optræden i Sverige er af gammel dato, første fund er således — efter det tilgængelige herbariemateriale — fra Lund 1836 (*D. pilosus* nævnes dog fra Lund allerede af E. Fries i »Nov. Fl. Svec.» VI, 1823). Følgende fund er registreret:

Skåne: L u n d, foreligger indsamlet med mange fund i perioden 1836—1934 (desuden et antal fund uden datoangivelse), findes dér stadigvæk; Y s t a d 1901 + et fund uden datoang.); M a l m ö 1902, 1909, 1916, 1929; Ö r t o f t a 1899, 1929; S v a l ö f 1911 (vägdike v. Utsädesföreningen); B o r r b y 1935; E s l ö v 1921; U p p å k r a 1957; N o s a b y 1925; S t e h a g 1946; S. Å s u m 1893; Å k a r p 1900; N. S k r ä f l i n g e 1897.

Gotland: Visby 1925, 1936, 1945.
Småland: Ljungbyholm 1934.
Halland: Varberg 1919.
Göteborg: Göteborg 1944.
Västergötland: Falköping 1937; Skövde 1915; Skara 1893, 1906.
Östergötland: Söderköping 1874, 1883, 1891, 1908; Skönberga socken 1898, 1909, 1923; Bosgård 1915, 1925.
Västmanland: Västerås 1917, 1925, 1955.
Södermanland: Mörkö socken 1934; Stockholm 1864, 1875.
Uppland: Uppsala 1862 (förv. i Bot. Trädg.); Drottningholm 1916; Lofö socken, Kersön 1916.
Gästrikland: Gävle 1898.

Arten ses således tydeligvis at være naturaliseret flere steder.

Den eneste oplysning i literaturen om plantens adventive forekomst i Sverige samt overhovedet som adventivart uden for sit spontane udbredelsesområde er formentlig citerede Bobrov, som kort anfører: Indslæbt til Sverige. Svensk herbariemateriale, formentlig af fundene i og omkring Lund, er sikkert engang tilgået russiske, botaniske Museer som bytte.

Hvordan arten i sin tid er kommet til Sverige, kan ikke afgøres. Den kan være forvildet fra dyrkning i haver, bl.a. i de botaniske haver i Lund og Uppsala, eller kan mere sandsynligt være indslæbt til havne- og jernbaneterræn med importerede varer, f.eks. fra Sortehavshavne. Nogle af de foran anførte findesteder refererer sig netop til havne og jernbaneterræn, således Västerås, Örtofta, Malmö og nogle af fundene fra Lund, men desværre mangler de fleste af herbariearkene nøjagtige biotopangivelser.

Arten er også konstateret indslæbt til Danmark. Der kendes ca. 20 fund med første fund i København 1880; den forekommer recent indslæbt, og adskillige fund blev gjort i 1961, alle med ruderatkarakter. I 1961 blev det også konstateret, at planten i vissen tilstand høstes, farves og bruges som prydgenstand ved juleudsmykninger. Dette faktum kan formentlig også have betydning for plantens fortsatte spredning, idet den er i stand til at modne sine nødder, som så kan spredes ved, at de tørre hoveder føres omkring. Den er hidtil ikke konstateret dyrket i Danmark.

I herbariet fra Uppsala ligger et eksemplar samlet i Velez Rubio v.f. Cartagena i Sydspanien 1833, i herb. tilh. Kiels Universitet's Bot. Inst. er fundet et ekspl. samlet ved Kiel (Holsten) 1907, men derudover kendes ingen angivelser af adventive forekomster i Europa. Planten er dog uden al tvivl indslæbt også til andre lande, men skjuler sig foreløbig under navnet *D. pilosus*.

Botanisk Museum, Gothersgade 130, København. K.

ALFRED HANSEN

Zusammenfassung

Dipsacus pilosus ist kaum in Schweden vorhanden

Es wird nachgewiesen, dass die Funde in Schweden, die bisher als *Dipsacus pilosus* bezeichnet worden sind, sich tatsächlich auf die Art *Dipsacus strigosus* Willd. beziehen. *D. strigosus* ist im südlichen Teil des Europäischen Russlands, in Kaukasus,

Kleinasien, Armenien und Kurdistan-Iran urwüchsig, ist aber längst nach Schweden (mit erstem Fund 1836) und nach Dänemark (mit erstem Fund 1880) als Adventivart eingeschleppt worden und jetzt stellenweise als naturalisierte Art zu betrachten. Ausser den Skandinavischen Funden ist die Art als Adventivpflanze bisher nur aus Süd-Spanien und Holstein (Kiel) bekannt. Aller Wahrscheinlichkeit nach ist sie jedoch in anderen Ländern Europas vorhanden, ist aber noch nicht als diese Art erkannt.

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Litteratur

Malmgren, Berndt: Introduktion till mikrobiologin. — Natur och Kultur, Stockholm 1961. 218 sid., 53 textfigurer. Pris: 15: 50 (häft.), 19: 50 (inb.).

Hawker, Lilian E., Linton, A. H., Folkes, B. F., and Carlile, M. J.: An Introduction to the Biology of Micro-organisms. — Edward Arnold (Publishers) Ltd. London 1960. VII+452 sid., 40 planscher+48 textfigurer. Pris: 35 shillings.

Böckerna här ovan dök upp på bokhandelsdisken förra året. Gemensamt för dem är att båda avser att tjäna som introduktioner till den snabbt växande vetenskapsgren, som mikrobiologin utgör. I övrigt skiljer de sig dock rätt avsevärt.

Professor Malmgren — förf. är professor i mikrobiologi vid Karolinska institutet i Stockholm — presenterar en stor mängd fakta på de 200 sidor hans bok omfattar. En inledande, 20 sidor lång historik över mikrobiologins historia följes av en utmärkt redogörelse för de mikrobiologiska arbetsmetoderna samt kapitel över mikroorganismernas systematik, fysiologi, genetik och »ökologi» — den korrekta termen är ekologi. Den systematiska framställningen är inte invändningsfri. Det ligger en betydande överdrift i påståendet, att det »föreligger nu en tendens» bland systematiker att i likhet med Haeckel vilja sammanföra så olikartade organismer som alger, svampar, bakterier och protozoer till ett enda rike, Protista. Det är inte mikroorganismernas systematiska samhörighet utan en rad andra faktorer, som gör mikrobiologin till en självständig disciplin. Bokens sista två kapitel innehåller en utförlig och mycket förtjänstfull redogörelse för problem rörande de patogena mikroorganismerna, deras aktivitet och virulens samt värdorganismens d.v.s. framför allt människans reaktioner vid kontakt med smittämne.

Inslagen av medicinsk mikrobiologi är starkt dominerande i denna bok. Den icke medicinska mikrobiologin är däremot påfallande vagt och ofullständigt behandlad. I det systematiska kapitlet ägnas t.ex. de humanpatogena protozoerna 6 1/2 sidor medan hela Fungi avfärdas på två sidor. Algerna klaras av på nio rader! I bjärt kontrast till den utförliga redogörelsen för de patogena bakterierna står den fragmentariska presentationen av mikroorganismernas mineraliseringsaktivitet. Det är i viss mån att beklaga att de medicinska aspekterna kommit att så starkt dominera framställningen, ty den läsekrets som boken i första hand vänder sig till — enligt förordet sådana »som med studentexamen som bakgrund för fortsatta studier vill orientera sig inom ämnesområdet» — kan få den uppfattningen att mikrobiologin främst är en medicinsk angelägenhet.

Den språkliga framställningen tynges något av mängden medicinska facktermer. Illustrationerna är däremot nästan genomgående av hög klass — några figurer har dock lånats från The Microbial World av Stanier, Doudoroff och Adelberg utan att källan angivits.

Bokens sista kapitel »Hur man studerar mikrobiologi» kräver en komplettering: Man kan studera mikrobiologi även vid Lunds universitet. Studiekursen avviker något från den som anges för Stockholms del. Då mikrobiologin i Lund är ett självständigt examensämne behövs ej här något särskilt tillstånd av Kanslern för att få medtaga ämnet i examen.

Om professor Malmgrens bok i första hand är en introduktion till den medicinska mikrobiologin riktar sig »An introduction to the biology of micro-organisms» främst till biologer med intresse för mikrobiologi. Denna bok är förvånansvärt innehållsrik och den ger avsevärt mer information än vad som kan väntas av en »general introduction to the morphology, physiology and ecology of the major groups of micro-organisms». För nybörjaren är boken en trevlig och lättläst introduktion till ämnet, av den mer avancerade specialisten kan den med fördel användas som en behändig uppslagsbok. Härtill bidrar den lista av referenser för vidare studier, som avslutar varje kapitel. Boken är delad i tre »Sections». I den första lämnas en utförlig redogörelse för morfologin och livscykelns förlopp hos bakterier, svampar, alger, protozoer och slemsvampar samt virus. I anslutning härtill ges en mycket god systematisk översikt. Den andra avdelningen behandlar mikroorganismernas fysiologi och metabolism och därmed sammanhängande problem. Under den tredje sektionen, Ecology of Micro-organisms, redogöres inte bara för markens, vattnets och luftens mikrobiologi utan där presenteras också mikroorganismerna som nyttiga symbioskomponenter och som skadliga parasiter hos växter och djur (inkl. människan). Dessutom ingår ett kapitel rörande födoämnesmikrobiologi och ett avslutande, komprimerat kapitel ägnas åt den industriella mikrobiologin.

Boken är redigt disponerad, framställningen är koncis och klar och illustrationerna mestadels utomordentliga. Vad kan man mer begära för det — numera — facila priset 29: 75.

BÖRJE NORÉN

I. M. VASILJEV: Wintering of plants. — American Institute of Biological Sciences, Washington 6, D.C. 1961. 300 sidor. Pris 8.50 $.

Det föreliggande arbetet är det första i en serie i U.S.A. utgivna översättningar av ryska botaniska avhandlingar. Redaktören för den engelska upplagan är Jakob Levitt, ett namn, som borgar för att översättningen ur facklig synpunkt bör vara perfekt. Levitt utgav 1956 en liknande monografi »The Hardiness of Plants». Denna upptager endast sådana ryska verk, som varit översatta till eller innehållit en sammanfattning på tyska, engelska eller franska, och han säger nu i sitt företal, att i inget annat land är lantbruksväxternas övervintring ett mera betydande problem än i Ryssland, och att detta resulterat i ett större antal uppsatser publicerade på ryska än på alla andra språk tillsammans under senare år.

Efter att ha läst företalen och sett den omfattande litteraturförteckningen,

som upptager 944 ryska författare och 350 övriga, som återfinnas i en särskild avdelning under rubriken »utländska författare», grips man givetvis av stora förväntningar, som mynnar ut i en förhoppning att här finna en stor mängd nya upptäckter och klarläggande av hittills dunkla punkter inom det besvärliga och svåröverskådliga område, som övervintringen utan tvekan utgör. Läsningen blir därför redan från första kapitlet både spännande och angenäm, icke minst tack vare den klara och lättfattliga framställningen. Härtill bidrager också förhållandet, att översättarna åstadkommit en ovanligt elegant (amerikansk) engelska.

Redan under 1700-talet förvånades vetenskapsmännen av det faktum, att vissa växter kunde överleva mycket låga temperaturer under själva övervintringsperioden, men att de blevo svårt skadade under den varma årstiden även vid temperaturer, som lågo föga under 0-punkten. Efter hand som den experimentellt grundade vetenskapen började utvecklas, började man få ett underlag, som kunde förklara omständigheterna kring köldskadornas uppkomst, men beträffande själva köldhärdighetens natur och vilka faktorer, som inverka vid köldhärdighetens utbildning, uppstod en livlig strid, som kan sägas ha fortgått ända tills i våra dagar, och i första hand kan sägas ha förorsakats av att man haft en allt för stor benägenhet att generalisera de resultat, som framkommit vid experiment med en eller ett fåtal närbesläktade växter, och att man i allt för hög grad tillskrivit härdigheten ett beroende av endast en eller ett fåtal faktorer. Även om denna fråga ännu är långt ifrån löst, föreligger dock nu så många fakta, att man lättare kan se sammanhangen och urskilja undantagen och sålunda diskutera vinterhärdigheten på ett annat plan än tidigare.

Vasiljevs bok består av tre delar. När man läst igenom del I, som handlar om olika orsaker till köldskador och utvintring samt faktorer, som ha samband därmed, och är dels beskrivande och dels historisk, finner man, att de ryska forskarna, enligt författarens framställning, kommit precis till samma punkt som forskarna på andra håll i världen vad beträffar den teoretiska förklaringen till köldskador och utvintring. Härvid blir man dock ej besviken utan snarare glad över att enighet tycks råda på denna punkt.

Del II är betitlad »Köldhärdighetens fysiologi hos växter», och här upprepas vissa saker som redan berörts i del I, men för övrigt är framställningen koncentrerad på härdigheten och dess beroende av olika faktorer såväl inre som yttre.

I sitt eget företal ägnar Vasiljev ett avsnitt till att lovprisa Michurin, och detta måste inge läsaren de värsta farhågor, vilka också delvis besannas i bokens tredje och sista del, som handlar om framställandet av vinterhärdiga former av växter. Om Vasiljev sålunda i de två första delarna visar att han är en framstående fysiolog, måste man till sin besvikelse konstatera, att han ej är genetiker och därför godtroget accepterat Lysenkos och Michurins befängda idéer rörande ärftligheten och dess natur.

Förmodligen har Vasiljev i första hand avsett att göra en handbok för lärare och studenter, och det kan utan tvekan medges, att han i så fall lyckats bra, eftersom framställningen är klar och enkel utan att fördenskull ha mindre värde för den på området mycket kunnige eller specialiserade.

BENGT LÖÖF

Notiser

Utnämning. Docent D. von Wettstein, Stockholm, har utnämnts till professor i ärftlighetslära vid Köpenhamns universitet.

Forskningsanslag. Statens naturvetenskapliga forskningsråd har i slutet av 1961 och början av 1962 utdelat — förutom en del anslag till fortsättning av tidigare understödda undersökningar — även följande belopp för botaniska undersökningar: Prof. G. Ehrensvärd och doc. S. Gatenbeck, Lund, 35.000 kr. för studier över enzymmekanismerna vid acetat- och propionatkondensationer i lägre svampar; prof. G. Erdtman, Solna, 6.000 kr. för deltagande i kongress och insamling av botaniskt material i Arizona; doc. M. Fries, Uppsala, 33.684 kr. för kvartärbotaniska forskningar på nordamerikanskt material och för undersökningar rörande svensk senkvartär vegetations- och klimathistoria; prof. N. Fries, Uppsala, 19.500 kr. för fysiologisk-genetiska undersökningar över svampar; doc. H. Hertz, Lund, 32.958 kr. för undersökning av den geoelektriska effekten, osmotiska vattentransporten och CO_2-halten i växter; doc. N. Hylander, Uppsala, 1.800 kr. för museistudier i Oslo, Köpenhamn, Lund och Helsingfors i samband med färdigställandet av Nordisk kärlväxtflora, del 2; doc. B. A. Kihlman, Uppsala, 11.076 kr. för undersökningar över effekten av strålning och radiomimetiska kemikalier på kromosomstrukturen; doc. G. Stenlid, Uppsala, 9.664 kr. för studier över flavonoida ämnens inverkan på högre växter.

Fonden för främjande av forsknings- och försöksverksamheten på jordbrukets område har i okt.—dec. 1961 utdelat bl.a. 35.000 kr. till veterinär G. Bengtsson och fil. lic. M. Jaarma, Stockholm, för undersökning av den joniserande strålningens groningshämmande inverkan på potatis, 20.000 kr. till Statens centrala frökontrollanstalt, Stockholm, och Lantbrukshögskolans institution för växtodlingslära, Uppsala, för inventering och beskrivning av landets flyghavretyper och studier av deras ogräsegenskaper, samt 15.000 kr. till Sveriges Utsädesförenings vete- och havreavdelning, Svalöv, för fortsatt undersökning av svartrost i havre.

K. Vetenskapsakademien har i jan. 1962 utdelat ett resestipendium om 6.400 kr. från J. A. Wahlbergs minnesfond till fil. mag. B. Nordenstam, Lund, för en botanisk forskningsresa till Sydafrika.

Från Magn. Bergvalls stiftelse har i jan. 1962 utdelats 3.600 kr. till fil. lic. Kerstin Gezelius, Uppsala, för undersökning av metabolismen hos de cellulära slemsvamparna, 10.000 kr. till agr. lic. L. Kåhre, Stockholm, för undersökning av mognadsförloppet hos vallväxtfrön, samt 8.000 kr. till fil. lic. V. Stoy, Svalöv, för undersökningar av fotosyntesen hos olika genotyper av vårvete. För »forskningar i genfysiologi och mutationer» har prof. Å. Gustafsson, och dåv. doc. D. v. Wettstein, Stockholm, av National Institute of Health, U.S.A., erhållit ett anslag å 90.000 dollar.