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# Rhodora

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## SYNOPSIS OF THE GENUS *LEPANTHES* IN MEXICO

RICHARD EVANS SCHULTES

and

GORDON W. DILLON

Prior to 1938, only four species of the orchidaceous genus *Lepanthes* were known to be native to Mexico. In 1938, Schultes described *Lepanthes Rekoii* from a Oaxacan collection and began a study of the numerous Mexican specimens of the genus in the Orchid Herbarium of Oakes Ames. The study was later carried out jointly by the two writers of this paper. Subsequent collections referable to *Lepanthes* were made in Mexico by Dr. H. Emery Moore of the Bailey Hortorium and by Dr. Robert L. Dressler, now of the Missouri Botanical Garden; several undescribed species were discovered in the Moore and Dressler collections and are herein described by Mr. Charles Schweinfurth and by Dr. Dressler.

Many of the specimens of Mexican *Lepanthes* are from the valuable collection of the late Mr. Erick Ostlund of Colonia del Valle, D. F. and Cuernavaca, Mexico. Four new species were found in the Ostlund collection, and sundry sterile specimens also preserved in his herbarium (now a part of the Orchid Herbarium of Oakes Ames) indicate that botanical explorations in central and southern Mexico, especially in Guerrero, Oaxaca and Chiapas, may yet increase the number of Mexican species.

In this paper, an enumeration of the Mexican representatives

of *Lepanthes* is given, together with a key to the recognised species, of which there are sixteen. Nine are herein described as new. The material on which the paper is based is preserved in the Orchid Herbarium of Oakes Ames.

*Lepanthes tridentata* Sw., a West Indian species, has been reported from Mexico, but we have omitted it in our enumeration, believing the report to have been based on the misidentification of a Galeotti specimen of *Pleurothallis disticha* (Linnaea 22 (1849) 820), a concept which, in this paper, is transferred to *Lepanthes*.

*Lepanthes turialvae* has sometimes been credited to the Mexican flora. This binomial refers to an extremely confused concept, so confused that the rejection of the name as a *nomen confusum* has been suggested (Schultes, R. E. in *Rhodora* 60 (1958) 97). No matter which of the several ways in which the binomial has been used be adopted, *Lepanthes turialvae* is definitely not represented in our material from Mexico.

Species of *Lepanthes* are found in both the Atlantic and the Pacific watersheds of Mexico in relatively high regions of the following states: Hidalgo, Mexico, Puebla, Vera Cruz, Oaxaca, Guerrero and Chiapas. It is noteworthy that, so far as is known, all the Mexican species are endemic with the exception of *Lepanthes acuminata* Schltr., *L. oreocharis* Schltr. and *L. Pristidis* Rchb.f. In general, the Mexican species show relationships with the Middle American representatives of the genus. In some cases, however, West Indian affinities are apparent.

It is very probable that additional species will still be discovered in Mexico. *Lepanthes* is well represented in Middle and South America and occurs throughout much of the West Indies. The number of species-concepts represented in Middle America is very large in comparison with the number in Mexico: in Costa Rica, for example, forty or more are recognised.

The northern limit of the genus in Mexico appears to be the State of Hidalgo, where Moore collected *Lepanthes avis* and *L. Moorei*.

## KEY TO THE MEXICAN SPECIES OF LEPANTHES

1. Peduncles conspicuously overtopping leaves.
    2. Sepals conspicuously ciliate. . . . . (15) *L. Schiedeii*.
    - 2a. Sepals eciliate.
      3. Leaves three or more times longer than wide. . . . . (9) *L. oreocharis*.
      - 3a. Leaves suborbicular to ovate-elliptic.
        4. Flowers large, almost equal to leaves (over 1.5 cm. long). Sepals, when spread, forming ellipse. . . (16) *L. tenuiloba*.
        - 4a. Flowers much smaller than leaves. Sepals, when spread, noticeably constricted at junction of dorsal with laterals.
          5. Lip trilobate. . . . . (14) *L. Rekei*.
          - 5a. Lip bilobate.
            6. Lobes of lip oblong and divaricate.
              7. Petal-lobes very unequal, without an apicule in sinus between them. . . . . (3) *L. avis*.
              - 7a. Petal-lobes subequal, with definite apicule in sinus between them. . . . . (4) *L. congesta*.
              - 7a. Lobes of lip cuneate and incurved. . . (10) *L. orizabensis*.
    - 1a. Peduncles shorter than leaves.
      8. Lip trilobate (middle lobe small, often an apicule).
        9. Petal-lobes conspicuously unequal.
          10. Petal-lobes with an apicule in sinus between them. Anterior lobe of petal obliquely deltoid. . . (2) *L. ancylopetala*.
          - 10a. Petal-lobes without an apicule in sinus between them. Anterior lobe of petal semiorbicular. . . (6) *L. Moorei*.
        - 9a. Petal-lobes subequal.
          11. Petal-lobes glabrous. Sepals ciliate. . . . . (12) *L. parvula*.
          - 11a. Petal-lobes papillose, especially along margin. Sepals not ciliate. . . . . (11) *L. papillipetala*.
      - 8a. Lip bilobate.
        12. Sepals usually long-acuminate. Lateral sepals recurved.
          13. Petal-lobes subequal. . . . . (1) *L. acuminata*.
          - 13a. Petal-lobes unequal.
            14. Posterior lobe of petal oblong; anterior lobe acuminate, shorter than posterior. . . (8) *L. Oestlundiana*.
            - 14a. Posterior lobe of petal falcate; anterior lobe suborbicular, larger than posterior. . . (13) *L. Pristidis*.
        - 12a. Sepals acute or obtuse, not long-acuminate. Lateral sepals not recurved.
          15. Petals ciliate; anterior lobe minute. . . . . (7) *L. nigriscapa*.
          - 15a. Petals eciliate; anterior lobe long. . . . . (5) *L. disticha*.
1. *Lepanthes acuminata* Schlechter in Fedde Repert. 10 (1912) 355.  
 Range: Guatemala, Honduras and Mexico (Chiapas). MEXICO: Dressler 1439.

2. *Lepanthes ancylopetala* Dressler, sp. nov.

Herbae epiphyticae, caespitosae, usque ad 4.5 cm. altae. Folia elliptica, usque ad 18 mm. longa. Inflorescentiae folio breviores. Flores succedanei, in racemis brevibus. Sepalum dorsale deltoideo-lanceolatum vel ovato-lanceolatum, acutum, 2-nerviium; sepala lateralialia usque ad medium vel ultra connata. Petala transverse bilobata, plusminusve sigmoidea; lobis posterioribus ligulatis vel lanceolatis, ca. 1 mm, longis, lobis anterioribus oblique deltoideis, quam posterioribus multo brevioribus. Labellum cum apiculo infracolumnari, lobis lateralibus ovatis, acuminatis, columnam amplectentibus.

Plant epiphytic, caespitose, 1.5-4.5 cm. tall. Secondary stem erect, monophyllous, 8-25 mm. tall, bearing 4-7 closely appressed sheaths, each with an ovate, acute, infundibuliform mouth; sheaths more or less hispidulose along nerves and margin. Leaves short petiolate, elliptic, tridenticulate apically, 3-5 mm. wide, 8-18 mm. long. Inflorescences 1-several per growth, 3-10 mm. long (peduncle 1.5-5 mm.), rarely equalling the leaf, flowers alternate, 2-ranked, successive. Bracts of inflorescence infundibuliform, .5-1.1 mm. long, acute, carinate, more or less hispidulose or hispid-villous; pedicel .6-1 mm. long, jointed to ovary which is .5-.8 mm. long. Flowers rose-pink. Dorsal sepal deltooid-ovate, acute, somewhat concave, 1.2-1.6 mm. wide, 2.2-2.5 mm. long, 3-veined; lateral sepals 2-veined, obliquely deltooid-lanceolate to ovate-lanceolate, acute, .8-1.3 mm. wide, 2.2-2.8 mm. long, connate for 1.1-1.6 mm. Petals transversely bilobed, with a tooth more or less conspicuously developed at the junction of the lobes, the posterior lobe much the larger, each lobe somewhat bent near the base, so that the petal is often somewhat sigmoid in form; posterior lobe .8-1 mm. long, .25-.45 mm. wide, ligulate to lanceolate, sometimes slightly falcate, acute to obliquely obtuse; anterior lobe obliquely deltooid, .2-.5 mm. long, acute or obtuse. Mid-lobe of lip an upcurved apicule beneath column, .15-.25 mm. long, lateral lobes clasping column, ovate, acuminate and incurved anteriorly (more or less comma-shaped), .35-.6 mm. wide, .7-.8 mm. long. Column .6-.85 mm. long, dilated above.

MEXICO: Estado de Chiapas, Municipio de Ocosingo, Laguna Ocotál Grande, about 25-30 km. southeast of Monte Libano. Alt. about 950 m. "Karst topography. Epiphytic on small mossy trees in pine forest, also (but less common) on trees along lake shore and in upper branches of tall tropical evergreen forest; flowers rose-pink." July 20-August 20, 1954. *Robert L. Dressler 1475* (TYPE in Herb. Ames 69093).

This species is similar in habit to *Lepanthes stenophylla* Schltr. and *L. oreocharis* Schltr., but it is readily distinguished by its very unequal petal-lobes; it is also a smaller plant. Other species,

such as *Lepanthes nigriscapa* and the related *L. inaequiloba* A. & S., have very unequal petal-lobes; but the petals of these species are of a different shape, and the plants are of quite different habit.

The specific epithet refers to the "bent petal" which is characteristic of the species.

3. *Lepanthes avis* Reichenbach f. Xen. Orch. 1 (1856)  
144, tab. 50, II, 5-7.

Range: Mexico (Vera Cruz, Hidalgo). MEXICO: Moore 5288; Smith 341; von Kirchmar s. n. (Record from the Reichenbach Herbarium (TYPE)).

4. *Lepanthes congesta* R. E. Schultes, sp. nov.

Herbae epiphyticae, caespitosae, usque ad 4 cm. altae. Caules secundarii erecti, numerosissimi, vaginalium ostiis et nervis minute hispidulis. Foliolum rotundato-ellipticum, leviter marginatum, obtusum vel subacutum. Inflorescentiae folium multo superantes, congestiflorae. Flores minimi, succedanei. Sepalum dorsale valde cucullatum, late ovatum, acuminatum, 3-nerviolum. Sepala lateralia usque ad medium connata, ovata, apice subacuminata, 2-nervia. Petala transverse bilobata, inter lobos cum apiculo; lobus posterior oblongus, margine integro; lobus anteriores minores sed similes. Labellum bilobatum, lobo utroque oblongo vel obovato; apice rotundato, incurvato. Columna superne dilatata.

A caespitose, epiphytic herb up to 4 cm. high. Secondary stems erect, very numerous, concealed by several closely appressed hyaline sheaths, each of which terminates in an infundibuliform mouth; sheaths hispidulous along the nerves and on the thickened margin of the mouths. Leaves round-elliptic, marginate, obtuse or subacute, 8-9 mm. long, 6-7 mm. wide. Peduncles much longer than the leaves. Flowers many, borne in succession in very congested racemes. Lateral sepals about 2 mm. long, 1.1 mm. wide, connate for more than half their length, ovate but apically acuminate-acute, 2-nerved. Dorsal sepal cucullate, about 2 mm. long, basally 1.2 mm. wide, broadly ovate, 3-nerved. Petals transversely bilobed, with an apicule between the lobes; the posterior lobes oblong, the margin entire, 1 mm. long, 0.5 mm. wide; the anterior lobes about 1 mm. long, 0.3 mm. wide. Lip bilobed, each lobe oblong or obovate with an incurved, rounded apex, 0.8 mm. long, 0.3 mm. wide. Column 1-1.2 mm. long.

MEXICO: Estado de Vera Cruz, Orizaba. "On oak trees". May, 1905, C. A. Purpus 1355 (TYPE in Herb. Ames 67044).

There has long been indecision as to the proper identification

of *Purpus 1355*. Mr. A. A. Eaton, in the first decade of this century, studied the collection, made a sketch of the flower and wrote that the plant "agrees in essentials with *Lepanthes avis* but usually has more than one or two peduncles and there are discrepancies in detail of the flower; but as Reichenbach's drawings in *Xenia* are evidently poor, drawn apparently by someone who did not know just what to represent, I think this may safely be called *L. avis*. Column agrees well."

In 1939, Schultes studied the collection and expressed doubt that it could be referable to *Lepanthes avis*.

There can be little uncertainty that, in *Purpus 1355*, we are dealing with a concept hitherto undescribed. There are a number of points of disagreement with *Lepanthes avis*, to which it seems to bear closest affinity. *Lepanthes congesta* has longer spikes, very much exceeding the leaves and usually has many more flowers. There are, furthermore, three or four inflorescences arising together, not, as in *Lepanthes avis*, singly or rarely in pairs. *Lepanthes congesta* has flowers which are yellow, not red and white as in *L. avis*. The lip of *Lepanthes congesta* is not divaricate but is, on the contrary, very strongly inturned at the tip of the lobes. Perhaps the difference of greatest degree is to be found in the petal, for while *Lepanthes avis* has (according to Reichenbach's figure) very unequal lobes, those of *L. congesta* are subequal with a definite apicule in the sinus between them.

5. *Lepanthes disticha* (Rich. & Gal.) Garay & R. E. Schultes, comb. nov.

*Pleurothallis disticha* Richard & Galeotti in Ann. Sci. Nat., sér. 3, 3 (1845) 16.

For more than a century, this obscure concept was included in the genus *Pleurothallis*. Recent investigation, however, has shown it to belong definitely to *Lepanthes*.

The accompanying plate of *Lepanthes disticha* was prepared from Nagel et Monzón 6754.

6. *Lepanthes Moorei* C. Schweinfurth, sp. nov.

Herba epiphytica, pusilla, caespitosa. Caules tenues, plusminusve



erecti, vaginis pluribus arcte tubulatis omnino obtecti. Folium breviter petiolatum; lamina elliptica vel ovato-elliptica, subacuta vel subacuminata, basi cuneata. Inflorescentia saepissime unica, supra dense paucivel multiflora, quam folium brevior. Flos parvus, ut in genere membranaceus. Sepalum dorsale late ovatum, abrupte acutum. Sepala lateralialia oblique ovata, abrupte acuta, per medium inferiorem connata. Petala transversa, in circuitu oblique ovato-lanceolata. Labellum trilobatum, comparate magnum, lobis lateralibus triangulari-lanceolatis, incurvis, columnam excedentibus.

Plant epiphytic, small, slender, caespitose, up to 7 cm. high. Roots fibrous, glabrous, relatively stout. Rhizome abbreviated. Stems congested, very slender, erect or lightly arcuate, entirely concealed by 8 or less close tubular sheaths which are finely muriculate along the nerves and terminate in an ovate marginate hispid mouth, up to 5.5 cm. long (very variable in height). Leaf solitary, terminal, erect, spreading, shortly petioled; lamina elliptic or ovate-elliptic, sub-acute to short acuminate with a tridenticulate apex (when mature), cuneate at base, up to 2.1 cm. long and 1 cm. wide, chartaceous in the dried specimen. Inflorescences solitary (very rarely paired), more or less shorter than the leaf, densely 2- to many-flowered, up to 1.8 cm. long. Floral bracts congested, distichous, infundibuliform. Flower very small, membranaceous, column orange with red blotches. Sepals connate as in the genus, glabrous. Dorsal sepal broadly ovate, abruptly acute, 3-nerved below the middle, about 3 mm. long and 2.4 mm. wide. Lateral sepals obliquely ovate, abruptly acute, connate up to the middle, 2-nerved, about 2.8 mm. long (from the apex to the base of the column) and 1.8 mm. wide where broadest. Petals transverse, obliquely ovate-lanceolate in outline, minutely cellular-pubescent on the margins, about 1 mm. long and 2 mm. wide; posterior lobule relatively large, obliquely ovate-triangular, obtuse; anterior lobe very short, semiorbicular. Lip adnate to the lower part of the column, 3-lobed; lateral lobes relatively large, obliquely triangular lanceolate, incurved, obtuse, peltate, about 1.8 mm. wide above; mid-lobe minute, hirsute, apparently deciduous. Column arcuate-decurved, shorter than the lip, with an enlarged, subquadrate, 3-dentate rostellum.

MEXICO: Estado de Hidalgo, Distrito de Zacualtipán. "Slopes of ravine with pine-oak and moss-covered beech-magnolia woods. To the left of road beyond Rancho El Reparo, about 6.1 miles on road from Zacualtipán to Tlahuelompa." Alt. about 2000 m. October 14, 1949, H. E. Moore, Jr. 5289 (TYPE in Herb. Ames No. 65879).

This species differs from *Lepanthes inaequiloba* A. & S. in its slender aspect, with differently proportioned petals and larger lip.

7. *Lepanthes nigriscapa* R. E. Schultes & Dillon, sp. nov.

Herbae epiphyticae, caespitosae, usque ad 15 cm. altae. Caules secundarii erecti, plusminusve septemvaginati, vaginarum infundibuliformium ostiis hispidulis. Folia elliptica, obtusa, apice tridentata. Pedunculi foliis breviores vel subaequales. Flores pauci in racemis abbreviatis. Sepalum dorsale late lanceolatum, obtusum, 3-nerviium. Sepala lateralia usque ad medium connata, late lanceolata, obtusa, 2-nervia. Petala late elliptica, transverse bilobata; lobi posteriores late elliptici, ciliati in margine exteriori; lobi anteriores minuti, obtuse triangulares. Labellum bilobatum, lobo utroque dolabriformi, apice rotundato incurvo, in sinu incisura triangulari. Columna sursum dilatata.

A caespitose, epiphytic herb up to 15 cm. high. Secondary stems up to 11 cm. long, strong, erect, concealed by about 7-8 closely appressed, somewhat coriaceous sheaths, each of which terminates in an infundibuliform mouth. Sheaths hispidulose along the prominent nerves and on the thickened margins of the mouths. The uppermost sheath enclosing the petiole of the leaf. Leaves 4.5 cm. long and 1.5-2 cm. wide, elliptic, obtuse, tridentate at the apex. Peduncles not over-topping the leaves. Flowers few, borne in succession in abbreviated racemes. Lateral sepals 2.3 mm. long, about 1-1.3 mm. wide, connate for more than half their length, broadly lanceolate, obtuse, 2-nerved, the inner nerve more prominent. Dorsal sepal broadly lanceolate, obtuse, 2.5 mm. long, 1.5 mm. wide, 3-nerved. Petals transversely bilobed, broadly elliptic in outline, 2.2 mm. wide; the posterior lobe broadly elliptic, 1.9 mm. wide and 1 mm. long, ciliate along the outer margin; the anterior lobe very minute, 0.3 mm. wide, obtusely triangular. Labellum bilobed, each lobe dolabriform with a rounded, strongly incurved apex, 1 mm. long, with a slight triangular indentation in the sinus. Column dilated upwards. The sepals are yellow, and the petals and lip are red.

MEXICO: Estado de Oaxaca, Pacific slopes, northwest of Pluma Hidalgo. "Epiphytic on trees along river near the coffee plantation Copalita." Alt. about 1100 m. October 19, 1936, Nagel & Juan G[onzález] 6441. (TYPE in Herb. Ames 51713).

Future collections may indicate that *Lepanthes nigriscapa* should be treated as a variety of *L. inaequiloba* A. & S. The former has flowers which are only half as large as those of the latter and petals which are ciliate, not glabrous.

PLATE 1235. LEPANTHES NIGRISCAPA Schultes & Dillon. 1, plant, natural size. 2, flower, enlarged five times. 3, petal, enlarged ten times. 4, lip, enlarged fifteen times. — LEPANTHES OESTLUNDIANA Schultes & Dillon. 5, plant, natural size. 6, flower, enlarged five times. 7, petal, enlarged ten times. 8, lip, enlarged twenty times. DRAWN BY G. W. DILLON.

LEPANTHES

*nigriscapa* Schultes & Dillon



*L. Oestlundiana*

Schultes & Dillon

*Lepanthes nigriscapa* seems to be related to *L. hondurensis* Ames of Honduras, differing from it in part by having smaller flowers with obtuse (instead of acuminate) sepals. The petals of the two species differ very markedly. The structure of the column is similar in both species. While the lips are similar, that of *Lepanthes nigriscapa* lacks the apicule in the sinus which is found in *L. hondurensis*. Vegetatively, *Lepanthes nigriscapa* and *L. hondurensis* are very similar, but the latter has more numerous and more closely placed sheaths than the former, and its leaves tend to be acuminate.

The lip of *Lepanthes nigriscapa* resembles that of *L. cascajalensis* Ames of Costa Rica in being deeply bilobed with inturned apices, but the lobes of *L. cascajalensis* are flat, bearing no thickened ridge. The petals of *Lepanthes cascajalensis* are broader, while the sepals are broader and more acuminate. The column differs markedly. Vegetatively, the two species are very distinct. With the exception of the lip, there is little to point to a relationship between *Lepanthes nigriscapa* and *L. cascajalensis*.

#### 8. *Lepanthes Oestlundiana* R. E. Schultes & Dillon, sp. nov.

Herbae epiphyticae, laxae caespitosae, usque ad 14 cm. altae. Caulis secundarii erecti vel leviter patuli, multivaginati, vaginarum infundibuliformium ostiis hispidulis. Folia ovato-elliptica, acuminata, apice tridentata. Pedunculi foliis breviores vel subaequales. Flores pauci in racemis abbreviatis. Sepalum dorsale ovatum, valde acuminatum, 3-nerviium. Sepala lateralia ovata, usque ad medium connata, acuminata, 2-nervia. Petala eciliata, transverse bilobata, late lanceolata, lobis posterioribus oblongis, lobis anterioribus multo minoribus. Labellum unguiculatum, bilobatum, lobo utroque malleoliformi, eciliato, ovato, apice acuminato. Columna tenuis, sursum dilatata.

Plants loosely caespitose; epiphytic herbs up to 14 cm. high. Secondary stems erect or slightly spreading, up to 9.5 cm. long, concealed by about 6-9 closely appressed, more or less coriaceous, blackish sheaths each one of which terminates in an infundibuliform mouth. Sheaths hispidulose along the prominent nerves and on the thickened margin of the mouth; uppermost sheath enclosing the petiole of the leaf. Leaves broadly elliptic-ovate, abruptly acuminate, prominently tridentate at the apex, up to 4.5 cm. long and 2 cm. wide. Peduncles not overtopping the leaves. Flowers few, borne in succession in abbreviated racemes. Dorsal sepal 3 mm. long and 1.5 mm. wide, broadly ovate, strongly acuminate, 3-nerved. Lateral sepals 3 mm. long and about 1.2 mm. wide, connate

for about half their length, ovate, strongly acuminate, 2-nerved with the inner nerve more prominent. Petals 2.4 mm. wide, transversely bilobed, broadly lanceolate in outline, eciliate. Anterior lobe of petals 0.7 mm. long, 1.5 mm. wide, oblong. Posterior lobe much smaller, 0.9 mm. wide. Labellum 1 mm. wide, unguiculate, bilobed, each lobe malleoliform, eciliate, ovate in outline, with a prominent central ridge or fold, the apex acuminate and slightly incurved. Column very slender, dilated upwards. Sepals and labellum pale green; petals yellow and red.

MEXICO: Estado de Vera Cruz, Zacuapam. "Epiphytic on trees in damp and shady places near a brook in virgin forest." Alt. about 2925 m. February 12, 1932, *Otto Nagel 2637* (TYPE in Herb. Ames, 51708).

*Lepanthes Oestlundiana* seems to be related to Schlechter's *L. scopula*, a native of Middle America. There is a drawing of the type of *Lepanthes scopula* in the Ames Herbarium. The leaves of *Lepanthes Oestlundiana* are more constantly acuminate, the sepals are more acuminate, the lip has broader lobes of a slightly different shape than the corresponding parts of *L. scopula*. The posterior lobe of the petals of *L. scopula*, furthermore, is strongly retrorse, while that of *L. Oestlundiana* is characteristically retrorse. However, the relationship between these two species, is close.

*Lepanthes Oestlundiana* is related also to *L. nigriscapa* from the Pacific slopes of Oaxaca. The petals of both species have the same general pattern. The posterior lobes of the petals of *Lepanthes Oestlundiana* are oblong and eciliate, while those of *L. nigriscapa* are broadly elliptic and ciliate on their outer margin. The anterior lobe of the petals of the former is oblong, of the latter obtusely triangular. The sepals of *Lepanthes Oestlundiana* are ovate and strongly acuminate, those of *L. nigriscapa* are elliptic and obtuse. The lips, while of the same general pattern, differ in that the lobes of the lip of *Lepanthes Oestlundiana* bear a central ridge or fold while in *L. nigriscapa* the ridge is almost marginal. The apices of the lobes of the lip of the former are acute and eciliate, those of the latter are obtuse and coarsely ciliate. *Lepanthes Oestlundiana* has broadly elliptic-ovate leaves with prominently tridentate apices, while in *L. nigriscapa* the leaves are elliptic with the tridentation of the apices less marked. These differences, though constant and

certainly of specific importance, nevertheless are not great, and it is clear that the two species are very closely related. This close relationship assumes additional significance when it is emphasized that *Lepanthes Oestlundiana* is a plant of the Atlantic watershed of Vera Cruz, while *L. nigriscapa* grows on the Pacific watershed of Oaxaca.

We take pleasure in naming this species in memory of the late Mr. Erik Ostlund from whose large herbarium of orchids this collection came.

9. *Lepanthes oreocharis* Schlechter in Fedde Repert. 10  
(1912) 483.

Range: Guatemala and Mexico (Chiapas, Guerrero). MEXICO: *Matuda 1688*; *Juan G[onzález] 1060*; *G. B. Hinton 1744*; *Wendt s. n.* (TYPE).

10. *Lepanthes orizabensis* R. E. Schultes & Dillon, sp. nov.

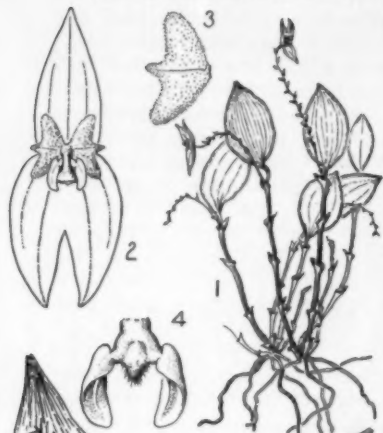
Herbae epiphyticae, caespitosae, usque ad 5 cm. altae. Caules secundarii erecti, plusminusve septemvaginati, vaginarum infundibuliformium ostiis hispidulis. Folia suborbicularia vel elliptica, marginata, obtusa, apicibus tridentatis. Inflorescentiae folium superantes. Flores pauci, succedanei, in racemis brevibus. Sepalum dorsale late lanceolatum, acuminatum, 3-nerviium. Sepala lateralia lanceolata, usque ad medium coherentia, apicibus acuminatis recurvis, 2-nervia. Petala eciliata, transverse bilobata, lobis anterioribus oblongis cum apicibus rotundatis, lobis posterioribus cuneatis, apicibus obliquis. Labellum bilobatum, lobo utroque triangulari, apice acuminato incurvato. Columna tenuis, sursum dilatata.

Plants epiphytic, caespitose, up to 5 cm. high. Secondary stems erect, 1.5-3.5 cm. long, concealed by about 7 closely appressed hyaline sheaths, each terminating in an infundibuliform mouth; sheaths hispidulose along the prominent nerves and the thickened margin of the mouth. Uppermost sheath enclosing the petiole of the leaf. Leaves suborbicular to elliptic, marginate, obtuse, 0.8-1.3 cm. long, about 0.7 cm. wide, apex inconspicuously tridentate. Peduncles overtopping the

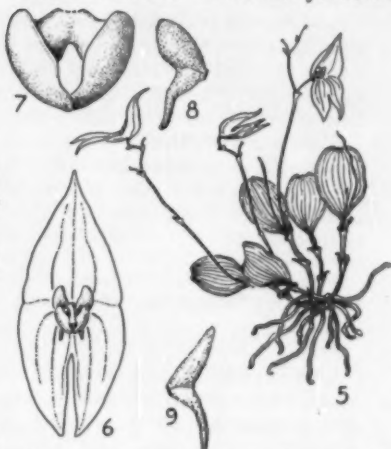
PLATE 1236. LEPANTHES REKOI R. E. Schultes. 1, plant, natural size. 2, flower, enlarged five times. 3, petal, enlarged ten times. 4, lip, enlarged sixteen times. — LEPANTHES TENUILOBA Schultes & Dillon. 5, plant, natural size. 6, flower, enlarged two and one half times. 7, lip, enlarged ten times. 8, 9, petals showing variation, enlarged five times. — LEPANTHES DISTICHA (Rich. & Gal.) Garay & Schultes. 10, plant, natural size. 11, flower, enlarged five times. 12, lip, enlarged fifteen times. 13, petal, enlarged ten times. — LEPANTHES ORIZABENSIS Schultes & Dillon. 14, plant, natural size. 15, flower, enlarged five times. 16, lip, enlarged ten times. 17, petal, enlarged ten times. DRAWN BY G. W. DILLON.

**LEPANTHES**

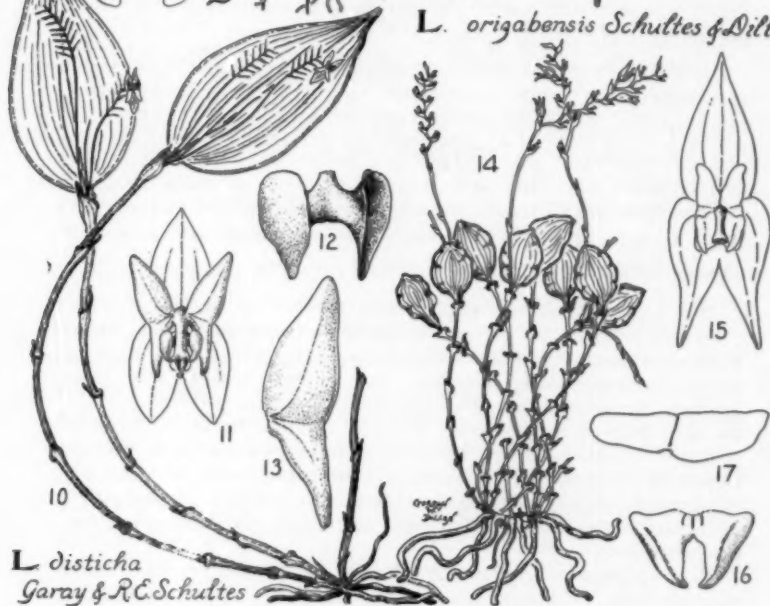
*Rekoi* R.C. Schultes



*L. tenuiloba* Schultes & Dillon



*L. origabensis* Schultes & Dillon



*L. disticha*  
Garay & R.C. Schultes

leaves. Flowers few, borne in succession in abbreviated racemes. Dorsal sepal broadly lanceolate, acuminate, 4.5 mm. long, 2.25 mm. wide, 3-nerved. Lateral sepals coherent for almost half their length, lanceolate, narrowing to a recurved, acuminate tip, 4.5 mm. long, 1.5 mm. wide, 2-nerved, the inner nerve more prominent. Petals about 2.7 mm. wide, ciliate, transversely bilobed. Anterior lobe oblong with rounded apex; posterior lobe cuneate with oblique apex. Lip 1.8 mm. wide, enfolding the column, bilobed, each lobe more or less triangular with a central ridge, the apex acuminate and slightly incurved. Column slender, dilated upwards.

MEXICO: Orizaba, Vera Cruz, 1855, Müller *s. n.* (TYPE in N. Y. Bot. Gard.); Sierra de Agua [Vera Cruz?], May 1854, Müller 982.

*Lepanthes orizabensis* seems to be allied to *L. avis*, being similar vegetatively, in the shape of leaf, in the lax inflorescence and in general aspect. *Lepanthes orizabensis* is larger, however, and differs from *L. avis* (according to Reichenbach's rather sketchy drawings) in the shape of the petals, the shape of the lip and the relative size of the flowers.

Another ally of *Lepanthes orizabensis* is *L. Schiedei*, the type specimen of the former having been originally determined as the latter species. The absence of cilia on the sepals of *Lepanthes orizabensis* and the differently shaped lip, however, make these two species quite distinct.

*Lepanthes orizabensis* is likewise very closely allied to *L. fractiflexa* A. & S. of Cuba, from which it can be separated by its smaller flowers and sepals of a different shape.

11. *Lepanthes papillipetala* Dressler, sp. nov.

Herbae parvulae, caespitosae, epiphyticae, usque ad 22 mm. altae. Folia petiolata; laminae orbiculares vel ellipticae, usque ad 12 mm. longae. Inflorescentiae folium breviores. Flores succedanei, in racemis brevibus. Sepalum dorsale deltoideo-ovatum, acutum, 3-nerviium. Sepala lateralia oblique ovato-lanceolata, acuta, 2-nervia, usque ad medium connata. Petala transverse bilobata, pilis minutis papillatis ornata; lobis posterioribus ligulatis, apicibus obtusis, ca. 1 mm. longis; lobis anterioribus angustioribus ligulato-lanceolatis. Labellum cum apiculo infracolumnari, lobis lateralibus ovatis, acuminatis, hispidulis, columnam amplectentibus.

Plant epiphytic, caespitose, 10-22 mm. tall. Secondary stem erect, monophyllous, 4-10 mm. tall, bearing 3-4 closely appressed sheaths, each with an ovate, acute, infundibuliform mouth; sheaths more or less



hispidulose along nerves and margins. Leaves petiolate, petiole ca. 2 mm. long, blade orbicular to elliptic, apically tridenticulate, with a pronounced submarginal vein, 3–5 mm. wide, 5–12 mm. long. Inflorescences one to several per growth, 3–5 mm. long (peduncle 1–2.5 mm.), flowers alternate, 2-ranked, successive: bracts of inflorescence infundibuliform, ca. 1 mm. long, acute, carinate, more or less hispidulose. Pedicel 1–1.5 mm. long, jointed to ovary, which is ca. 1 mm. long. Flowers light pink, dorsal sepal deltoid-ovate, acute, 1.75–2.2 mm. wide, 2–2.7 mm. long, 3-veined, midvein with few minute papillae externally, margin sometimes very minutely papillate-serrulate. Lateral sepals 2-veined, obliquely ovate-lanceolate, acute 1.1–1.25 mm. wide, 2–2.9 mm. long, connate for ca. 1.8 mm., apices slightly divergent. Petals transversely bilobed, with a tooth (the apex of the petal) more or less developed at the junction of the lobes; posterior lobe ligulate, obtuse, .8–1.1 mm. long and .4–.55 mm. wide, bearing minute papillate hairs, especially on inner margin (these hairs ca. .04–.05 mm. long); anterior petal lobes narrower, ligulate-lanceolate, obtuse, with a tuft of minute papillate hairs at tip, .2–.3 mm. wide, .65–1 mm. long. Mid-lobe of lip an apiculate beneath column, ca. .2 mm. long; lateral lobes clasping column, ovate, acuminate and incurved anteriorly (more or less comma-shaped), hispidulose, especially on posterior margin, .75–.8 mm. long, .3–.5 mm. wide. Column ca. .75 mm. long, dilated above.

MEXICO: Chiapas, Municipio de Ocosingo, Laguna Ocotál Grande, about 25–30 km. southeast of Monte Líbano. Alt. about 950 m. "Karst topography. Flowers light pink, epiphytic on small mossy trees in pine forest, also (but less common) on trees along lake shore and in upper branches of tall tropical evergreen forest." July 20–August 29, 1954. Robert L. Dressler 1476 (TYPE in Herb. Ames 69092).

This dwarf species is at once distinguished from all its allies, except *L. parvula*, by the papillate hairs of its petals. Various species, such as the *Lepanthes Lindleyana* Oerst. & Reichb. f. — complex and *L. Rekoii* have ciliate petals, but papillate petals are not common in the genus. In habit, this species resembles *Lepanthes avis*, but the lateral lobes of the lip in the latter species are divergent rather than closely encircling the column as in the former. *Lepanthes papillipetala* is closely related to *L. parvula* but is distinguished by its entire sepal-margins, its hispidulose lip and its larger flowers.

#### 12. *Lepanthes parvula* Dressler, sp. nov.

Herbae parvulae, caespitosae, epiphyticae, usque ad 22 mm. altae.

Folia orbiculari-elliptica, usque ad 10 mm. longa. Inflorescentiae folio breviores. Flores succedanei, in racemis brevibus. Sepala ciliata. Sepalum dorsale deltoideo-ovatum, acutum, 3-nerviium. Sepala lateralia oblique ovata, acuta, 2-nervia, usque ad medium vel ultra connata. Petala transverse bilobata, papillis minutis ornata, lobis falcatis, apicibus obtusis. Labellum cum apiculo infracolumnari, lobis lateralibus ovatis, acuminatis, minutis, papillatis, columnam amplectentibus.

Plant epiphytic, caespitose, 7-22 mm. tall. Secondary stem erect, monophyllous, 3-12 mm. tall, bearing 3-5 closely appressed sheaths, each with an ovate, acute, infundibuliform mouth; sheaths more or less hispidulose along nerves and margins. Leaves petiolate, petiole ca. 1 mm. long, blade orbicular-elliptic, apically tridenticulate, with a somewhat pronounced submarginal vein, 2.5-6 mm. wide, 3.5-10 mm. long. Inflorescences one to several per growth, 2-5 mm. long (peduncle .5-2 mm.), flowers alternate, 2-ranked, successive; bracts of inflorescence infundibuliform, ca. .7 mm. long, carinate, acute, hispidulose. Pedicel ca. .8 mm. long, jointed to ovary, which is ca. .5 mm. long. Flowers light pink, sepals ciliate on margins and slightly papillate on exterior of midveins; dorsal sepal deltoid-ovate, acute, 1.3-1.6 mm. long, .9-1.1 mm. wide, 3-veined (lateral veins very weakly developed); lateral sepals 2-veined (only inner vein well developed), obliquely ovate, acute, ca. .6 mm. wide, 1.3-1.6 mm. long, connate for ca. .9 mm. Petals minutely papillate, transversely bilobed, with a deltoid tooth more or less developed at the junction of the lobes; lobes more or less equal, falcate from a deltoid base, obtuse, .45-.6 mm. long, whole petal lunate with central, deltoid tooth on concave side. Mid-lobe of lip a pubescent apicule ca. .15 mm. long beneath column, lateral lobes minutely papillate, ovate, acuminate, ca. .6 mm. long, clasping column. Column ca. 1.6 mm. long, dilated above. Capsule ca. 2 mm. long.

MEXICO: Chiapas, Municipio de Ocosingo, Laguna Ocotál Grande, about 25-30 km. southeast of Monte Libano. Alt. about 950 m. "Karst topography. Flowers light pink, epiphytic on small mossy trees in pine forest, also (but less common) on trees along lake shore and in upper branches of tall tropical evergreen forest." July 20-August 20, 1954. Robert L. Dressler 1477 (TYPE in Herb. Ames 69094).

In its ciliate sepal-margins and general habit, this species resembles the larger *Lepanthes Schiedeii* Reichb. f. but differs in several characters: the short inflorescence, the much smaller flowers and the more or less papillate petals and lip, which are differently shaped. From *Lepanthes papillipetala* Dressler, this species may be distinguished at once by its ciliate sepals, its less strongly papillate petals, its papillate lip and its smaller flowers.

These species grow together in pine forests and, without the aid of a lens, can be separated only on the basis of a marked difference in flower size. It is interesting that three distinct new species of *Lepanthes* should be found growing together in the same habitat, especially so when two of the species appear to be rather closely related.

13. *Lepanthes Pristidis* Reichenbach f. in *Linnaea* 22 (1849) 820; *Xen. Orch.* 1 (1856) 151, t. 50, figs. IV, 11-14; in *Walpers Ann. Bot.* 3 (1852-53) 156.

Range: Cuba and Mexico (Vera Cruz). MEXICO: *Liebold s. n.* (Record from the Reichenbach Herbarium) (TYPE); *Sartorius s. n.* (Record from the Reichenbach Herbarium); *Schaffer 51* (Record from Reichenbach Herbarium).

Reichenbach's drawings of this concept are so inadequate that it is not clear from them just what are the affinities of *L. Pristidis*. A study of the type drawings and of Reichenbach's description, however, indicate that it is distinct from the other species of Mexican *Lepanthes*. It is probably related to *Lepanthes disticha*.

*Lepanthes Pristidis* occurs also in Cuba (Acuña, "Cat. descr. orquid. Cub." (1939) 145).

14. *Lepanthes Rekoii* R. E. Schultes in *Bot. Mus. Leaflet*, Harvard Univ. 6 (1938) 193.

Range: Mexico (Puebla and Oaxaca). MEXICO: *Juan G[onzález]* 2415; *Schultes 817*; *Schultes & Reko 336* (TYPE).

This exceptional little orchid, known only from one station in northeastern Oaxaca and one station in northeastern Puebla, shows unmistakably clear relationships with *Lepanthes Dawsonii* Ames of Honduras. The two have in common a trilobate lip which is apparently of rare occurrence in the genus.

It has been thought that *Lepanthes* is a genus in which considerable latitude should be allowed in the identification of specimens, because intraspecific variation has been thought to be rather great. Since colonies of *Lepanthes* are usually small and frequently isolated, collections of species of this genus seldom contain sufficient material to permit a study of intraspecific variations. Fortunately, Schultes was enabled to study a number of

living specimens for variation within the species at the type locality of *Lepanthes Rekoii*.

In August 1938, the type of *Lepanthes Rekoii* was collected on an oak tree on the eastern slopes of the great Cerro de los Frailes in the District of Teotitlán in northeastern Oaxaca. Diligent search yielded only one flowering and one fruiting specimen. The characters of this species were so striking and sharp, however, that Schultes described the plant as new. A collection by Juan G[onzález] from Puebla, though differing in some slight details from the type, was cited with the type.

In July, 1939, Schultes revisited the type locality and found in full flower the colony from which the type came. Again, search within a 150-yard radius failed to reveal another colony. Nearly thirty flowers were closely examined before pressing and were compared with a drawing of the type. Very little deviation from the type was noticed. More flowers were critically examined in the laboratory with the type at hand; almost no variation in floral parts and no variation in specific characters was in evidence.

15. *Lepanthes Schiedeii* Reichenbach f. in *Linnaea* 22 (1849) 820;  
*Xen. Orch.* 1 (1856) 144, t. 50, figs. I, 1-4;  
in Walpers *Ann. Bot.* 3 (1852-53) 524.

Range: Mexico (Vera Cruz and Chiapas). MEXICO: *Matuda 1595*;  
*Schultes 1012*; *Schiede s. n.* (Record from Reichenbach Herbarium  
(TYPE)).

16. *Lepanthes tenuiloba* R. E. Schultes & Dillon, sp. nov.

Herba parvula, caespitosa, epiphytica. Caules secundarii erecti, tenues, monophylli, plusminusve trivaginati, vaginarum infundibuliformium ostiis hispidis. Folium ovatum vel ovato-ellipticum, coriaceum, apice tridenticulatum, basi cuneatum. Pedunculi folium superantes. Flos grandis, usque ad 15 mm. longus, purpureo-ruber. Sepala connata, glabra, in circuitu elliptica; sepalum dorsale elongato-triangulare, acutum, prominenter 3-nerviium; sepala lateralia triangulari-lanceolata, acutiuscula, 2-nervia. Petala parvula, glabra, transverse bilobata; lobis anterioribus lanceolatis longo cum angusto, abrupte acuminato, lineare apice; lobis posterioribus oblongo-lanceolatis. Labellum bilobatum; lobis lateralibus in circuitu oblique oblongo-ellipticis, in sectione

abrupte malleoliformibus. Columna tenuis, apice dilatata, inter labelli lobos circumdata.

Plant very small, 2.5–3 cm. tall to the tip of the leaf, caespitose, epiphytic. Roots fibrous, short, stout. Secondary stems slender, erect, monophyllous, from 3–10 mm. long, concealed by about 3 hyaline, close-tubular sheaths which end in infundibuliform mouths; sheaths pubescent on the longitudinal nerves and on the margins of the mouth; the uppermost sheath largest, enclosing the petiole of the leaf. Leaf ovate or ovate-elliptic, 8–12 mm. long, 4–7 mm. broad, tridenticulate at the apex, cuneate at the base, coriaceous, marginate, short-petiolate. Peduncles conspicuously overtopping the leaf, very slender, bearing near the middle one tubular sheath with an infundibuliform mouth, up to 30 mm. long, few-flowered (usually only one expanded at a time). Flowers very large for the plant, when spread out up to 1.5 cm. long from the tip of the dorsal sepal to the apex of the lateral ones, borne in succession on a raceme. The sepals glabrous, purplish-red, when spread out forming a perfect ellipse in outline; lateral sepals connate to about the middle, asymmetrically triangular-lanceolate, acutish, 2-nerved, about 7 mm. long, 2.5 mm. wide at the base; dorsal sepal elongate, triangular, acute, prominently 3-nerved, about 7 mm. long, 5 mm. wide at the base. Petals very small, purplish-red, glabrous, transversely bilobed; the anterior lobe lanceolate, 0.7 mm. wide at the base, with a long narrow, abruptly acuminate, linear apex; the posterior lobe oblong-lanceolate, 2 mm. long, 1 mm. wide or less. Labellum bilobed; the lateral lobes obliquely oblong-elliptic in outline, 1.6 mm. long, 0.5 mm. wide, in section abruptly malleoliform, tightly clasping and partially obscuring the column. Column slender, slightly dilated at the apex.

MEXICO: Estado de Chiapas, Siltepec, August 9, 1937, *E. Matuda 1595a*. (TYPE in Herb. Ames, No. 46731; Duplicate Type in Herb. Univ. Michigan).

*Lepanthes tenuiloba* is not closely related to any known Central American species of *Lepanthes*, unless it be with *L. guatemalensis* Schltr. The two species agree in floral size and in general habit, but there are significant structural differences in the flowers. It is easily distinguished from other species by the flowers which are exceedingly large, considering the size of the plant, and by the connate sepals which, when spread out, form a perfect ellipse in outline instead of being constricted at the junction of the dorsal with the lateral sepals. The relative minuteness of the petals in comparison with the large sepals is a feature which cannot be found in many species. Distinctive also is the shape

of the petals with their curiously attenuated anterior lobes and the shape of the labellum which tightly enfolds the very slender column. *Lepanthes tenuiloba* has the largest flowers among the Mexican species, although several species are larger vegetatively.

*Matuda 1595* was a mixed collection. It contained several excellent specimens of *Lepanthes Schiedeii* Reichenb. f. The half dozen or more specimens of the much larger flowered *Lepanthes tenuiloba* have been renumbered *Matuda 1595a*.

—BOTANICAL MUSEUM OF HARVARD UNIVERSITY AND  
AMERICAN ORCHID SOCIETY, CAMBRIDGE, MASS.

## NOTES ON THE FLORA OF A GORGE OF ESOPUS CREEK, NEW YORK

HENRY F. DUNBAR

The object of this paper is to record evidence of a changing flora: (1) remnants of a flora of a colder climate which is presumed to have preceded the present time but followed the last glacial period, (2) presence of species characteristic of a warmer climate and which may be the vanguard of a gradual plant migration into this area.

### DESCRIPTION OF THE AREA

This study covers the slopes immediately adjacent to Esopus Creek and creek bed, Ulster County, N. Y. from the Ashokan Reservoir to the flood plain at Marbletown. Through most of this area the creek flows rapidly with very little quiet water over a stony or gravelly bottom. The shores, mostly heavily wooded, rise steeply, and, in some places consist of sheer cliffs of Devonian sandstone often 100 ft. high. Frequent sand terraces and gravel bars occur with a flora characteristic of such places. The elevation of the study area lies between 200 and 500 feet above sea level. The average rainfall is about 43 in. per year and the temperature range is from a minimum of  $-25^{\circ}$  F to a maximum of about  $100^{\circ}$  F.

The predominating trees on the sand, gravel or silt shores are poplars (*Populus deltoides* and *P. grandidentata*), sycamore (*Platanus occidentalis*), and both the gray and speckled alders (*Alnus serrulata* and *A. rugosa*). The steep slopes adjacent to the creek are heavily covered with hemlock and white pine (*Tsuga canadensis* and *Pinus Strobus*), the three birches (*Betula lenta*, *B. lutea*, *B. papyrifera*), and the maples (*Acer rubrum*, *A. saccharum*, *A. pensylvanicum*). On the higher slopes various oaks (*Quercus alba*, *Q. Prinus*, *Q. rubra*, *Q. velutina*, and *Q. coccinea*) complete with the pines and the hemlocks. The more conspicuous shrubs along the shore are the ninebark (*Physocarpus opulifolius*), the dogwood (*Cornus Amomum*), and various willows (*Salix spp.*).

Of outstanding interest is the occurrence of species usually found further north or at higher elevations. Their presence here in cool, shady, moist situations suggests that they may be relics of a time when a colder climate favored their more general distribution. Such a condition doubtless followed the last glacial period, and, as warming up progressed, plants requiring a damp and cool environment failed to survive in the territory surrounding the gorge.

#### SIGNIFICANT PLANTS OF THE AREA

The species listed below seem to be noteworthy, judging from published ranges available to me — chiefly those of the 8th edition of Gray's Manual, which, except where otherwise indicated, is the basis for remarks on ranges. The nomenclature used follows that of the Manual. Specimens of all of the plants mentioned have been collected by me, unless otherwise indicated, and are deposited in the herbarium of the New York State Museum in Albany, N. Y.

#### HIGH NORTHERN

*BRYUM MUHLENBECKII*. This moss, of circumpolar distribution, has previously been reported in the northeastern U. S. only from northern parts of New York and New England.<sup>1</sup>

*MYURELLA JULACEA*. Grout describes this species as a "subalpine moss, south to Conn." Ketchledge collected both of these mosses on the gorge. He also reports the *Myurella* from northern New York.<sup>2</sup>

*LYCOPODIUM SELAGO*, var. *PATENS*. Only three or four plants of this clubmoss were found in the gorge growing on rocks close to the creek. This boreal species occurs in the Catskill Mountains in Greene Co., about 25 miles away, and recently I found a large stand of it in the Shawangunk Mts. about 15 miles south of the study area.

*WOODSIA ALPINA*. This fern of "arctic regions", has not previously been reported from New York State south of Essex Co. in the northern Adirondacks,<sup>3</sup> but it has been recorded from both northern Vt. and Me. About 25 plants were found scattered along a northeast-facing cliff.

*CRYPTOGRAMMA STELLERI*. A circumboreal species, reaching locally in northeastern North America into Penn. and N. J. In New York State

<sup>1</sup> GROUT, A. J. *Moss Flora of North America*. Vol. 11. p. 234.

<sup>2</sup> KETCHLEDGE, EDWIN H. *Checklist of Mosses of New York State*. New York State Museum Bulletin number 363.

<sup>3</sup> Map files of the Botany Office, New York State Museum, Albany, N. Y.



there are four known stations in Greene Co. and one in Delaware Co. Thus this station becomes the southernmost one reported in the state.

**SEDUM ROSEA.** The occurrence of this plant in the gorge is the fifth New York station. Usually growing in arctic regions, it has been found in Madison, Yates, Greene and Schuyler Cos., N. Y. It has also been collected in northeastern Penn. and on Roan Mountain in North Carolina. Uhl has reported 11 gametic chromosomes in plants from the Esopus Gorge.<sup>4</sup>

**ACHILLEA BOREALIS.** (*A. Millifolium* L. var. *nigrescens* E. Mey.) Identified by S. J. Smith who believes that it should be given varietal status, following the treatment of Cronquist in the Britton and Brown Illustrated Flora. According to Smith, these specimens are identical with those found in some of the Adirondack gorges, near Elmira and in the Delaware Water Gap.

#### CANADIAN ZONE

The following plants exhibit more or less isolated extensions of range from the cooler valleys of the Catskills.

**POLYSTICHUM BRAUNII.** This fern common in the Catskills at elevations from 1500 to 2200 feet, is rare at other altitudes. One plant was observed on a wet, north-facing cliff. It was subsequently washed away during a flood and hence was not collected.

**PICEA RUBENS AND ABIES BALSAMEA.** Three or four depauperate specimens of each were found on the wooded slopes. Abundant stands of both occur in the Catskills above 3500 ft. some 15 or 20 miles to the west.

**TRisetum spicatum** var. **MOLLE.** This grass was collected in the gorge by S. J. Smith.

**EPILOBIUM CILIATUM.** Smith identified this species also growing in the same area.

**LOBELIA KALMII.** Fernald reports this plant as growing from Newfoundland to central Maine, northern New Jersey and southeastern Pennsylvania. Here it occurs in several locations on wet cliffs.

The following might be designated as Appalachian rather than Canadian.

**ILEX MONTANA.** But one (male) plant has been found in the area.

**VIOLA ROTUNDIFOLIA.** This violet occurs sparsely in moist, shady ravines.

**VIBURNUM ALNIFOLIUM.** This shrub, growing in similar places to the violet, is even more scarce.

#### SOUTHERN

The following plants suggest that they may have moved into this

<sup>4</sup> Heteroploidy in *Sedum rosea* (L.) Scop. *Evolution* 6: 81-86. 1952.

area as the climate warmed up. It is true that in each case there are instances of their occurrence even further north, but they are scarcely expected to be found associated with those listed above and are offered as possible evidence of post-glacial northward migration.

*CORALLORHIZA ODONTORHIZA*. The range for this orchid is from southwestern Maine to Georgia and Alabama.

*TEPHROSIA VIRGINIANA*. This species is recorded from Florida north to southern New Hampshire.

*GALIUM PILOSUM*. This bedstraw occurs in the Finger Lakes region of New York and sparsely in the Hudson Valley, but is not reported from the mountain regions of New York State.<sup>3</sup>

*SOLIDAGO ODORA*. With a distribution much like that of the *Tephrosia*, this plant is equally unexpected in the gorge.

#### ACKNOWLEDGMENTS

I wish to express my appreciation of help in preparing this paper to the following persons: Dr. R. T. Clausen, Dept. of Botany, Cornell Univ. for data on *Sedum*; E. H. Ketchledge, Department of Botany, N. Y. State School of Forestry for data on mosses; Stanley J. Smith, New York State Museum for permission to examine the Botany Office files and for many helpful suggestions; Professor G. S. Torrey of the Univ. of Conn., and Charles Schweinfurth of the Botanical Museum of Harvard University, for a critical reading of the manuscript and many constructive thoughts.

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### PLANTS NEW TO ILLINOIS AND TO THE CHICAGO REGION

JULIAN A. STEYERMARK AND FLOYD A. SWINK

Since the last publication by the authors and Dr. Thieret<sup>1</sup>, the following new records have come to light. All specimens are deposited in the herbarium of the Chicago Natural History Museum.

#### PLANTS NEW TO ILLINOIS

*BUTOMUS UMBELLATUS* L. This species was found growing spontaneously and aggressively spreading in a small pond south of 87th Street and east of Kean Avenue near Buffalo Woods Forest Preserve, Cook Co., Aug. 6, 1957, *Swink 3007*.

*BETULA PUMILA* L. var. *GLABRA* Regel. This variety is not given for Illinois in the 8th Edition of Gray's Manual. The following collection belongs to this variety: Low mound in swale, north of Waukegan, Lake Co., June 8, 1908, *Frank C. Gates 2500*.

*PODOPHYLLUM PELTATUM* L. f. *DEAMII* Raymond. This color form of

the May Apple, previously known in this country only from Indiana and Missouri, has recently been collected in the Chicago area, as follows: Tinley Creek Woods along bridle path east of Harlem Avenue,  $1\frac{1}{2}$  miles south of Highway 143, May 15, 1957, *Herbert Pahnke s.n.*

*PODOPHYLLUM PELTATUM* L. f. *POLYCARPUM* Clute. This form was reported by Pepoon<sup>2</sup> from the Chicago area but no specimens are extant. The data for the only herbarium record for Illinois are as follows: Woods bordered by Mill Creek Road, Kelly Road, and Dilleys Road, on property of Dr. and Mrs. L. F. Yntema, northwest of Wadsworth, about 5 miles southwest of Zion, Lake Co., August, 1956, *Jean Yntema s.n.*

*RUBUS OCCIDENTALIS* L. f. *PALLIDUS* (Bailey) Robins. The data for the collection of this form with cream- or amber-colored fruit are as follows: Open borders of *Quercus alba-Quercus rubra-Carya ovata* woodland bordering swampy meadow, on property of Dr. and Mrs. L. F. Yntema, west of Highway 41, northwest of Wadsworth, about 5 miles southwest of Zion, Lake Co., July 18, 1956, *Steyermark 81982*.

*ROSA MICRANTHA* Sm. This adventive species has become established at the following locality: Natural prairie overlying glacial gravel moraine on crest of slope just east of Highway 173 and north of Forest Hill Golf Course, T44N, R2E, Sect. 8, 0.8 mile northeast of junction of Highways 51 and 173, just northeast of Rockford, Winnebago Co., Oct. 1, 1955, *Steyermark 80289*.

*RHAMNUS FRANGULA* L. var. *ANGUSTIFOLIA* Loud. This unusual narrow-leaved variety is not recorded in any of the principal floras of the United States; it was found growing with typical *Rhamnus frangula*. The narrow elongate *Salix*-like leaves have irregularly undulate-scalloped margins. The data are as follows: Near a small pond west of 104th Avenue south of Longjohn Slough approximately  $\frac{1}{2}$  mile south of 95th Street in Palos Forest Preserve south of Willow Springs, Cook Co., July 2, 1957, *Swink 3001*.

*XYDENDRUM ARBOREUM* (L.) DC. Three trees of this species, of differing sizes and ages, have been located near each other in southern Cook County. They have certainly become naturalized at this locality, where they were growing with the native flora. The data are as follows: In a quaking aspen thicket at the north end of Sweet Woods Forest Preserve south of Thornton, Cook Co., Sept. 29, 1956, *Swink 2787*. In addition, there is a specimen of this species in the Chicago Natural History Museum Herbarium collected by Robert Ridgway on Sept. 7, 1920, with the following location:  $9\frac{1}{2}$  miles northeast of Olney, on Corn Ford Road, Richland Co. In his *Ligneous Flora of Richland County*, page 30, Ridgway states that the specimen "had long been misplaced and was with a lot of herbaceous material sent to the Missouri Botanical Garden, where identified by Mr. J. M. Greenman. There is some reason

for suspecting that the original label had slipped from the corner and had been replaced by one which may not have belonged to the specimen in question, a memorandum to that effect having been inserted. However, whether this suspicion is correct or not, there can be no question that the specimen was collected in Richland County, the only doubt being as to the locality and date". This tree probably was introduced.

*VERBENA STRICTA* Vent. f. *ROSEIFLORA* Benke. The first collection for this rose-colored form for Illinois is as follows: Dry pasture, Starved Rock State Park, La Salle Co., July 27, 1940, *George D. Fuller 2299*.

*GALEOPSIS LADANUM* L. f. *PARVIFLORA* (Lam.) Koch. This is a small-flowered form with corolla only 3-4 mm. long, equalling or only slightly exceeding the calyx. This form is not mentioned in any of the principal manuals of the flora of the central or eastern states. The data are as follows: Along Midway Plaisance, Chicago, Cook Co., Aug. 10, 1956, *Juan Y. Poncho 7020*. The only other species of the genus recorded for Illinois by Jones *et al.*<sup>3</sup> is *Galeopsis tetrahit*, which is recorded from Boone County, where collected by E. W. Fell, and from Cook County, on the basis of the report by Higley & Raddin<sup>4</sup>. The following additional specimens of *Galeopsis tetrahit* are to be found in the herbarium of the Chicago Natural History Museum: *H. N. Patterson*, from the vicinity of Oquawka, Henderson Co., in 1897; and *W. C. Ohlendorf*, from Lawndale, Cook Co., in August, 1885.

*VIBURNUM LANTANA* L. This shrub was collected in woods of York Forest Preserve south of Elmhurst, Du Page Co., November 5, 1955. It was found in a secluded area of the preserve far from any habitation and growing among native species; *F. A. Swink 2782*.

*SOLIDAGO ULIGINOSA* Nutt. var. *LINOIDES* (T. & G.) Fern. *Solidago uliginosa* var. *linoides* has not been recorded for Illinois either in the 8th Edition of Gray's Manual or in Jones *et al.*<sup>3</sup> The following collection may be cited: Lake Co., natural swampy meadow fringed by *Salix* spp., *Cornus stolonifera*, and *Betula pumila*, on east side of Highway 59, north of Miller Road, T43N, R9E, Sect. 12, 4 miles north of Barrington, October 1, 1955, *Steyermark 80305*.

#### PLANTS NEW TO THE CHICAGO REGION

*HOLCUS LANATUS* L. This Old World grass, reported from Champaign and Crawford counties by Jones *et al.*<sup>3</sup> has been collected in a lawn at 9800 Willow Springs Road in the Palos Forest Preserve area, where it was growing spontaneously, *F. A. Swink 3004*

*PARONYCHIA FASTIGIATA* (Raf.) Fern. var. *PALEACEA* Fern. This species

<sup>1</sup> Steyermark, J. A., Swink, F. A., and Thieret, J. W. Plants New to Illinois and Indiana and the Chicago Region. *RHODORA* 59:31-33. 1957.

<sup>2</sup> Pepon, H. S. Flora of the Chicago Region. Chicago Academy of Sciences. 1927.

has been reported by Jones *et al.*<sup>3</sup> from central and southern Illinois only, but is found to be rather frequent in several of the Cook County forest preserves. Collections were made from two of these localities, as follows: Open woodland just east of Hidden Pond in Hidden Pond Woods Forest Preserve, August 14, 1957, *F. A. Swink 3009*; and open woodland near picnic area of Wolf Road Woods, *F. A. Swink 3010*, August 15, 1957.

*STELLARIA PUBERA* Michx. var. *SILVATICA* (Béguinot) Weath. This plant, previously known in the state only from Cook County, was collected in shaded ground of Warrenville Forest Preserve, Du Page Co., June 2, 1956, *F. A. Swink 2789*.

*AGRIMONIA ROSTELLATA* Wallr. This species is locally abundant in open wooded areas of Cantigny Woods Forest Preserve near La Grange, Cook Co., as the following collection shows: *F. A. Swink 3011*. Previous localities, as recorded in Jones *et al.*<sup>3</sup>, show its distribution in central and southern Illinois.

*LOTUS CORNICULATUS* L. On a sandy knoll beside a small creek in a cow pasture 2 miles south of the Kankakee River,  $\frac{1}{4}$  mile west of Illinois-Indiana state line, 2 miles north of Hopkins Park, Kankakee Co., August 4, 1957, *Karl E. Bartel 6*. Previously known in Illinois only from Champaign, Iroquois, and Jo Daviess counties (Jones *et al.*<sup>3</sup>, p. 286).

*HYPERICUM SPATHULATUM* (Spach) Steud. In a roadside ditch  $\frac{1}{2}$  mile south of the Will-Kankakee county line, 3 miles northeast of Essex, Kankakee Co., August 2, 1953, *F. A. Swink 2380*. Previously known only from the southern and west-central portions of the state.

*EPILOBIUM HIRSUTUM* L. In rich black soil along the Santa Fe Railroad south of Argonne National Laboratory at the southwest end of Rocky Glen Forest Preserve, Du Page Co., July 21, 1957, *Karl E. Bartel 7*. Previously known only from Cook Co., where first reported by Steyermark and Swink (*RHODORA* 51: 147-149, 1949).

*SWERTIA CAROLINIENSIS* (Walt.) Ktze. At edge of woods near picnic area, Pioneer Woods Forest Preserve, 107th Street and Willow Springs Road, Cook Co., July 29, 1956, *J. W. Thieret 2137*. This plant was reported by Pepoon<sup>2</sup>, who stated that the station had been destroyed in the construction of a paved highway. Although reported and accompanied by a photograph on page 427 of Pepoon's Flora, there has apparently been no authentic specimen kept of this original discovery. The collection by Dr. Thieret represents a new and different location for this species.

<sup>3</sup> Jones, G. N., Fuller, G. D., Winterringer, G. S., Ahles, H. E., and Flynn, A. A. *Vascular Plants of Illinois*. 1955.

<sup>4</sup> Higley, W. K. and Raddin, C. *The Flora of Cook County, Illinois, and a part of Lake County, Indiana*. *Bull. Chi. Acad. Sci.* 2, no. 1: 94. 1891.

A MILESTONE IN BOTANICAL CARTOGRAPHY.<sup>1</sup>—Geobotanical investigations in general and studies on the distribution of taxa in particular were instrumental in forming one of the main pillars on which the theory of evolution rests. Likewise, this approach has greatly affected the development of taxonomic botany during the past one hundred years. It has also strongly influenced the understanding of the need for extensive collections and large herbaria wherever taxonomical and geobotanical studies are to be performed. It has been said that over-confidence in some of the hypotheses, advanced by this important school of thought has sometimes resulted in unnecessary splitting of species because of some geographical distinctiveness; a typical case may seem to be the thick volume XII of the magnificent Flora SSSR with its 849 species of *Astragalus*. There are also instances when too strong adherence to an originally fruitful hypothesis has counteracted further research on details seemingly offsetting these ideas. As a whole, however, the geobotanical approach to taxonomy and evolution has been one of the most prolific ones in botany in the past and it will certainly continue to be so for a long time to come.

In studying the distribution of species and their past history, different approaches have been tried. They have developed from the very schematical descriptions of areas given by Linnaeus and his predecessors, through the more elaborate outlines of Willdenow, Wahlenberg, and von Humboldt, to the more or less detailed maps of present-day publications. The distribution maps seem to have originated with DeCandolle, who used a few such outlines in his "Géographie botanique raisonnée" in 1855. They were, however, developed further by the influential Austrian school of geobotany, and then notably by its greatest representatives, Kerner von Marilaun and his son-in-law, Richard Wettstein. In later years, Scandinavian followers of this school improved considerably the methods of mapping and stressed the necessity of greater exactitude. As a direct result of this, the so-called dot-maps, on which small dots represent every collection or locality, have been employed in Scandinavian geobotanical and taxonomical works for many years. This scientific art has recently reached fulfillment in the well-known "Atlas of the distribution of vascular plants in N.W. Europe," worked out and published by Professor Eric Hultén of Stockholm in 1950. That Atlas gives exact maps of the known distribution in Fennoscandia (in its wider sense) of almost all the species occurring within the area. It is based on records in literature and on detailed studies in the main herbaria in these countries, which certainly are better known botanically than any other comparable area in the world.

<sup>1</sup>ERIC HULTÉN: The Amphi-Atlantic Plants and Their Phytogeographical Connections. Kungliga Vetenskapsakademiens Handlingar. Fjarde Serien. Band 7. Nr. 1. Stockholm 1958. pp. 1-340.

In addition, more schematical maps show the general distribution of the species, but these are in no way detailed and are sometimes incorrect; they were never intended to be more than approximative.

Although Professor Hultén knows more about the distribution of the higher plants in the entire northern hemisphere than does anybody else, his interest has been focused on certain problems of past dispersals involving plants of Scandinavia and of the Beringian region. His studies on the flora of the latter area effected his coining of the now universally accepted theory of equiformal progressive areas, which may perhaps be regarded as an outgrowth of the age and area hypothesis. He was able to demonstrate, in 1937, that this theory could explain most distribution areas of plants on the continents, and also that it could give distinct indications as to the place of origin, or rather place of survival, of the different species. At that time, Professor Hultén tried to press this hypothesis to explain the distribution of all plants in the boreal zone, and especially those confined to a limited area in northwestern Europe and to a larger area in eastern North America. These are the truly amphi-Atlantic plants in the restricted meaning of the term, but Professor Hultén stressed that they could only be properly studied in connection with plants having larger areas, or what others have named bis-Atlantic distribution. Scandinavian botanists had long regarded the strictly amphi-Atlantic distribution as an indicator of a former trans-Atlantic land connection, but Professor Hultén maintained that if they were seen from his wider point of view these areas could more appropriately be explained as being remnants only of a formerly circumpolar area. Despite several indications to the contrary, recently reviewed in a good article by Dr. Eilif Dahl in the Norwegian journal *Blyttia*, Professor Hultén has vindicated this point of view in several articles and also in his Atlas, but the lack of adequate maps of the total extent of the species under discussion has made it almost impossible to consider the entire problem on a fully scientific basis.

In a recent book on "The amphi-Atlantic plants and their phyto-geographical connections," Professor Hultén has published a group of 279 maps of species which apparently are selected with the above-mentioned explanation in mind. These are the most accurate maps of general distribution ever published of so many species at the same time, and their reproduction and exactness are such that most remarks on them must be regarded as vague comments only. When all the boreal flora has been so mapped with the same care as given to these maps for Europe, this method of indirect inquiry into the history and dispersal of the boreal species will be exhausted and the hypotheses based on them will then have to be tested by aid of other and more exact approaches.

In the new book, Professor Hultén starts with a very readable and concise introduction, stating in a nutshell the present knowledge of the distribution of boreal plants in general and of his opinions as to the explanation of their areas in particular. This fascinating chapter is followed by information about the material on which the maps are based, and also about the plants included and excluded. In this connection it must be said that comparing the reasons given for the exclusion of some species, and the maps given of some others to which the same principles could have been applied, indicates that the selection has been somewhat arbitrary, but this cannot be avoided as long as all the species are not mappable. And the reader must keep in mind that there is a distinct tendency behind the selection, as stated in the introductory chapter. The bulk of the book consists of a short text about the individual species, on the left hand page, and detailed maps of two species or taxa, in dark-brown and greyish blue, on the right hand page. The book concludes with a list of references, a comprehensive, though far from complete, bibliography, and an index.

A detailed description of the maps is not possible; they have to be seen and studied to be fully appreciated. There is no doubt that future geobotanists will long draw upon the wealth of information here collected, and the book is likely to influence plant geographers in such a way as no other recent publication can do. American readers will probably be able to find a lot of "mistakes" or "omissions" in the areas of many species, whereas European botanists will have less opportunity to add to the information collected by the author. The reason for this discrepancy between the American and European parts of the distributions mapped is evidently caused by the fact that our present knowledge of the American flora is considerably more restricted than that of the European plants. Not only can this be seen by comparing the vast number of flora lists and treatments (both past and present) of small regions in Europe with the low number of such articles printed in America (and the difficulties in getting such treatments printed here), but it is perhaps best seen by comparing the number of specimens in European and American herbaria. European herbaria contain over 77 million specimens, whereas the herbaria in the United States and Canada, an area twice as large as Europe, contain only about 32 million specimens. Still more relevant to the present study is the fact that less than 2 million specimens of herbarium plants are available in Canada as a whole, and vast regions here are almost devoid of collections. Therefore, criticism of the maps for possible mistakes in this very essential part of the area should be made with this in mind, at the same time as caution in the hypothesizing is required just for the North American parts of the areas.

A rather common misunderstanding may seem to have affected the



author when he tries to explain the fact that considerably more species have been introduced into North America from Europe than the reverse way. He regards this as connected with the much greater disturbances by cultivation in the New World. Certainly, some weeds may have got an unexpectedly wide distribution in a short period because of this fact, whereas ecological and climatical conditions may counteract this to a certain extent. In order to get weeds established, however, even the most favourable conditions for dispersal within the country are of no significance if seeds are not carried over the ocean, and the main reason for the difference in number of introduced species must be the fact that considerably more seeds were transported westward than eastward. All the settlers brought with them effects of different kinds and seeds from their homelands, including many weeds. In addition, the fishing vessels carried fish only towards Europe but ballast westwards, and this ballast was very often soil which was carried ashore in the new country. The whole problem of introduction of plants and animals has recently been excellently studied in a book by a compatriot of Professor Hultén, namely in "The faunal connection between Europe and North America" by Professor C. H. Lindroth, the eminent entomologist. In that book the elimination of introduced species, before discussing possible dispersal routes of other plants or animals, is done more thoroughly than plant geographers have ever done with their material. Professor Hultén has excluded most introduced species, and he has mapped some others to show areas of no significance to the geobotanical problems aimed at. But although there is no doubt that the author has been very critical and correct in his selection in most cases, others are occasionally somewhat irrelevant, since only palynological studies can demonstrate with certainty the age of some of these plants in the flora. It is hardly very logical to regard a species as introduced in North America solely because it is introduced in New Zealand, but it is to be hoped that this kind of reasoning has not been employed on other species than *Juncus subnodulosus*.

Naturally, the species concept of Professor Hultén is based on that of the classical geobotanical school, but it may sometimes seem to be unnecessarily wide and other times it is unduly narrow. Because of his careful differentiation of what he believes are intraspecific races, this does not matter, since taxa which others may regard as species are usually shown with different signs. In a few cases, however, the usual caution has broken down, with worthless maps as a result. Examples of such inadequate maps are, e.g., those of *Molinia coerulea* and *Myrica Gale*. It does not matter that the map of *Eriocaulon septangulare* shows no distinctions between the endemic British species and the American *E. pellucidum* with which it has long been misidentified, but the map of what the author calls *Sisyrinchium montanum* is a complete mess,

including a mixture of *S. albidum*, *S. Bermudianum*, *S. montanum* s.str., and a still undescribed endemic species from Ireland. This last mixture is, perhaps, the very best demonstration of the fact that the morphological-geobotanical method, though excellent, is by no means sufficient for exact studies of this kind, since it cannot always prevent evolutionary heterogeneity being included into a single taxon.

Professor Hultén should be excused for ignoring recent biosystematic data which in fact would have added considerable strength to the arguments the maps are intended for, though not always in support of his own ideas. Also, unfamiliarity with cytogenetics alone is responsible for his attempts to use terms and explanations from this branch of botany to enhance his views on some species: his "cytogenetical" explanations of *Antennaria Porsildii*, *Draba fladnizensis* and *D. lactea*, and a few other groups are not supported by available cytogenetical evidence. Only in a very few cases does this affect the maps slightly, and the data in the maps are much more important than the good or bad judgments we may pass upon them now or later.

It is pity that all new combinations proposed, on pp. 16, 38, 52, 74, 96, 106, 146, 174, 204, 246, 262, 294, and perhaps elsewhere, are illegitimate since the author does not follow the old-fashioned rule for references to the basionyms in the text, as required by the International Code. It is to be hoped that at least some of these combinations will be legitimized elsewhere.

There are a few printing errors, none of them essential. The dot in Iceland for *Luzula pallescens* ought to be erased, and some mix-up has caused a dot on the same island for *Carex Hartmani*—the same dot is correctly placed for *Carex adelostoma* based on the same original information. Löve 1951 on p. 96 should be Löve & Löve, and Rousseau on p. 152 is probably an error for Rouleau. The specific epithet of *Carex macloviana* is everywhere capitalized by mistake. And several of the references mentioned in the text are not met with in the bibliography, which, nevertheless, is rather comprehensive and invaluable as a source for further literature on boreal geobotany.

In conclusion it must be said that this most recent one of the many outstanding contributions to boreal geobotany by Professor Hultén is a worthy addition to his long list of books and the most valuable map collection ever published. It is the very best basis available for discussions on the amphi-Atlantic plants. However, the problem of the origin of these areas cannot be properly discussed before maps are available of all the boreal and arctic flora, a task nobody can fulfill better than Professor Hultén himself. Even when such maps are available for the entire flora of the northern zone, they will have to be complemented by detailed evolutionary studies of each species and by extensive palynological investigations before all doubts are removed.

Although the present maps by no means can be regarded the final step towards the solution of this delicate and important geobotanical problem, they are undoubtedly a very important step in the correct direction. In this connection it does not matter if the explanation these maps are intended to support will prove to be right or wrong, since the main object of the compiler is, after all, not to vindicate his own old opinions but to get the correct explanation of the facts expressed in the peculiar areas of the relatively few species of plants with true amph-Atlantic distribution.

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