TUCKERMAN

A SYNOPSIS OF THE LICHENES
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OF
THE LICHENES
OF NEW ENGLAND, THE OTHER NORTHERN STATES,
AND BRITISH AMERICA.

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The study of any group of plants, with a view to the true relations of the species brought together in it, and their real history, requires the investigation of a great number of individual states, and this often through a series of years. And there is, perhaps, no family of plants in which extensive and continuous observation is more important than in the Lichenes. The present work is prepared, therefore, only as an Index and Introduction to the history of the plants described in it; and it has been my object rather to state results of foreign study, than to offer the necessarily imperfect conclusions of my own limited research. Use has constantly been made of the Lichenographia Europaea Reformata of Fries, whose characters of the sections and genera I have, for the most part, adopted entire, or with only occasional amplification; and the profound descriptions of the Lichenographia, as here applied to our species, constitute almost the whole descriptive value of the present enumeration. The exceptions to this will, I hope, meet with the indulgence which the extreme difficulty of any inquiries in a field as much neglected as this has been, among us, seems to demand.*

* The later works of Fries have also been consulted, and, beside these, principally those of Turner & Borrer, Eschweiler, and Schärer, and, for American
The geographical limits of the work include the countries generally north of 40° N. lat.; but only occasional reference has been made to those regions of Arctic America which do not belong to the British possessions, and I have had, also, less regard to the extreme southern boundary, which is everywhere characterized by the appearance of southern species. The greater, or more northern, portion of this district is naturally distinct and similar throughout, and its Lichenose vegetation seems, indeed, almost represented by that of New England alone. It is probable, however, that a large proportion of the species inhabiting any part of the district, if we except its southwestern extremity, are described here.

For the particular citations of New York Lichens, my principal authorities have been the Catalogue of the Plants of New York of Dr. Torrey, 1819, and the Synoptical View of the Lichens of New York by Mr. Halsey, 1824. For citations of species from Pennsylvania, &c., besides Dillenius (as revised in Fries's Index Dillenianus) I have been almost wholly indebted to the Catalogue of the Plants of North America of Muhlenberg, 1818, and his specimens now existing in that part of the herbarium of Acharius which is at Upsal, as well as in the herbaria of Willdenow and Floerke at Berlin. For the Canadian and Newfoundland Lichens, I have availed myself of those described in the Flora of Michaux, as compared with the specimens in his herbarium at Paris, the species enumerated by Mr. De la Pylaie in his Voyage a l'Ile

species chiefly, the Synopsis and the Lichenographia of Acharius. The terminology is wholly that of Fries, and its peculiarity will be found mostly to consist in a strict etymological use of the whole force of the terms he employs. These terms are, then, possibly, the best expressions of the knowledge they contain, and, in this view, as well worth studying as any other part of systematic science, the design of which is to teach, not current names for its objects, but their history.
PREFACE.

de Terre-Neuve, and the specimens of those collected by him, Mr. Despreaux, and others, preserved in the Royal Herbarium at Berlin, in that of Professor Kunth, and in those of the late Baron Delessert and of Dr. Montagne, at Paris. To the vast herbarium of Sir W. J. Hooker I am indebted, not only for numerous Lichens of Canada and Newfoundland, but for a large collection of the arctic species obtained in the different voyages of Parry, Franklin, and others; and to these, and his various Enumerations, together with those of Mr. Brown, Sir John Richardson, and Dr. Greville, I owe most of the arctic citations. The late venerable Mr. Menzies also favoured me with a nearly entire set of the Lichens collected by him on the Northwest Coast of America.

The genera separated from Lichenes by Fries, and referred to his family Byssaceae, have not yet been fully studied in this country; but these plants are so closely related to Lichenes, that I have enumerated our ascertained species, as an appendix, at the end.

The present occasion does not permit me to offer more than general acknowledgments to the eminent botanists whose kind consideration has encouraged the progress of this work. But I cannot conclude it without expressing my indebtedness to the great kindness and liberality of Sir W. J. Hooker, and of William Borrer, Esq., the learned lichenographer of Britain; to my much respected friend, Dr. Klotzsch of Berlin, without whose liberal assistance in the study of the Floerkean herbarium it could not have been undertaken; and to my esteemed friend Dr. Gray, at whose instance it has been prepared.

CAMBRIDGE, 4th February, 1848.
LICHENES.

Perennial, aerial Algae, vegetating only under the influence of moisture, which is imbibed by the whole surface, propagated by spores (sporidia), and also by the cells (gonidia) of the green layer.

Thallus (universal receptacle, Ach.) composed of three layers, viz.: the cortical, the medullary, and the gonimous; evolved from a hypothallus (the elementary state in which the layers are confused, and discernible afterwards as cylindrical cells, and also as fibres on the underside of foliaceous Lichenes, and forming the base, closely adnate to the matrix, in crustaceous ones), typically horizontal or vertical. The horizontal thallus is either crustaceous (often somewhat lobed at the circumference or squamulose), or foliaceous (becoming sometimes in degenerate states crustaceous). The vertical thallus is either compressed (subfoliaceous), or terete (fruticulose); of both of which the filamentous thallus and the pendulous thallus are degenerations. In Cladonia and Stereocaulon a vertical thallus (podetium) arises from the primary horizontal thallus, and is itself often besprinkled with a kind of secondary horizontal thallus in the form of leaf-like scales.—Lichenes are reproduced in two ways: 1. by gonidia, the (normally green) cells of the green (gonimous) layer, which appear on the surface as irregularly shaped powdery masses (soredia), and propagate either on the original thallus, forming foliaceous or squamulose expansions, or external to the original thallus, forming new individuals of the parent thallus; and 2. by sporidia, consisting of sub-globose or elliptical cells, which are either naked or contained in other elongated more or less vertical cells (asci), and immersed in the thalamium (or fructification proper), and propagate new individ-
uals of the species. The thalamium is either rounded, gelatinous-waxy, and the asci converging (nucleiform); or flattened at length into a rigid, persistent, or afterwards collapsing lamina (subdisciform); or originally disciform (open); and is itself contained in a receptacle (exciple), either of the same color with and like the thallus (thalline exciple), or of different color and nature (proper exciple). The whole fructification constitutes the apothecium, which is typically round, though also occurring normally oblong and linear (lirelliform), and is either excavated with a contracted margin (urceolate); or slightly concave with an elevated margin (scutelliform); or very concave-scutelliform (cyathiform); or very concave-scutelliform and pervious (infundibuliform, a term applied also to the pervious cup-bearing podetia of Cladonia); or goblet-shaped and stipitate (crateriform); or dilated, flat, and without prominent margin (peltiform, of which the reniform is a variation); or convex with repressed margin (cephaloid); or between scutelliform and peltiform (disciform); or between scutelliform and cephaloid (tuberculatus). When the thalline exciple is prolonged below into a footstalk, it is said to be pedicellate; a proper exciple in like manner prolonged is said to be stipitate. When the proper exciple is originally and typically closed, the apothecium receives the name of perithecium. In the Angiocarpi several thalamia are sometimes contained in the same exciple (composite apothecia); and in the Gymnocarpi, in like manner, several disks are sometimes confluent (symphycarpeous apothecia). The colors of the thallus in Lichenes are disposed by Fries in four series: — 1. from pale green becoming glaucous; 2. from yellowish green becoming ochroleucous; 3. from dark green becoming fuscous or olivaceous; 4. from pale yellow-green becoming lemon-colored. Each series has its peculiar variations. The glaucous runs into pale green, ceruleescent, and white; the fuscous into dark green, olivaceous, cinereous, grayish-fuscous, and dark chestnut; the ochroleucous into yellowish green and albescence; the lemon-colored into pale yellow, orange-red, and vermillion-red.
Synopsis of the Genera.

Div. I. GYMNOCARPI, Schrader, Fries.

Apothecia open, disciferous. Thalamium originally disciform, or becoming so, contained in a thalline exciple or a proper exciple; disk normally persistent, ascigerous; sometimes originally pulverceaceous-collapsed.

Tribe I. PARMELIACEÆ, Fr. — Apothecia rounded, from concave becoming explanate, scutelliform, rarely peltate. Disk somewhat waxy, persistent, contained in a thalline exciple.

Subtribe I. USNEEEÆ, Eschw. — Disk open. Thallus subvertical, or pendulous-sarmentose, centripetal, without apparent hypothallus.
1. USNEA. Apothecia peltate; thallus with a solid medullary layer.
2. EVENIA. Apothecia scutelliform; thallus fistulous, or with a cottony medullary layer.
3. RAMALINA. Apothecia orbiculate-subpeltate; disk pale, of nearly the same color with the thallus.
4. CETRARIA. Apothecia scutellate-peltate, oblique.

Subtribe 2. PARMELIEÆ, Eschw. — Disk at first closed, becoming at length discoid-open. Thallus horizontal, centrifugal, with a hypothallus.
5. NEPROMA. Apothecia reniform, adnate to the lobes beneath.
6. PELTIGERA. Apothecia pelteform, adnate to the upper side of the elongated lobes.
7. SOLORINA. Apothecia adnate to the disk of the thallus.
8. STICTA. Apothecia scutelliform; thallus with cyphellae, or discolored spots, on the under side.
9. PARMELIA. Apothecia scutelliform; thallus without veins or cyphellae beneath.
10. THELOTRENA. Apothecia urceolate-scotelliform, a discrete interior exciple veiling a nigrescent disk.
11. GYALECTA. Apothecia urceolate, an elevated and discrete colored margin bordering a nigrescent disk.

Tribe II. LECIDEACEÆ, Fr. Apothecia rounded, a persistent disk contained in an open proper exciple, which it finally covers, and becomes convex, cephaloid, and immarginate.
15. *Biatora*. Apothecia disciform, solid, with a waxy (originally paler) exciple.
16. *Lecidea*. Apothecia disciform, solid, with a carbonaceous, black proper exciple.

Tribe III. *GRAPHIDACEÆ*, Fr. — Apothecia of various form, an altered thalline carbonaceous proper exciple, or an originally proper exciple margining a gyrose and proliferous-papillate, or canaliculate disk.
17. *Umbilicaria*. Apothecia orbiculate or lirellæform; thallus foliaceous.
18. *Opegrapha*. Apothecia lirellæform; thallus crustaceous.

Tribe IV. *CALICIACEÆ*, Fr. — Apothecia orbiculate or globose, always open, margined by a proper exciple, the disk collapsing into naked sporidia; or immarginate, and the sporidia capituliform-compact.

Div. II. ANGIOCARPI, Schrader, Fries.

Apothecia closed, nucleiferous, pertuse and with an ostiole, or irregularly dehiscent; the nucleus included, subglobose, ascigerous.


Tribe II. *EndocarpaceÆ*, Fr. — Apothecia immersed in the thallus, globose, the thalline exciple attenuated into a neck, and terminated by a discrete heterogeneous lirellæform ostiole. Nucleus deliquescent. Thallus horizontal, foliaceous or crustaceous.
24. **Endocarpon.** Apothecia pale, included in the foliaceous thallus.
25. **Sagedia.** Apothecia blackish, immersed in the crustaceous thallus.
26. **Pertusaria.** Apothecia verrucæform, with one or more blackish, papillate ostioles.

**Tribe III. Verrucariaceæ, Fr.** — Apothecia rounded, a closed proper exciple (perithecium) becoming pertuse with an ostiole, or at length open. Nucleus gelatinous, subhyaline, deliquescent. Thallus crustaceous.

27. **Conotrema.** Perithecia at length open; nucleus subdisciform.
28. **Verrucaria.** Perithecia closed, with a papillæform or simply pertuse ostiole.

**Tribe IV. Limboriaceæ, Fr.** — Apothecia rounded, the carbonaceous proper exciple closed, at length variously dehiscent. Nucleus subcercaceous, rigescent. Thallus crustaceous.

29. **Pyrenothea.** Perithecia at length pertuse, protruding the fatiscent nucleus.

**Div. I. Gymnocarpi, Schrad., Fr.**

**Tribe I. Parmeliaceæ, Fr.**

**I. Usnea, Dill., Hoffm.**

Apothecia rounded, peltate, subterminal; disk open, placed upon the filamentous medullary stratum, the margin mostly radiate-ciliate. Thallus cartilagineous, at first erect, suffruticulose, becoming with age more or less filamentous or pendulous, the crustaceous cortical stratum somewhat separate from the medullary.

A genus universally diffused; and the first species occurring, in one or other of its forms, in every quarter of the globe. This species extends throughout the United States. *U. homalea*, Tuckerm. Enum. 1845, with a softish, much compressed, anciptal, rugulose, fastigate and attenuate-branched thallus, and plane apothecia, with scarcely elevated, obtuse margins, *Ramalina homalea*, Ach. Lich. p. 598, was discovered on the coast of California by Menzies! but has not been detected elsewhere.


Firs and other trees on the sides, and in swamps at the base, of the high mountains of New England, and northward, occurring 5 feet long. Infertile, as is also the case with the European Lichen on which the species was founded. It seems, like the last species, to be very widely diffused; and I have, or have seen, specimens probably belonging to it, from Europe, Asia, Africa, and New Holland. A single Cape of Good Hope specimen, in my possession, is fertile, and has quite concave, radiate apothecia, with somewhat elevated, obtuse margins. The earliest specimen that I have seen is an infertile one in the Berlin herbarium, collected in Cappadocia by Tournefort.


4. *U. trichodea*, Ach. Th. pendulous (prostrate), very delicate


5. *U. spachelata*, R. Br. Th. erectish, fruticulose, the principal branches ochroleucus, black-vittate, smooth, the ultimate ones attenuate, black, all sorediiferous. *R. Br. Suppl. to Parry's Voy* p. 307.

Melville Island, *R. Br.* I have not seen American specimens, but I have received fine ones from Dr. Vahl, collected by him in Spitzbergen.

II. **EVERNIA**, Ach., Fr.

Apothecia rounded, scutelliform, marginal; disk open, placed upon the cottony medullary layer, colored. Thallus originally erect, teretish-fruticulose or compressed-foliaceous (abnormally filamentous or pendulous), within uniform, and either fistulous, or filled with the cottony medullary layer.

The third section of this genus (*Physcia*) is further represented in the South of Europe by three species not as yet known with us:— *E. intricata*, Fr., with a much-branched, linear, glaucous thallus; *E. villosa*, Fr., with a villous, multifid, glaucous thallus; and *E. flavicans*, Fr., with a much branched, linear, bright yellow thallus; of which the first and last species attain to the southern coast of England (Borrer); the first two are found in the Canary Islands (Montagne); the second in Peru (Acharius); and the last in the West Indies (Ach.) and South America (Eschweiler). It is possible that one or more of these species may occur in the Southern States. In the North, *E. di-viricata*, Ach., nearest to *E. prunastri*, with a more or less filamentous, softish, lacunose thallus, is the only European Lichen of the present section that is wanting with us.

§ 1. **Cornicularia**, Fr. Fruticulose, passing into filamentous or pendulous forms.

1. *E. furcellata*, Fr., with long (terete-compressed ?) di-trichotomously divided, suberect, entangled branches, from hoary becoming cinereous, or slightly greenish, with furcate fuscous spices, *Dill. Musc. t. 85*.
f. 14, was constituted on a Lichen which Fries referred to this figure and description of Dillenius, whose own specimens were sent him from Pennsylvania, by J. Bartram. I have not seen Fries's description, but he says incidentally (Lichenogr. p. 478) that his specimens are (like those of Dillenius) infertile, and that the genus of the Lichen is therefore doubtful.


Very common: α, trees on high mountains, fertile; and on the ground in alpine districts, infertile; White Mountains. Arctic America, R. Br. (Ross's Voy.). — β, old rails, stones, and trees, sterile; common in New England. Arctic America, R. Br. (Scoresby's Arc. Regions), Rich. — γ, trees in mountainous and subalpine districts, infertile; New England and westward. Arctic America, Rich. — δ, dead wood, Canada, Michaux! Newfoundland and northward, Herb. Hook. ! Michaux's Lichen is extremely delicate, but apparently not distinct.

3. E. divergens, Fr. Th. somewhat angular, dark-chestnut, white-dotted; branches elongated, flexuous; apices attenuated, forked, of the same color; apoth. innate-sessile, crenulate, disk of the same color. Fr. Lichenogr. p. 21. Cornicularia, Ach.


4. E. ochroleuca, Fr. Th. teretish, smoothish, ochroleucous (and palish), axils compressed-sublacunose, irregularly branched, apices attenuate, subfibrillosae; apoth. innate-sessile, at length repand, disk livid-fuscous. Fr. Lichenogr. p. 22. — a. rigida, Fr.; th. suberect, fruticulose, rigid, ochroleucous, apices reflexed, blackish. Cornic. ochro-
leuca, Ach. — \( \beta \) sarmentosa, Fr.; th. filamentous, sarmentose-pendulous, much branched, softish, ochroleucous or pale, apices elongated, of the same color. *Alectoraria sarmentosa*, Ach.

Mountainous, alpine, and arctic regions. — \( \alpha \), on the earth; White Mountains, infertile. Arctic America, *Rich.* (Herb. Hook. !), R. Br. (Parry's First Voy.), fertile. — \( \beta \), on the trunks and branches of trees in the mountains of New England, and northward, fertile; and on the earth, alpine and arctic, sterile. \( \alpha \) does not seem to be well represented on our mountains. The arctic specimens are very fine.


Trunks and rails, N. W. America, *Menzies!* and Rocky Mountains, *Herb. Hook.!* fertile. A few specimens in my possession, from the White Mountains, and elsewhere, may belong to this; but most of the degenerate plants commonly referred to it here are, perhaps, as safely placed with *E. prunastri*.

§ II. *Dufourrea*, Fr. Fruticulose, inflated, apothecia terminal.


Arctic America, *Hook.* Considered by Hooker nearest to *E. madreporiformis*, from which he remarks that it differs in color, in its branching, and in being fistulous.


Bear Lake, and elsewhere in Arctic America, *Rich.* (herb. Hook. !). I follow Fries in considering the Dufourrea a section of the present genus. Hooker (App. to Parry's Sec. Voy. 1. c.) refers Dufourrea nodosa, R. Br. (Ross's Voyage), to a variety of the present species. I have not seen the description of Brown.

§ III. *Physcia*, Fr. Foliaceous-compressed, the under side channelled.
8. E. prunastri, Ach. Th. subfoliaceous, ochroleucous (and pallescent), laciniae linear-attenuate, rugose-lacunose; on the under side somewhat channelled and white; apoth. subpedicellate, cyathiform, rufous. Fr. Lichenogr. p. 25. —


III. RAMALINA, Ach.

Apothecia rounded, scutelliform, thick, pedicellate-subpeltate, scattered upon both sides of the thallus, disk open, placed upon the (green) gonimous stratum. Thallus originally erect, ramose-laciniate, similar throughout, and of the same color.

Two species occurring in the North of Europe are as yet wholly wanting with us: — R. pollinaria, Ach., with a softish, faceid, corrugated thallus besprinkled with white powdery spots; and R. scopulorum, Ach., with a thick, rigid, polished, often terete thallus, attaining to a very large size. At the extreme South, we may possibly have some West Indian species, or others peculiar to this continent. The late Mr. Menzies kindly presented me with two, collected by him on the coast of the Mexican State of California, which may be noticed briefly in this place. It is probable the first, at least, has been already described, but I have not been able to find any account of it. R. retiformis, Menz. herb.; subcartilagineous, much elongated, the irregular flexuous branches dilated above and regularly reticulate-perforate; apoth. lateral. Monterey! — R. Menziesii, Tuckerm.; submembranaceous, thin, deeply lacunose or plane, canalicate, smooth; apoth. lateral, sessile, with a thin, elevated margin. R. scopulorum? Menz. herb. R. scopulorum, var. tenuissima, Hook. & Arn. in Beechey’s Voy.
p. 163? Monterey! Appears to me to differ from R. scopulorum in its softish, plane, often deeply lacunose, and thin thallus, as well as in the apothecia. — Roccella, a genus nearly allied to the present and the last, and diffused throughout the warmer regions of the globe, has not as yet any North American representative. I saw, however, in a small collection of "Algæ from Carolina, Bermudas, and the Caribbees, by the Rev. Mr. Clerk," in the British Museum, a Roccella, which resembled R. phycopsis, Ach.; but it is uncertain at which of the above localities this Lichen was obtained.


Very common: α, β, and γ, on trees, rails, &c.; the last especially in mountain forests; δ, abundant in the New England mountains, and northward, on trees and rocks. New York, Torrey. Pennsylvania, Muhl.


IV. CETRARIA, Ach., Fr.

Apothecia scutellate-peltate, affixed obliquely to the apices of the thallus. Thallus cartilaginous-membranaceous, originally ascendant; smoothish on the under side; lobes either somewhat terete, or foliaceous and somewhat concave above.
All the European species, and indeed all that belong to the genus (as revised by Fries) in the last general work of Acharius (Synopsis), occur with us, with several others. It is difficult to define strictly the limits between the foliaceous species of Cetraria and some Parmelia of the subsection Imbricaria; and in his Flora Scanica, Fries has suggested the possibility of extending Cetraria to include most or all of the Imbricariae. But the genus, as limited in the Lichenographia Europaea, seems a natural one, and well distinguished from Parmelia.

§ 1. *Cartilaginea*, Fr. Thallus cartilagineous, suberect.


On the earth in alpine and subalpine districts. White Mountains, fertile. Northward to Arctic America, *R. Br., Hook.!*


5. *C. Islandica*, Ach. Th. subfoliaceous, sublinear, canaliculate, ciliate-spinulose, olivaceous-chestnut; apoth. obliquely scutellate, adnate to the upper side of the lobes, very entire, disk dark-chestnut.
AND BRITISH AMERICA.

Fr. Lichenogr. p. 36. — \( \beta. \) platyna, Fr.; laciniae broader, flattish, waved. Fr. l. c. — \( \gamma. \) crispa, Ach.; laciniae narrow, crisped, with connivent margins. Fr. l. c.

On the earth in alpine and subalpine districts, and at lower elevations northward, abundant and fertile; \( \gamma \) not found elsewhere. Also degenerate and sterile on hill-sides, and in sandy fields near the coast, throughout New England. New York, Torrey. Pennsylvania, Muhl.


On the earth in alpine and subalpine districts. White Mountains, fertile. Northward to Arctic America, R. Br. (Scoresby).

§ II. Membranaceae, Fr. Thallus coriaceous-membranaceous, the sterile fronds subdepressed.

8. C. glauca, Ach. Th. membranaceous, foliaceous, expanded, sinuate-lobed, ascendanat, glaucous (and cinerascent); becoming black on the under side; apoth. terminal, peltate, dark-reddish-chestnut. Fr. Lichenogr. p. 38. — \( u. \) fertilis, Fr.; laciniae elongated, channelled, becoming whitish on both sides, or spotted with white. Fr. l. c. — \( \beta. \) sterilis, Fr.; laciniae shorter, wider, subdepressed, the under side fusca black. Fr. l. c.

Trunks of trees, stones, &c., in mountain forests, and elsewhere; New England. Northward to Newfoundland, Pylaie.

9. C. sepincola, Ach. Th. membranaceous, foliaceous, ascendant, laciniate, from green becoming olivaceous-fuscescent; paler beneath; laciniae plane (the margins sometimes crisped, pulverulent), fertile ones short; apoth. adnate to the upper side of the lobes, dark-fusca. Fr. Lichenogr. p. 39.


Trunks of trees, and old rails, common and fertile; ascending to subalpine districts, where it is often very small, and resembles the last; New England. New York, Halsey. Pennsylvania, Muhl.!


Trunks of trees, and old rails. — α, Northwest coast, Menzieς! — β, Lake Superior to New England, fertile. New York, Halsey. Pennsylvania, Muhl. The plant of Menzieς differs from ours considerably, but more specimens of the Oregon Lichen are required, to settle the distinctness of the two.

12. C. placorodia, Tuckerm. Th. subcartilagineous, foliaceous, of narrow, at first smooth and discrete, at length convex, concrete, and plicate lobes, finally besprinkled with black grains or wholly isidiophorous, pale livid-glaucous; on the under side fuscescent, rugose, smooth, sparingly fibrillose; laciniae crisped, crenate; apoth. marginal, peltate on the ascending lobules, from pale fuscescious dark chestnut, with an inflexed crenate margin, at length explanate. Parmelia placorodia, Ach.! Syn. p. 196.

Trunks (normal), Chelmsford, Russell! and common on rails, when (like C. ciliaris, C. lacunosa, and others) it assumes a Parmeliaceous aspect. From Parmelia it appears to me distinct, in its marginal, obliquely affixed apothecia, and its smooth, reticulate-rugose under-side. Acharius was acquainted only with the rail-Lichen.

13. C. aurescens, Tuckerm. Th. subcoriaceous, foliaceous, plane, sinuate-lobed, yellowish-green; beneath whitish with pale fuscescent fibres; margins of the lobes elevated, crisped, black-denticulate; apoth. large, elevated, chestnut, with a thin crenulate margin.

Trunks and branches of Coniferae, New Hampshire. And old rails, Massachusetts.

Trees and rocks in mountain forests, New England; fertile.

15. C. viridis, Schwein. Th. membranaceous, foliaceous, round-lobed, lacunose-rticulate, glaucous-green; pale yellow on the under side; margins waved, black-denticulate; apoth. chestnut-brown, with an inflexed, lobate-dentate margin. Schwein. in Hals. Lich. N. Y. l. c. p. 16.

Cedars, Massachusetts. New York, Halsey. Certainly very near the next; and the Massachusetts Lichen here referred to it is perhaps nothing but a state of C. juniperina, p.


On trees, and on the earth, Arctic America, Rich., Hook. ! — β, cedars and other trees, and rails, on the coast of Massachusetts, Russell ! and southward to New York, Torrey, and Pennsylvania, Muhl. Our β can be compared only with the low-country Lichen of the North of Europe, from which it appears to differ as described. The alpine European forms, and our own arctic ones, recede variously from this type.


Subalpine shrubs and rocks; also trees in mountain woods and swamps, infertile; New England. Northward to Arctic America, Rich.
V. NEPHROMA, Ach.

Apothecia reniform, plane, not velate, adnate to the under side of the thallus, with an elevated thalline margin. Thallus membranaceous, softish, somewhat villous on the under side.

Nephroma is constituted a section of Peltigera in the Lichenographia of Fries, but in his Flora Scania, 1835, and his Summa Fl. Scand. 1845, these genera are recognized as distinct; as they are also by Montagne. Féé (Crypt. Exot. Suppl. p. 8) remarks that they differ also in their thecae.


2. N. resupinatum, Ach. Th. cartilagineous-membranaceous, smooth, from glaucous becoming fuscescent; pale and downy on the under side, which is sparingly besprinkled with whitish soredia; apoth. rufous-fuscous. Ach. Syn. p. 241.

Trunks, often of mountain ash, in mountain forests, luxuriant and fertile; New England. New York, Halsey. Arctic America, Rich. Darker on rocks, where it is frequently quite small.


Rocks. White Mountains, not uncommon. And on the coast, Mr. Oakes. Fertile.


VI. PELTIGERA, Hoffm.

Apothecia orbiculate, peltiform, plane, adnate to the upper side of elongated lobes of the thallus, or more rarely marginal; with a thin margin of the thallus. Thallus coriaceous-membranaceous, venose on the under side.

1. P. malacea, Ach. Thallus spongy, soft, smooth, round-lobed, fuscous-cinerascent, clothed on the under side with a dense blackish tomentum becoming white towards the margins; apothecia ascendant, rounded, margin crenulate. Fr. Lichenogr. p. 44.

Mountainous districts; on the earth and on shrub firs near the limit of trees, and on rocks at lower elevations, White Mountains.

2. P. aphthosa, Hoffm. Th. coriaceous, smooth, besprinkled with warts, bright green (and glaucescent); reticulated with blackish veins, and fibrillose on the under side; apoth. large, ascendant, round, with a somewhat lacerate margin. Fr. Lichenogr. p. 44.


3. P. canina, Hoffm. Th. membranaceous, flaccid, scrobilicate, subtomentose, fuscous-green (and cinerascens, and hoary); the under side whitish and reticulated with pale fuscous veins; apoth. ascendant, rounded, at length semi-revolute, vertical. Fr. Lichenogr. p. 45.


4. P. rufescens, Hoffm. Th. coriaceous, soft, subtomentose, cinereous-virescent (and cinereous, and rufescens); fuscous-fibrillose on the under side, and reticulated with black-fuscous veins; lobes rather narrow, with elevated and crisped margins; apoth. at length vertical, oblong, revolute. Fr. Lichenogr. p. 46. Pellidea spuria, Ach. Tuckerm. Lich. N. E. l. c.

On the earth, rocks, and trunks among mosses; New England. Thallus smaller and thicker than in the last.
5. *P. polydactyla*, Hoffm. Th. papyraceous, very smooth, shining, plumbeous-virescent (and gray), on the under side almost naked, reticulated with spongy fuscous veins; (fertile lobules often very numerous;) apoth. ascending, finally revolute. *Fr. Lichenogr. p. 46. — *


7. *P. venosa*, Hoffm. Th. coriaceous (small), fan-shaped, simple, green (and cinereous); white on the under side, and variegated with fuscous-black, divaricately branched veins; apoth. adnate to the thallus, round, horizontal. *Fr. Lichenogr. p. 48.*


**VII. SOLORINA**, Ach.

Apothecia suborbiculate, depressed, adnate to the disk of the thallus, covered originally with a thin membrane, which forms at length an evanescent margin, ‘subgelatinous within.’ Thallus coriaceous-membranaceous, foliaceous, venose or lanuginous beneath.

Eschweiler (Syst. p. 21, & Lich. Brasil. in Mart. Fl. Bras. 1833, p. 60) considers this genus very distinct from *Peltigera* in the peculiar evolution of its apothecia. The apothecia of some species of *Peltigera* are indeed velate, and this is the case with nearly all, according to Fries; but these groups differ also in their thecia, as shown by Eschweiler and by Feé, and in a somewhat different habit. Montagne (Bot. Zeitung,
1, p. 476), Flotow (Ibid. p. 613), Féé (Crypt. Exot. 1. c.), and J. D. Hooker (Lich. Antarct. in Hook. Jour. Bot.) have enlarged the present genus by the addition of some interesting tropical and other species.


Rocks (limestone), New York, B. D. Greene, Esq. Newfoundland, Pylaie. Northward to Bear Lake, Herb. Hook. ! Solorina orbiculata, Menz. herb. ! from the Pacific coast, appeared to me a distinct, but I believe it is an undescribed species.

**VIII. STICTA, Ach.**

Apothecia scutelliform, adnate to the margin or disk of the thallus, somewhat oblique, the margin free beneath. Disk at first closed, nucleiform; becoming at length elevated and explanate. Thallus expanded from a centre, foliaceous, coriaceous-cartilagineous, lobate, villous on the under side, and having on this side small, regular urceolate cavities (cyphella), or where these are wanting soredia, or discolored spots.

A mostly tropical genus, with many West Indian and South American species, some of which are represented in the extreme southern parts of the United States.

1. S. aurata, Ach. Thallus subcoriaceous, reddish-brick-colored; on the under side lanuginous, reddish-yellow at the circumference, and besprinkled with small, irregular, often sorediiform, yellow cyphellae; laciniae rounded, sinuate-cut, the margins undulate, crisped, and yellow-pulverulent; ' apothecia marginal, disk plane, fuscous-red, margin inflexed.' *Delis. Stict. p. 49.*

Among mosses on rocks and trees. (Southern States ! and Texas ! infertile.) Ohio? The Southern Lichen probably occurs within our limits.

Rocks among mosses, New England, infertile; less common in the Northern mountains. *S. Feei*, Delis. 1. e. p. 44, from North America, is perhaps a Southern species.


4. *Lichenes quercizans*, Ach. Th. cartilagineous, lacinate, plane, pale-rufous-fuscous; somewhat tomentose, and subfuscous-nigrescent beneath, with urceolate (membranaceous), whitish cyphellæ; lobes subimbricate, oblong, rounded, crenulate; ‘apoth. scattered, disk somewhat concavo-plane, with a thin entire margin.’ *Delis. Stict. p. 54.* *Lobaria, Michx.*

Pennsylvania, *Herb. Montagne! Mossey rocks, New York, Russell!* The specimens from Mr. Russell seem to me to differ from *Lichenes sylvatica* in the characters indicated by Delise, and to agree with his *Lichenes quercizans*, as they also do with my brief notes on the specimen (from Carolina) in herb. *Michaux*. *S. Beauvoisii*, Delis. 1. e. p. 83, constituted on a North American Lichen, seems hardly distinct from the present.

5. *Lichenes scrobiculata*, Ach. Th. coriaceous, suborbiculate, lax, scrobiculate, leaden-gray (and glaucescent); lanuginous on the under side, with naked, white spots; laciniae rounded, somewhat entire (commonly sorediiferous); ‘apoth. scattered, from rufous becoming fuscescent.’ *Fr. Lichenogr. p. 53.*


6. *Lichenes anthrapsis*, Ach. Th. cartilagineous-membranaceous, lacu-
nose-reticulate, broadly round-lobed, cinereous-virescent; rugulose and somewhat villous beneath, with small, white, sorediiform cyphellae; lobes somewhat crenate; apoth. scattered, disk at length convex, black, and excluding the entire thalline margin. Ach. Syn. p. 233.

On the earth, among mosses; Northwest Coast, Menzies! New York, Halsey. The upper surface resembling that of S. pulmonaria.

7. S. pulmonaria, Ach. Th. coriaceous, lax, lacunose-reticulate, dark green (and olivaceous); tomentose on the under side, with naked, white spots; laciniae elongated, discrete, sinuate-lobed, retuse-truncate; apoth. submarginal, rufous. Fr. Lichenogr. p. 53. Lichen pulmonarius, L.

Trunks in mountain forests, fertile. Also on rocks, where various sterile forms are found. Among these is S. limita, Ach., quoted by Delise as from the United States, which has occurred at the White Mountains, with all the features of the Swiss Lichen. New England. New York, Torrey. Pennsylvania, Muhl. Newfoundland, Pylaie.

8. S. glomerulifera, Delis. Th. coriaceous-cartilagineous, thick, orbicular, appressed, smooth, from pale green becoming glaucescent; villous on the under side, with scattered, excavated cyphellae (which are often wanting); laciniae elongated, sinuate-lobed; apoth. scattered, dark-reddish-chestnut, with a rugose, persistent margin. Delis. Sict. p. 129. Tuckerm. Further Enum. l. c. Parmelia, Ach.

Trunks of trees, and rocks, fertile; New England. Pennsylvania, Muhl. in herb. Willd. ! Northward to Newfoundland, Pylaie. The green glomerules of the European Lichen always wanting in ours. Young plants of this species may be taken for the next.


IX. PARMELIA, Ach., Fr.

Apothecia scutelliform, orbicular, adnate horizontally to the disk of the thallus, with an equal thalline margin. Disk at first connivent-
closed, somewhat waxy. Thallus expanded horizontally from a centre, two-sided, of various form, upon a hypothallus. *Fr. Lichenogr.* p. 56.

**Synopsis of the Sections.**

**Sect. I.** The fibrillose hypothallus adnate to the foliaceous thallus, which is discrete from the matrix.

**Subsect. I. Imbriaria, Fr.** — Apothecia elevated, subpedicellate, regular; disk very thin, naked, placed upon the gonimous layer. Thallus imbricate-foliaceous; often black-dotted from abortion of the apothecia. — *Sp. 1–24.*

**Subsect. II. Physcia, Fr.** — Apothecia at first closed, at length dehiscent. Disk thickish, waxy, placed upon the medullary layer. Thallus normally foliaceous; ascendant or stellate; fibrillose on the under side.

* Thallus normally ascendant, or loosely decumbent; apoth. somewhat obliquely marginate. — *Sp. 25.*

** Thallus normally stellate-appressed; apoth. plane. — *Sp. 26–33.*

**Sect. II.** Thallus subfoliaceous, at length compacted into a conglomerate, subgranulose crust; arising from a fibrillose (rarely obsolete) hypothallus, which is adnate to the matrix.

**Subsect. III. Pyxine, Tuckerm.** — Apothecia erumpent, at first closed, palish; becoming patelliform, and, with the altered thalline margin, black; finally cephaloid, excluding the margin. Thallus subfoliaceous, imbricate-laciniate, at length crustaceous-concrete at the centre, on a black, fibrillose hypothallus. — *Sp. 34.*

**Subsect. IV. Amphiroma, Fr.** — Apothecia erumpent, somewhat coronate with an accessory thalline margin. Disk waxy, thickish, naked. Thallus foliaceous, somewhat monophyllous, rounded, at length crustaceous-compact at the centre, placed on a spongy-pannose hypothallus. — *Sp. 35–38.*

**Subsect. V. Psoroma, Fr.** — Apothecia for the most part two-formed, adnate or immersed; arising in the one case from the thallus, with a crenate-thalline margin; and in the other from the hypothallus, with an entire proper margin. Disk waxy. Thallus of discrete, foliaceous squamules, arising from a common hypothallus; often at the centre, or wholly, concrete in a subgranulose crust. — *Sp. 39–41.*
Sect. III. Thallus crustaceous, lobed at the circumference, or wholly squamulose-effigurate. Hypothallus smooth, adnate to the matrix, often confused with the thallus.

Subsect. VI. Placodium, Fr. — Apothecia plano-scutelliform, elevated, disk without proper margin, naked. Thallus as above. (Thalline margin often colored like the disk.) — Sp. 42–47.

Subsect. VII. Psora, Fr. — Apothecia innate, at first somewhat urceolate, afterwards scutelliform. Disk with a proper margin (visible at least in the younger apothecia), normally at first cæsious-pruinose. Thallus as above. — Sp. 48–50.

Sect. IV. Thallus crustaceous, uniform. Circumference similar, or the hypothallus sometimes fibrillose-radiant.

Subsect. VIII. Patellaria, Fr. — Apothecia regular, scutelliform, sessile, the thalline margin persistent. Lamina of the disk somewhat plane, without proper margin. Thallus crustaceous, adnate to an indeterminate, mostly black hypothallus. Disk not cæsious-pruinose. — Sp. 51–66.

Subsect. IX. Urceolaria, Fr. — Apothecia innate in the crust, or immersed in protuberant warts. Lamina urceolate, or protuberant, verruciform, blackish, normally cæsious-pruinose, marginate. Thallus crustaceous; the whitish hypothallus confused with the thallus, or often fibrillose and radiant. — Sp. 67–70.

Sect. I. The fibrillose hypothallus adnate to the foliaceous thallus.

Subsect. I. Imbricaria, Fr.

Series I. Glaucесеntеs, Fr.

1. P. crinita, Ach. Thallus submembranaceous, suborbicular, glaucous-fuscescent (the whole thallus, as well as the apothecia, beset with isidioid granules and branchlets); black and somewhat smooth on the under side, and here and there black-fibrillose; lobes plane, with somewhat ascendant, erose-crenate, ciliate margins; apothecia (imperforate) marginal, subpedicellate, cyathiform, with a thin, inflexed, crenulate margin, at length explanate, large. Ach. 1 Syn. p. 196. P. perforata, β. Fr. Trunks, &c., fertile; New England. New York; Torrey. Pennsylvania, Muhl. There appear to be indications of other differences beside the isidioid efflorescence to distinguish this from P. perforata. The latter is perfectly normal with us.
2. *P. perforata*, Ach. Th. membranaceous, smooth, greenish-glau-cescent; on the under side black, with dark fibres; lobes rounded, ascendant, subcrenate, ciliate; apoth. large, rufous, elevated, infundibuliform; disk perforate, at length explanate, margin very entire. *Fr. Lichenogr.* p. 55.


Trunks and rocks in mountainous districts, fertile; and common also in sterile forms; New England. New York, Halsey.


5. *P. tiliacea*, Ach. Th. membranaceous, orbicular, smoothish, glaucous-cinerascent; on the under side blackish-fuscous, with black fibres; lobes sinuate-laciniate, the external ones rounded, crenate; apoth. subfuscous, margin very entire. *Ach. Syn.* p. 199.


Trunks, &c., fertile; New York, Halsey. — β, New England. Pennsylvania, Muhl. The anamorphic development called by Sommerfelt Lecidea Parmeliarum, and referred by Acharius to Endocarpon, occurs not unfrequently in this species, as well as in the next.


8. P. aeurites, Ach. Th. membranaceous, orbicular, contiguous, rugose-plicate, glaucescent (at length furfuraceous); on the under side pale, with fuscous fibres; lobes discrete at the circumference, plane, rounded, cut-crenate; apoth. dark-fuscescent, margin at length crenulate. Fr. Lichenogr. p. 62.

Dead wood, and firs, in mountainous districts, fertile; and on rocks, sterile. The sterile plant is also common on rails, &c., on the coast. New England. New York, Halsey. Fries refers to this species the P. obsessa, Muhl. Catal., and Ach. Syn. p. 213.

9. P. levisgata, Ach. Th. membranaceous, suborbicular, smooth, glaucescent; black, and fibrillose on the under side; laciniae multifid, linear, plane, cut, divaricate (often sorediferous); apoth. chestnut, margin very entire. Ach. Syn. p. 212.

Trunks (very common on beech in mountainous districts), fertile.

10. P. sinuosa, Ach. Th. membranaceous, suborbicular, smooth, glaucescent; black, and fibrillose on the under side; laciniae linear, wider at the circumference, sinuate-pinnatifid, the sinuses wide, circular; apoth. somewhat plane, fuscous, margin thin, very entire. Ach. Syn. p. 207.

Trunks and rocks. Nova Scotia, Ach. Fries and Meyer refer this and the last to a single species, but Borrer regards them distinct.

Trunks in mountain forests, frequent, and rocks, fertile; New England.


Series 2. O l i v a c e o - f u s c a, Fr.

14. P. olivacea, Ach. Th. membranaceous, orbicular, smooth, rugulose (elevated-punctate, or granulate-farinose), olivaceous-fuscous; paler and subfibrillose on the under side; lobes radiate, appressed, plane, rounded, crenate; apoth. dark-olive, with an inflexed, at length crenate margin. Fr. Lichenogr. p. 66.


Alpine and subalpine rocks, and occurring also at lower elevations in mountainous districts. White Mountains; Chin of Mansfield, and other of the Green Mountains; fertile. Northward to Newfoundland, Pylaie, and Arctic America, Rich. — $\beta$, Greenland, Dill.


Alpine and subalpine rocks. White Mountains and the higher Green Mountains. Northward to Newfoundland, Pylaie, and Arctic America, R. Br. — $\beta$, White Mountains, infertile. Northward to Arctic America, Hook. Melville Island, R. Br.

Series 3. Ochroleuca, Fr.

17. P. caperata, Ach. Th. submembranaceous, orbicular, rugose (or granulose-pulverulent), ochroleuaceous; on the under side blackish and sparingly fibrillose; lobes sinuate-laciniate, rounded, somewhat entire at the apices; apoth. fuscous-red, margin tumid-incurved, rugose-crenate. Fr. Lichenogr. p. 69.


19. *P. incurva*, Fr. Th. cartilaginous-membranaceous, stellate-imbricate, globuliferous, greenish-straw-colored (and ochroleucous); black and fibrillose on the under side; laciniae very narrow, multiform, subterete, recurved at the apices; apoth. rufous-fuscous, subentire. *Fr. Lichenogr. p. 70.*  
*P. recurva*, Ach.

Rocks in mountainous districts (subalpine, and descending). White Mountains; fertile.

20. *P. ambiguа*, Ach. Th. membranaceous, orbicular, stellate-imbricate, farinose-sorediferous, greenish-straw-colored (and ochroleucous); black and fibrillose on the under side; laciniae plane, linear, appressed, multiform; apoth. adnate, rufous-fuscous, very entire. *Fr. Lichenogr. p. 71.*

Trunks and dead wood in mountainous districts, fertile; and on rocks, infertile; White Mountains. Northward to Arctic America, Rich.

21. *P. centrifugа*, Ach. Th. submembranaceous, suborbicular, greenish-straw-colored (and ochroleucous); white and fibrillose on the under side (the crust-like centre often falling away, and leaving a concentrically disposed circumference); laciniae linear, concrete, convex, rugose; apoth. rufous-fuscous, margin subentire. *Fr. Lichenogr. p. 71.*


Series 4. *Citrina*, Fr.

22. *P. parietina*, Fr. Th. foliaceous or squamulose, imbricate, membranaceous, sublobate, yellow; paler and obsoletely fibrillose on the under side; apothecia with elevated margins, very entire. *Fr. Lichenogr. p. 72.*—*a.* (foliacea), Fr.; th. foliaceous, from greenish becoming bright yellow; lobes explanate, appressed. *P. parietina*, Ach. —*b.* aureola, Fr.; th. foliaceous, somewhat zoned and subcentrifugal, dark-golden-yellow; lobes concrete, plicate-ramose. *P. aureola*, Ach. —*v.* rutilans, Fr.; th. foliaceous-subcrustaceous, imbricate-complicate, irregularly laciniate. *P. rutilans*, Ach. —*d.* laciniosa, Duf.; th. naked, lacerate-dissected, squamulose; laciniae ascending, naked. —*e.* polycarpa, Fr.; th. smaller, conglomerate; the lobes complicated, and covered with the

Very common: *α*, on trunks, rocks, &c.; *β*, on rocks and stones (especially maritime), exposed to the sun; *γ* and *δ*, on trunks, exposed to the sun; *ε* and *ζ*, on the smaller branches and twigs of trees; *ζ* and *η*, on smooth bark, the last also common on dead wood; *ι*, on bark and dead wood in moist places; New England (*γ* and *δ*), Halsey. Pennsylvania (*η*), Muhl. Ohio (*α*), Mr. Lea! Illinois (*α*), Russell! Northward to Nova Scotia (*γ*), Menzies! Newfoundland (*α*), Pylaie, and Arctic America (*ε* and *ζ*), Rich! I have adopted Fries's view of the European species nearly entire. He remarks that he has distinguished and enumerated these forms, not so much on account of their importance as distinct states, as to furnish an example, that can almost everywhere be authenticated, of the extremely Protean character of the thallus of Lichens.


Arctic America, and southward, *Ach.*


Trunks and branches of trees near the coast, and luxuriant in places exposed to the sea-spray; New England. New York, Torrey (at Newburgh, Russell!). Pennsylvania, Muhl. Illinois, Russell!
Subsect. II. Physcia, Fr.

25. P. ciliaris, Ach. Thallus cartilagineous, from green becoming glaucous; laciniae linear, ramose, subascendant, channelled beneath, ciliate with simple fibres; apothecia subterminal, pedicellate, margin erect, at length lacerate-dentate, fimbriate, or obliterated in foliaceous branches; disk plane, black, subpruinose. Fr. Lichenogr. p. 77. Borrera, Ach. — β. galactophylla, Tuckerm.; more delicate; the laciniae very white and powdery beneath; margins of the apothecia at length obliterated in foliaceous expansions; disk white-pruinose. P. galactophylla, Willd. herb. — γ. angustata, Tuckerm.; laciniae extremely narrow, of nearly the same color beneath, subterete at the apices. Borrera angustata, Bory ms.

Trees, New England (β), rare. New York, Torrey. Pennsylvania (β), Muhl. and southward, where β is common. North to Arctic America, Rich. — γ, Newfoundland, Bory in herb. Berol ! Rocky Mountains, Herb. Hook. ! P. leucomea, Ach., a species near this, but with narrow, ascendant laciniae, and tomentose marginal fibres, occurs in the Carolinas, Michx. ! and California, Menzies ! and P. erinacea, Fr., with lacerate-laciniate, diffuse lobes, which are ciliate, and beset above with very long whitisb fibres, in California, Menzies !

26. P. detonsa, Fr. Th. cartilagineous, substellate, naked, glaucous-fuscescent (and fuscous); whitish on the under side with black fibres; laciniae narrow, linear, somewhat convex, digitate-multifid, often semiterete, very densely crowded together and imbricated; apoth. sessile, margin at length crenate, and leafy, disk plane, becoming dark-fuscous. Fr. Syst. Orb. Veg. fide ipsius. P. Nova Angliae, Tuckerm. in litt. olim. P. aquila, Muhl. Catal.

Rocks and trees, New England. Ohio, Mr. Lea ! Near to P. aquila. I have not seen Fries’s description.

27. P. pulverulenta, Fr. Th. cartilagineous, substellate, pruinose-cinereous; black on the under side and hispid-tomentose; laciniae linear, multifid, approximate; apoth. sessile, margin tumid, entire, or squamulose-foliaceous, disk plane, black-fuscous, subpruinose. Fr. Lichenogr. p. 79. P. pulverulenta, venusta, & muscigena, Ach. — β. leucoleiptes, Tuckerm.; the whole thallus white-farinose-pruinose, lobes radiant, margins interruptedly inflexed and pulverulent; apoth. sessile, disk depressed, white-pruinose, margin subduplicate, the external border foliaceous or entire. Lichen leucoleiptes, Muhl. in herb.
AND BRITISH AMERICA.


Trunks, rocks, and upon mosses; Bear Lake and elsewhere in Arctic America, Rich. (Herb. Hook. !) — β, trunks and rocks; New England to Pennsylvania! often isidioid-efflorescent.


29. P. speciosa, Ach. Th. cartilagineous-membranaceous, substellate, glabrous, greenish-glaucous (and white); very white beneath, with numerous pale fibres; laciniae linear, somewhat concavo-plane, imbricate, incised-ramose, crenate, ciliate-fibrillose, margins often ascendant, green-pulverulent; 'apoth. subsessile, margin incurved, crenate, disk rufous-fuscous, nearly naked.' Fr. Lichenogr. p. 80.


Trunks, New England; Swartz, l. c. I have a Lichen from the White Mountains resembling this, except that the under side as well as the fibres are black.

31. P. stellaris, Wallr. Th. subcartilagineous, naked, not pruinose, glaucescent; whitish on the under side, with dark fibres; laciniae sublinear, multifid; apoth. sessile, disk fuscos-black, subpruinose, margin somewhat tumid, subentire. Fr. Lichenogr. p. 82. — a. (stellari-expansa), Fr.; th. stellate-expanded, fibres shorter. Fr. l. c. P. stellaris, aipo-
lia, & anthemina, Ach. — β. hispida, Fr.; laciniae ascendant, hispid on the margins, or tubulose-inflated. Fr. l. c. Borrera tenella, Ach. — γ. (tribracia), Fr.; laciniae ascendant, squamulose, sparingly fibrillose, pulverulent at the apices. Fr. l. c. Lecanora tribracia, Ach. part.


32. P. casia, Ach. Th. subcrustaceous-membranaceous, substellate, gray (and cineraceous), besprinkled with gray soredia; pale on the under side; laciniae linear, somewhat convex, subpinnaeatis, ciliate-fibrillose; apoth. sessile, margin thin, somewhat inflexed, entire, disk at length naked, black. Fr. Lichenogr. p. 83. — α. (stellata), Fr.; laciniae stellate-expanded, fibres shorter, soredia regular; P. casia, Ach.; and the laciniae sometimes very narrow. Fr. l. c. P. dubia, Fl. — β. (squamulosa), Fr.; laciniae squamulose, short, obtusely fibrillose. Fr. l. c. Lecanora tribracia, Ach. part.


33. P. obscura, Fr. Th. submembranaceous, orbicular, not pruinose, greenish, becoming livid-fuscous when dry; black and fibrillose on the under side; laciniae sublinear, somewhat plane, incised-multifid (often sorediferous, or the margins pulverulent); apoth. sessile, very entire, disk naked from the first, black-fuscous. Fr. Lichenogr. p. 84. P. cycloselis, Ach. — β. ulothrix, Fr.; laciniae linear, subcilicate, apoth. fibrillose below. Fr. l. c. P. ulothrix, Ach.

Trunks, dead wood, &c., and passing into several degenerate states; New England. New York (α and β), Halsey. Pennsylvania (β), Muhl. Ohio (β), Mr. Lea! Northward to Arctic America (α), Rich. — A very distinct species detected recently by Mr. Oakes (P. Tuckerman, Oakes ms.) may be referred to here. Resembling generally small greenish forms of P. parietina, this differs in the foliose-lobate margins of the apothecia, which are also fibrillose beneath, as in P. obscura, β. It is common on trunks about Boston (Oakes, Tuckerman), and I have found it on rocks at the White Mountains. It was sent from Ohio by the late T. G. Lea, Esq. (Herb. Russell!), and I have North Carolina specimens from Mr. Curtis. (What is P. fibrosa, Fr., referred to incidentally, Lich. pp. 75, 97?)
Sect. II. The subfoliaceous at length subgranulose thallus arising from a fibrillose hypothallus, which is adnate to the matrix.

Subsect. III. Pyxine, Tuckerm.


Trunks, common (abundantly fertile in mountain forests), and also on rocks; New England. Pennsylvania, Muhl. ! Rocky Mountains, Herb. Hook. ! (Southward to Texas.) I have not seen the description of Fries, and am uncertain whether his Pyxine is founded on our Northern Lichen (which is probably what Acharius described), or on the West Indian and South American Lecidea sorediata of Eschweiler. The latter seems distinct, and has been separated as Circinaria Berti-riana by Feé (Crypt. Exot. p. 128). Our Lichen appears to me a modification of Parmelia, near to Amphiloma, Fr. The apothecia have some of the features of those of Umbilicaria, and illustrate Fries's observation, that this genus is related to Parmelia.

Subsect. IV. Amphiloma, Fr.

35. *P. rubiginosa*, Ach. Thallus membranaceous, suborbicular, not pruinose, livid-glaucescent, lacinate-multifid at the circumference; hypothallus indeterminate, tomentose, bluish-black; apothecia reddish-brown, with an incurved, crenate margin. Fr. Lichenogr. p. 88. — β. conoplea, Fr.; the centre of the thallus passing into a bluish, pulveraceous-granulose crust; † apothecia symphycarpeous, immersed, convex, granulose-marginate.' Fr. l. c. *P. conoplea*, Ach.

Rocks and trunks. β has occurred at the White Mountains; and I have α from the South.

36. *P. Russelii*, Tuckerm. Th. orbicular, coriaceous-membranaceous, minutely farinose-granulose, submonophyllous, irregularly radiant, pale-fuscescent-lead-colored; laciniae somewhat ascendant; hypoth. indeterminate, of very short white fibres becoming lead-colored at the margins; apoth. (central, very numerous) reddish-chestnut and nigres-

Trunks and dead wood; Hingham, *Mr. Russell.* Ipswich, *Mr. Oakes.*

37. *P. Cronia,* Tuckerm. Th. orbicular, membranaceous, smooth, radiant, submonophyllous, dark-bluish becoming pale-lead-colored; laciniate plane, with elevated, darker margins (beset with elevated, often blackish points, and isidioid branchlets); hypoth. determinate, dark cerulescent.

Rocks among mosses, common on the coast of Massachusetts, and resembling a *Collema*; infertile. It is very distinct from *P. plumbea.*

38. *P. lanuginosa,* Ach. Th. membranaceous, white, pruinose; in the circumference lobed and crenate; hypoth. tomentose, bluish-black; apoth. rufous-fuscescent, with a pulverulent thalline margin. *Fr. Lichenogr.* p. 88. — β. (granulosa), Fr.; thallus, at the centre, or mostly, granulose-pulverulent. *Fr. l. c.* — *P. leproso-bryssina*; the whole thallus dissolved into a leprous-bysine mass. *Fr. l. c.* *Lepraria,* Ach.

Rocks in the mountainous districts and on the coast of New England; rarely fertile.

Subsect. V. *Psoroma,* Fr.


Rocks in woods, fertile; New England.

40. *P. triptophylla,* Fr. Scales of the thallus membranaceous, livid-fuscescent, at first stellate-expanded, and lacerate-dissected, at length granulose-coralline; hypoth. bluish-black; apoth. somewhat immersed, disk rather plane, rufous-fuscescent, margin persistent. *Fr. Lichenogr.* p. 91. — *a. coronata,* Fr.; apoth. produced from the thallus, with a thalline margin, and either simple or symphycarpeous. *Fr. l. c.* *Lecanora brunnea,* Ach. part. — β. *Schraderi,* Scherr.; apoth. produced from the hypothallus, plane, destitute of a thalline margin. *Fr. l. c.* — *γ. corallinoides,* Fr.; crust blackish from the predominant hypothallus, squamules wholly coralline. *Fr. l. c.*

41. **P. Hypnorum**, Fr. Scales of the thallus minute, imbricate, granulate-crenulate, somewhat yellowish-fuscescent; pale on the under side; apoth. sessile, dilated, disk membranaceous, fulvous-fuscescent, with an elevated, granulose, thalline margin. Fr. *Lichenogr.* p. 98. Icon, *Laur. in Sturm’s Fl. t. 18.*


Sect. III. Thallus crustaceous, lobate at the circumference, or wholly squamulose and effigurate.

Subsect. VI. **Placodium**, Fr.


Rocks, throughout New England; fertile.

46. **P. elegans**, Ach. Th. stellate-radiose, appressed, dark orange-
red, naked on both sides; laciniae somewhat discrete, linear, convex, contiguous, flexuous; apoth. of the same color, very entire. *Fr. Lichenogr.* p. 114.


Subsect VII. *Psora*, Fr.


49. *P. cervina*, Sommerf. Th. areolate-squamaceous; the scales crustaceous, subpeltate, repand or lobed, from greenish becoming livid-chestnut; on the under side white; apoth. at first immersed, marginate, at length protuberant, disk rufous-fuscous. *Fr. Lichenogr.* p. 127. — *β. squamulosa*, Fr.; th. chestnut-tawny; apoth. naked, thalline margin thin or wanting. *Fr. l. c.*


North America (Pennsylvania ?), *Muhl.*, Ach.

Sect. IV. Thallus crustaceous, uniform.

Subsect. VIII. *Patellaria*, Fr.

51. *P. pallescens*, Fr. Crust subtartaraceous, rugose-granulate, glauces-
cent; hypothallus pale; apothecia tumid, disk plane, pale, innate-pruinose, with an erect, entire, persistent margin. *Fr. Lichenogr. p. 132.*


52. *P. tartarea,* Ach. Cr. tartaceous, granulate-conglomerate, glaucescence; hypoth. pale; apoth. adnate, disk plane, rugulose, pale-yellowish-flesh-colored, with an inflexed, entire margin. *Fr. Lichenogr. p. 133.* — ß. frigida, Ach.; hypothalles confused with the thallus; crust at length granulate, whitish; apoth. smaller, reddish-flesh-colored. *Fr. l. c.*


Trunks in mountainous districts; White Mountains: Northward to Arctic America, *Rich., Hook.*

55. *P. subsfusca,* Fr. Cr. cartilagineous, at first contiguous, smooth, becoming chinky and granulate, glaucescence; hypoth. macular; apoth. adnate, disk plano-convex, subfuscous, whitish within, with an erect margin colored like the thallus. *Fr. Lichenogr. p. 136 (excl. P. albella).* — ß. discolor, Fr.; cr. as above; apoth. regular, disk thickish, always naked (red, rufous, fuscous, or black), margin entire, or at
length rugose. *Fr. l. c. Lecanora subfuscus, & L. epibryon, Ach. —
β. distans, Fr.; cr. thin; apoth. orbiculate, margin elevated, crenulate,
disk thin, pale, at first pruinose, finally naked. *Fr. l. c. Lecanora
distans, Ach.*

Trunks, dead wood, rocks, and stones.—β, trunks. New England.
New York, *Torrey.* Pennsylvania, *Muhl.* Northward to Arctic Amer-

56. *P. albella, Ach.* Cr. cartilagineous, thin, milk-white; apoth. or-
biculate, tumid, pale-flesh-colored, whitish-pruinose, margin very en-
sufusca, χ. Fr. Lichenogr. p. 139. —β. angulosa, Fr.; apoth. aggre-
gated, angulose-irregular, disk livid-fuscous, glaucous-pruinose, with a
Fr. Lichenogr. p. 139. P. angulosa, Ach.*

Trunks; New England. New York (*a* and *β*), *Halsey.*

57. *P. casio-rubella, Ach.* Cr. thin, softish, white; apoth. scat-
tered (rather large), disk plane, becoming at length somewhat tumid,
pale-reddish and fuscous, at first cassioid-pruinose, equalling the tu-


58. *P. atra, Ach.* Cr. cartilagineous, at length granulose-verrucose,
glaucouscent; hypoth. black; apoth. sessile, disk at length somewhat tu-
mid, polished, very black, within black, with an elevated, persistent,
subentire margin. *Fr. Lichenogr. p. 141.*


59. *P. cinerea, Fr.* Cr. subtartareous, areolate-rimose, glaucous-ci-
nereous; hypoth. black; apoth. innate, disk naked, nigrescent, pale
within, with a black, obtuse, subelevated thalline margin. *Fr. Lichen-

Rocks and stones, very common, and passing into many varieties.
An ochraceous state (*Urceolaria Acharii, Ach.*) occurs not uncom-
Arctic America, *Rich.*

60. *P. badia, Fr.* Cr. cartilagineous, rimose-areolate, subsquamulose,
dark-olive; hypoth. black; disk naked, polished, fuscous-black, with
an entire, persistent thalline margin. *Fr. Lichenogr. p. 147.*
Rocks and stones (granite), ascending to alpine districts; New England. Arctic America, Rich. Areole sometimes dispersed and squamaceous, with subimmersed, punctiform (imperfect) apothecia. Such a state, according to Fries, is the Endocarpon smaragdulum of some authors; and a similar one, tinged dark red by the oxide of iron, the Endocarpon Sinopicum, Wahl. The former is common in New England, and occurs in New York, Halsey. The latter is frequent on alpine and subalpine rocks on our higher mountains.

61. P. sophodes, Ach. Cr. tartaceous, verrucose-granulate, from green becoming fuscescent; hypoth. black; disk opaque, unpolished, fuscescent-cinerascent; thalline margin thick, at length rugulose. Fr. Lichenogr. p. 149. Lecanora, Ach. — β. exigua, Fr.; small; crust fuscescent-cinerascent; hypoth. obsolete; margins of the apothecia whitish, and disappearing. Fr. l. e. Lecanora, Ach.


Alpine and subalpine rocks; White Mountains. Newfoundland, Pylaie, and northward to Arctic America, Rich.

63. P. varia, Fr. Cr. cartilagineous, areolate-verrucose, yellowish-green, becoming ochroleucous; hypoth. smooth, macular; apoth. sessile, disk polished, yellowish-flesh-colored, or discolored, with a thin, erect, entire margin. Fr. Lichenogr. p. 156. — α. Fr.; apoth. scutelliform, plano-concave, with a persistent, sometimes crenulate, or pulverulent thalline margin. Fr. ! l. c. P. varia, Ach. — β. symmicta, Fr.; disk of the apothecia somewhat excluding the paler, very entire margin, from pale-yellowish becoming fuscous. Fr. ! l. c. — γ. sepincola, Fr.; apoth. somewhat immersed, convex, immarginate, from fulvous becoming black. Fr. l. c. Lecidea, Ach. — δ. polypora, Fr.; crust areolate and granulate; margins of the apothecia pale, entire, somewhat flexuous. Fr. l. c. Lecidea, Ach.


*Subsect IX. Urceolaria*, Fr.


Incrustating dead mosses and sticks, in alpine districts; White Mountains.

69. *P. calcarea*, Ach., Fr. Cr. subcartilagineous, areolate-verrucose, glaucescent (often mealy and white); disk immersed in the areolæ, from concave becoming plane, blackish, cæsious-pruinose, with a
thin, at length discrete, entire proper margin; thalline margin somewhat prominent, subentire, or rugose-crenate. *Fr. Lichenogr. p. 187.*

_Urceolaria, Ach._

Limestone, and from this passing to other rocks; New England. New York, Halsey.

70. *P. scruposa,* Sommerf. Cr. tartareous, rugose-granulate, glaucous-cinerascent; hypoth. white; apoth. immersed, disk urceolate, cæsious-black, with a connivent, cinerous-blackish proper margin, which is at first covered by the crenate thalline margin. *Fr. Lichenogr. p. 190.*

_Urceolaria, Ach. — β. bryophila, Ach.; cr. rugose; apoth. smaller, disk emergent, urceolate, with a contracted mouth, thalline margin subevanescent. Fr. l. c. Gyalecta, Ach._


X. _THELOTREMA, Ach._

Apothecia subconical-truncate, at length open, urceolate-scutelliform; a discrete, lax, membranaceous, lacerate-dehiscent, interior exciple veiling a rigescent disk. Thallus crustaceous.


Trunks, somewhat rare; New England. Arctic America, *Rich._ (Herb. Hook. !). Our Lichen, as well as that of Arctic America, agrees with the European; and the species is found also in Brazil (*Eschweiler)._

XI. _GYALECTA, Ach., Fr._

Apothecia orbiculate, urceolate, at first closed, then variously dehiscent, the elevated, discrete, colored border of the exciple surrounding the disk. Disk at first included, like a nucleus, and gelatinous, becoming at length open, explanate, indurated. Thallus horizontal, crustaceous, somewhat tartareous.


Tribe II. LECIDEACEÆ, Fr.

XII. STEREOCAULON, Ach.

Apothecia placed upon a thalline stratum, which forms a more or less evident, evanescent (spurious) thalline margin, becoming plane, with an obscure proper margin, and at length cephaloid and immarginate, solid. Thallus vertical, caulescent, mostly solid (podetia), supporting a horizontal, squamulose-granulose thallus, and arising sometimes from a horizontal, adnate, granulose thallus.

The apothecia are often quite those of Parmelia, but they also occur subimmarginate from the first, or with only an obscure proper margin, as observed by Scherer and Eschweiler, and the genus seems properly nearest to Biatora, and related through this to Lecidea. In this view, Cladonia must be taken for the highest type of Lecideaceæ; and the fistulous podetium, analogous certainly (Fr. Lich. p. 14) to the tubulose thallus of some Cetrarias, and in Cladonia turgida, if I am not mistaken, evidently formed by constriction of the ascending foliaceous thallus of that species, must be considered as indicating a higher rank than the solid podetium; this last being rather a branched stipe, as is suggested by a comparison of Stereocaulon Fibula with Biatora Byssoides. And, adopting a somewhat wider sense for Eschweiler's remark, that Cladonia unites in itself the horizontal and the vertical thallus, we might, in the point of view that we have chosen, see reason to agree with him that this genus is even the highest development of Lichenose vegetation; or to venture, at least, the suggestion, that no genus, which does not include the horizontal type, should seem to be the most perfect typical representative of Lichenes. Fries, from whose profound conclusions we are far from prepared to depart, attributes indeed to Usnea (l. c. pp. 9, 17, 198) the highest rank, and, where he considers the genera as falling into parallel series, he, in this view, assigns the position to Usnea, Stereocaulon, and Spherophoron. But if there is evidently a distinction between the highest typical development and the highest actually attainable development, and the former represent the most perfect condition of the plant, or genus, per se, as a distinct real or assumed existence in nature, — as the latter is representative of extreme tendencies of the vegetation in question to ascend to a higher than its typical structure, — Usnea, &c., may be taken as representing
the extreme development of Lichenes, and Cladonia, or some other genus expressing the horizontal type, as representing their typical perfection.—S. ranulosum, Ach., a mostly tropical species, with densely fibrillose podetia, and terminal, subglobose apothecia, inhabits North America, according to Acharius and Muhlenberg; but it is probable, only the southern part.

Sect. I. Podetia solid, filamentous within; apothecia normally fuscous.

* Squamules foliaceous, or fibrillose.

1. S. tomentosum, Fr. Podetia lax, terete, very much branched and the branches somewhat recurved, clothed with a dense, whitish, spongy tomentum; squamules somewhat rounded, incised-crenate (becoming phylloid-granulose), cinereous-camsung; apothecia minute, lateral, at length globose. Fr. Lichenogr. p. 201.

On the earth and stones in the lower regions of the White Mountains, and ascending; fertile. Northward to Arctic America, Herb. Hook. !

2. S. corallinum, Fr. Podetia lax, a little compressed, very much branched, glabrous (many conjoined at the base into a dense, at first digitate-divergent sod); squamules fibrillose, somewhat digitate-ramose, cinereous-camsung; apoth. scattered or conglomerate (rather large), finally globose. Fr. Lichenogr. p. 201. S. dactylophyllum, Floerk. !

Stones, in the lower regions of the White Mountains; fertile.


Stones, and on the earth in large patches, in the lower regions of the White Mountains; and ascending to alpine districts. Common also on the coast; but the genus is peculiarly montane. The present species was formerly considered as including most of those here described, and the following stations are therefore so far uncertain. New York, Torrey. Pennsylvania, Muhl. Northward to Canada, Michaux; Newfoundland, Pyia; the Saskatchewan, &c., Rich.; Greenland, Gieseke; and Melville Island, R. Br.
LICHENES OF THE NORTHERN STATES


Stones and rocks, in the lower regions of the White Mountains; somewhat rarely fertile. Occurring also in the deliquescent, degenerate state called by Acharius *S. Cereolus* (Meth. t. 7, p. 1). The horizontal thallus at the base is persistent, and often conspicuous.

** Squamules verruciform, rounded, or angulate.


Rocks; from Greenland, *Dill.*, to New England, where it is common in mountainous, and ascends to subalpine districts. Southward to Pennsylvania, *Dill.*


Fissures of rocks, and on stones, in the lower regions of the White Mountains; fertile.

Sect. II. PILOPHORON, Tuckerm. Podetia cartilagineous-subfilamentous, or araneous-fistulous within; apothecia subimmarginate, black.

7. **S. Fibula**, Tuckerm. Crust persistent, appressed, subsquamaeous-granulate, bright green; podetia (solid), erect, terete, simple, somewhat corticate with the green squamaeous granules, at length subdenudate, glabrous; apoth. (lateral, minute, somewhat plane, subimmarginate, and) terminal, mostly solitary, at first depressed-globose, immarginate, at length rather inflated, dark-greenish-nigrescent becoming black.

Moist rocks along streams in mountain forests; White Mountains. Rugose, nigrescent cephalodia (certainly abortive apothecia) occur commonly in the crust, resembling similar ones in *S. condensatum*. Barren podetia terminated often with powdery green pulvinules, as in *S. Cereolus*, Ach. Apothecia solid, as in the next, the disk placed upon
a paler stratum. S. Cereolus, as described by Borrer, and figured in E. Bot. Suppl. t. 2667, is certainly very near the present section, and agrees in many respects with the species under notice. The apparent difference of structure in the apothecia of this and of the next species from Cladonia, Stereocaulon, and Biatora is one so anomalous, that I prefer to leave them in this place, to which, indeed, their whole habit would seem to refer them.


On the earth; Northwest Coast, Menzies! Douglas, in herb. Hook. ! Rocky Mountains, Herb. Hook. ! — New York, Halsey. Pennsylvania, Muhl. Certainly a congener of the last. Fries remarks incidentally (Lichenogr. p. 242), that the apothecia are almost those of Biatora. Rugose cephalodia, like those of the last, occur also in the crust of this species, and at the bases of the podetia. Sommerfelt (Suppl. Fl. Lapp. p. 126) remarks that these cephalodia occur also in S. paschale, S. corallinum, and S. denudatum.

XIII. CLADONIA, Hoffm.

Apothecia orbiculate, submarginate; becoming at length inflated, cephaloid, and immarginate; empty. Disk open, at length protuberant and reflexed, concealing the proper exciple. Horizontal thallus squamulose-foliaceous or crustaceous, from which arises a vertical, cauline, cartilaginous, fistulous thallus (podetia).


Sterile, sandy earth; pine woods. North America, Floerke! Common in New England, and fertile. Pennsylvania, Muhl. Arctic America, Hook. Lobes black-fibrillose at the margins, beneath, in the European Lichen, but naked in 'warm, dry places;' according to Floerke, and in sterile soils, according to Fries. I have never found fibrillose specimens of our plant.

2. C. turgida, Hoffm. Th. foliaceous, erectish, laciniate, glaucous, branching into fruticulose, ramose, glabrous podetia, of the same color; the scyphiferous ones turgid, obconico-cylindrical; spurious scyphi immarginate, dentate-radiate; apoth. carneo-rufescent. Fr. Lichenogr. p. 214. Floerck. ! Clad. p. 115. Cenomyce parecha, Ach. !


Sterile earth in alpine and subalpine districts, White Mountains; fertile. The abnormal state with very short, vesicular, podetia, tipped with rufous-fuscous, abortive apothecia, is most common.


* Scyphifera, Fr. Podetia passing into a terminal scyphus, closed with a diaphragm.


5. C. pyxidata, Fr. Th. squamulose; podetia cartilaginous-corticate, at length verrucose, or furfuraceous, green-cinerascent; the scyphiferous ones turbinate; scyphi cyathiform, dilated; apoth. fuscous. Fr. Lichenogr. p. 216. Cenomyce, Ach. ! Syn. p. 252. — β. Po- cillum, Ach.; th. of large, thickened lobules; podetia dilated sensibly
upward from a thick base, verrucose with subsquamaceous granules. 


On the earth, most perfect, and in all the varieties, on high mountains; — γ being an alpine state, but descending; and * and ** alpine degenerations.† New England and westward. New York (α), Holsey. Pennsylvania, Muhl. North to Point Lake, &c., Rich.; and Greenland, Gieseke.

7. C. degenerans, Floerk. Th. squamulose; podetia cartilaginous-corticcate, irregularly proliferous-ramose (glabrous or granulate-furfuraceous), more or less squamulose-exasperate, green-pallescent, becoming

† "Apothecia lateralia, sparsa, stra, thallo innata, eoque submarginala, apoth. Roccelle aliquo modo accedentia," were observed by Brown in some Arctic American specimens of * (R. Br. in Parry's First Voy. App. p. 307).


9. *C. cornuta*, Fr. Th. squamulose; podetia cylindrical, somewhat ventricose, the epidermis cartilagineous and persistent below, membranaceous and becoming powdery-deliquescent above; scyphi narrowed, rather plane, with an incurved, somewhat entire margin; apoth. fuscous. *Fr. Lichenogr.* p. 225. *Lichen cornutus*, L.

Trunks among mosses, dead wood, &c., in the mountains of New England; fertile.


On the earth, in mountainous districts. White Mountains; fertile. Distinguishable from similar decorcite, symphycarpeous states of *C. pyxidata* by its pulverulence.

**Pervia**, Fr. Podetia not passing into closed scyphi, but the axils
and apices dilated-infundibuliform, or simply perforate in the more slender, much-branched forms.


On the earth, in mountainous districts. White Mountains; as yet infertile.


Decaying logs, common in mountainous districts; New England. Pennsylvania, Muhl. (Cf. Fries, l. c.)


On the earth, decaying logs, and stones, most perfect and frequent in mountainous districts; New England.

Fr. l. c. *Dill. Musc.* p. 544, & *Icon,* t. 82, f. 1. — *γ. racemosa,* Floerck.; podetia elongated, turgescent, ramose, and, as well as the axils, gaping; branches recurved or erect, fertile ones explanate. *Floerck.! l. c. p. 152. Fr. ! l. c. — δ. *subulata,* Floerk.; podetia elongated, more slender, with subperetuse axils; apices of the fertile ones cloven; branches erectish, or also recurved, or divergent. *Floerck.! l. c. p. 143. Fr. l. c. — *ε. pungens,* Ach.; small, cespitose, very much and intricately branched, fragile, pallescent or whitish-cinereous. *Fr. l. c. C. pungens,* *Floerck. l. c. p. 156. C. rangiformis,* Hoffm.


16. *C. carneola,* Fr. Th. squamulose; podetia membranaceous-corticate, at length finely pulverulent, ochroleucous, becoming fuscous-cerulescent at the base, the scyphiferous ones turbinate; apoth. pale-flesh-colored fuscous. *Fr. Lichenogr. p. 233 — α; podetia turbinate, all scyphiferous, simple or proliferous. Fr. ! l. c. — β; podetia elongated-turbinate, with radiate, subulate proliferations. Fr. l. c. — γ. *cyanipes,* Fr.; podetia very long, cylindrical, simple, or the scyphi obliterated and passing into somewhat divaricate, sterilecent branches. *Fr. l. c. Icon, Laur. in Sturm’s Fl. t. 13.*

On the earth; Arctic America. Greenland, *Fries.*
17. *C. Despreauxii*, Bory ms. Th. evanescent; podetia elongated, slender, cartilaginous-corticate, the epidermis separating below into bluish-white squamules, and becoming above finely granulate (not pulverulent), pale sulphureous, becoming bluish-fuscescent at the base; scyphi narrow, proliferous-radiate, or passing into and obliterated in steliscent branchlets; apoth. minute, pale-flesh-colored fuscescent. *Cenomyce Despreauxii*, Bory, fide schedul. in herb. *Berol*.

On the earth in alpine districts. White Mountains. Newfoundland, Bory!


On the earth: *α*, sands, and sterile pine woods (fertile?); — *β*, in
similar places, fertile; and abundant also in mountainous districts; —
Pennsylvania (α and β), Muhl. Canada (β), Michaux.

21. C. Boryi, Tuckerm. Th. (crustaceous) evanescent; podetia
turgid, fruticulose, dichotomous, fastigate-ramose, rugulose becoming
reticulate-perforate, pale sulphureous and glaucescent; axils scyphi-
form, entire, at length cirtrose-perforate; sterile apices scyphiform,
cristate-dentate, entire becoming cirtrose, with fuscous tips; fertile
ones somewhat cirtrose-ramose; apoth. flesh-colored, at length
detia indurated, obtusish, lacunose-subperforate, glaucous; axils and
apices sparsely scyphiform, sparingly subdentate. Cenomyce lacunosa,
Bory, Fide sched. in herb. Berol.

On the earth, near the sea, fertile; Hingham, Duxbury, Mr. Russell!
and elsewhere on the coast of Massachusetts, Dr. Porter! Mr. Oakes!
— β, alpine and montane districts, infertile; White Mountains. Mo-
nadnoc, Russell! Newfoundland, Bory! I have endeavoured to point
out the features that seem to distinguish this remarkable Lichen from
C. uncialis, but it is possible that the conclusion of its original indica-
tor may be correct. The podetia become very turgid, and at length
often explanate, measuring in one of my specimens eight lines in di-
ameter at the base, and five where the branches begin. The New-
foundland specimens, and our alpine ones, belong to an apparently
sterile, subalpine state of the Lichen.

Series 4. Cocciferæ, Fr. Podetia greenish, becoming fulves-
cent at the base. Apothecia scarlet.

* Podetia cartilaginous-corticate, never finely pulvcrulent.

22. C. cornucopioides, Fr. Th. squamulose; podetia cartilaginous-corticate,
from glabrous becoming verrucose or granulate-subpulverulent,
yellowish, at length cinereum-green; the scyphiferous ones elon-
gated-turbinate, attenuate below; scyphi cyathiform, dilated; apoth.

On the earth. Very frequent in mountainous districts, but often in-
North to the Saskatchewan, &c., Rich., and Greenland, Gieseke.


24. *C. Hookeri*, Tuckerm. Th. of rather thick, large, ascendant squamules; podetia cartilagineous-corticcate, elongated, cylindrical, glabrous, becoming at length squamulose, sulphur-yellow; scyphi cupuliform; apoth. scarlet.

On the earth; Newfoundland, *Herb. Hook.*! This beautiful species resembles *C. deformis* in some respects, but belongs to the present subdivision, and seems very distinct from every other scarlet-fruited *Cladonia* with which I am acquainted. I venture to inscribe it to the illustrious botanist who first proposed a complete survey of the cryptogamy of British America, and who has done more than any other to illustrate it.


On the earth, decaying logs, dead wood, and rocks, common and fertile; New England.

** Epidermis of the podetia membranaceous, dissolving into a fine dust.

Clad. p. 108. — β. clavata, Fr.; podetia ventricose, subulate at the apices or branched, sterile. Fr. l. c.

On the earth, decaying logs, dead wood, and rocks; common in mountainous districts, and fertile; New England. Pennsylvania, Mühl. Ochrocarpous states of this species, in which the bright scarlet of the apothecia is changed to a pale yellow, occur in our mountains, but less frequently than similar forms of C. Floerkiana.


Decaying trunks, and moist earth among mosses, in mountainous districts, fertile; New England.


On the earth, Canada, Michaux ! Fries. This is the "Lichen coc-ciferus; major, Dill. t. 14, f. 6, M," of Michaux's herbarium, the specimens appearing to me, at the time I examined them, to resemble some states of C. deformis. Fries observes incidentally (Lichenogr. p. 237) upon Canada specimens ('specimina authentica Canadensis') of Michaux's Lichen, that the podetia do not become squamulose, that it has
infundibuliform and not true scyphi, and much of the habit of C. uncialis; thus distinguishing it from C. bellidiflora, to which Floerke referred it. It is probable that the "Bæomyces tubulosus, Richard. Canada," of Herb. Willd. I which also appeared to me to resemble C. deformis, belongs to Michaux's species, and in this case the thallus is squamulose, and the podetia are finely pulverulent above. It appears certain that the C. sulphurina of Fries is not the C. Hookeri of this Enumeration. The species is also common in North Carolina, according to Fries, who received his specimens from Schweinitz.

XIV. BÆOMYCES, Fr.

Apothecia from the first globose, immarginate, velate, at length empty and araneous within, the base closely surrounding a stipe. Thallus crustaceous, uniform, protruding fertile stipes, which are destitute of a cortical stratum.

The structure of Bæomyces roseus has been illustrated very minutely by Dr. Küttlinger (Allg. Bot. Zeit. 1845, pp. 577–584, & t. vi.).


Sterile clay-soils, and sands; New England; and abundant also on the sterile surfaces of slides in the White Mountains. New York, Torrey. Pennsylvania, Muhl.

XV. BIATORA, Fr.

Apothecia margined at first by a waxy thalline exciple converted into a proper exciple, becoming at length hemispherical or globose, subimmarginate, solid, and cephaloid. Disk at length dilated, turgid, concealing the paler margin, placed upon a stratum oftener paler, never coal-black. Thallus horizontal, arising from a hypothallus, somewhat crustaceous, effigurate, or uniform. Podetia wanting, but the apothecia stipitate in a few species. The margin of the apothecia never originally black. Fr.

Sect. I. Thallus squamose, or lobed at the circumference.

* Apothecia sessile.

1. B. decipiens, Fr. Scales of the thallus discrete, somewhat peltate, angulate, dark-flesh-colored; beneath and at the circumference


Rocks; near Boston. Scales of the thallus small, obscure to the naked eye.


On the earth in alpine districts. White Mountains.

** Apothecia stipitate, margin at length revolute.


On sandy, sterile earth; slides, and banks of streams, in the White Mountains.

6. *B. Byssoides*, Fr. Th. crustaceous, effuse, granulose, greenish-glaucous, squamulose at the circumference; hypoth. fibrillose, white; apoth. substipitate, pileiform, from flesh-colored becoming fuscous;

Common in mountainous districts: *α*, sterile sandy and clayey soils; slides, banks of streams, and road-sides, in the mountains of New England. — *β*, rocks in mountain forests, New England. New York, *Halsey.* — *γ*, decaying wood, in similar situations with the last, apothecia almost sessile. The three varieties occur often in close neighbourhood at the White Mountains. This species, *Stereocaulon Fibula*, and *S. aciculare* illustrate the connection of *Stereocaulon* with the sessile *Biatora*. The difference of structure, indicated by Fries as generically distinguishing *Boeomyces roseus* from this and the last species, referred to *Boeomyces* by Acharius, has been further illustrated by Dr. Küttinger in *Allg. Bot. Zeit.* 1845, l. c.

Sect. II. Thallus effuse, uniform.


9. *B. pineti*, Fr. Cr. very thin, granulose, greenish-glaucescent; apoth. (minute) sessile, whitish; disk becoming at length yellowish-


Trunks and rocks, growing over mosses, in mountainous districts; New England.


Trunks; Pennsylvania, *Muhl., Ach.*  Southward.  Fries considers this scarcely distinct from the last. (Lichenogr. p. 264.)


Trunks.  Greenland, *Fries.*  *Lecidea coccinea, Schwein. in Hals. Lich. N. Y. l. c. 1824,* which cannot, by the description, be distinguished from this, occurs in New York, *Halsey,* and appears to extend to N. Carolina! (Mr. *Curtis*).

14.  *B. chlorantha*, Tuckerm. Cr. of discrete, subsquamaceous- verrucose granules, bright green, and white within (or deliquescent sorediferous); apoth. somewhat elevated, becoming plane, and at length convex, with a thick, flexuous, paler margin; within white; disk nigrescent.

Bark of *Pinus Strobus,* and other trees; New England.  Resem-
bling Lecidea enteroleuca, but with a different crust, and, I think, the apothecia of the present genus.


Trunks, and dead wood. New England.

18. B. porphyrinis, Tuckerm. Cr. subcartilaginous, smooth, chinky, at length rugose, glaucescence (and greenish-sorediiferous); white within; apoth. elevated on a white thalline stratum which constitutes an evanescent spurious margin, or sessile; disk at first somewhat plane, pruinose, with a thick, elevated margin, at length convex, and excluding the margin, fuscous-nigrescent.

Trunks, in the mountains of Massachusetts and New Hampshire. Near to B. mixta, but as that is one of the smallest, this is the largest Biatora that I am acquainted with. Several apothecia sometimes occupy the same thalline stratum, as in B. ochrophæa and B. aurantiaca. With age the apothecia become flexuous, and very large, a single exciple having sometimes a diameter of two lines.

19. B. ochrophæa, Tuckerm. Cr. subcartilaginous, thickish, gran-
ulate-verrucose and somewhat plicate, glaucescent; hypoth. pale; apoth. elevated-subpedicellate on a thalline stratum, which constitutes a thick, subcrenulate, at length evanescent spurious margin; disk plane, delicately pruinulate, at length convex, and excluding its thin, elevated, proper margin, from pale flesh-colored becoming blackish-fuscous.

Trunks in the mountainous districts of Northern New England, common. Apothecia at first closed, and either sessile (when some states resemble Parmelia carneo-lutea, Turn.) or elevated on a protuberant thalline stratum, at length lacerate-dehiscent and becoming plane, with a thick, crenulate thalline margin, which disappears, leaving the marginate disk. It has often all the aspect of a Parmelia, not a little resembling P. rubra. Is the structure of the apothecia in the last-mentioned species, and in P. carneo-lutea, wholly diverse from the structure above described of the present?


21. B. rivulosa, Fr. Cr. tartareous, mouse-colored and paler, covering a fuscous-black hypothallus, which often decussates the crust; apoth. produced from the crust, from pale-fuscous becoming blackish, whitish within, with a thin margin. Fr. Lichenogr. p. 271. Lecidea, Ach. Lecanora falsaria, Ach.


Trunks; New England.

24. B. lucida, Fr. Cr. granulate, greenish-yellow, at length deliquescent and ochroleucous; hypoth. white; apoth. (minute), convex, pale yellow, often excluding the paler margin. Fr. Lichenogr. p. 279. Lecidea, Ach.

Stones and decaying wood. Arctic America, Rich.


Upon mosses; Arctic America, Rich. Fries suspects this to be a state of B. ferruginea. It does not seem to be the Lecidea fusco-lutea, a, of Ach. Syn.

XVI. LECIDEA, Ach., Fr.

Apothecia margined at first by a very black, carbonaceous, proper exciple, becoming scutelliform or hemispherical, solid. Disk at first punctiform-impresseed, always open, oftener horny, and placed upon a carbonaceous stratum. Thallus horizontal, arising from a hypothallus, somewhat crustaceous, effigurate, or uniform. Apothecia very black from the first, the margin never, and the disk rarely, otherwise colored. Fr.

Sect. I. Thallus effigurate at the circumference, or wholly rugose-plicate.

1. L. candida, Ach. Crust rugose-plicate, candicant, becoming at length white-farinose, lobed at the circumference; hypothallus black;

On the earth upon mosses; Arctic America, Rich.

2. L. vesicularis, Ach. Cr. bullate-plicate, somewhat caulescent, from greenish becoming glaucous, radiculose at the base; apoth. free, peltate, obtusely marginate, at first pruinose, finally convex, naked; white within. Fr. Lichenogr. p. 286.

On the earth in alpine districts; Arctic America, Rich.

3. L. Wahlenbergii, Ach. Cr. suborbicular, gyrose-plicate, round-lobed at the circumference, from green becoming bright-yellow; hypoth. black; 'apoth. arising between the areoles, obsoletely marginate, naked, black within.' Fr. L. Lichenogr. p. 291. Icon, Laur. in Sturm's Fl. t. 28.


4. L. flavo-virescens, Fr. Cr. determinate, areolate-appressed, plicate, lobulate at the circumference, from greenish becoming yellow; apoth. adnate, with a thin margin, becoming at length convex, and excluding the margin, black within. Fr. Lichenogr. p. 291. L. scabrosa, Ach. Meth.

On the earth in mountainous districts, often in company with Biatora Byssoides; White Mountains. According to Borrer (in Hook. Br. Fl. 2, p. 178), L. citrinella, Ach., is the true Lichen flavo-virescens of Dickson, and the present species should bear the name given it by Acharius. Compare Fries, l. c.

Sect. II. Thallus effuse, uniform.


*Saxicola.*


Rocks and stones, especially granite and mica-slate; New England.

6. L. contigua, Fr. Cr. at first contiguous, glaucous-white; apoth. produced from the crust; disk thick, horny, very black, at first glaucous-pruinose, with a thick, discrete, plano-cupular, obtusely marginate, carbonaceous exciple. *Fr. Lichenogr.* p. 298.

Rocks and stones (granite), and often tinged ochraceous by the oxide of iron, in the mountains of New England.

7. L. variegata, Fr. Cr. at length areolate, glaucescent; the black, somewhat fimbriate hypothallus here and there prominent; apoth. produced from the crust, depressed, at first and often persistently glaucous-pruinose, black within; disk from urceolate becoming explanate, and dilated, with a persistent, at first thin, coarctate, at length obtusish margin. *Fr. Lichenogr.* p. 303.

Maritime granite rocks; Arctic America, Fries.

8. L. lapicida, Ach. Cr. at length areolate-verrucose, from glaucous becoming cinereous-white; apoth. superficial, produced from the cortical layer, sessile, not pruinose, horny and cinerascen-black within, with an even, naked disk, and a thin, at length flexuous margin (or, the margin disappearing, finally confluent and irregular). *Fr. Lichenogr.* p. 306.


9. L. atro-alba, Ach. Cr. somewhat areolate (the areolae commonly discrete, verrucæform), opaque, fuscous, and grayish-white; apoth. produced from the hypothallus, (small,) the obtuse margin scarcely discrete from the naked, at length somewhat umbonate disk. *Fr. Lichenogr.* p. 310.

Rocks and stones (granite); New England. New York, Halsey. The crust variable, and often nearly obsolete.

Rocks and stones in mountainous districts; White Mountains.

11. *L. fusco-atra*, Fr. Areolae of the crust cartilaginous, planate, olivaceous-fuscescent and fuscous, angulate, smooth and somewhat polished (or becoming dull and pallescence); apoth. produced from the hypothallus, appressed; disk plane, at first cinereous-pruinose, at length naked, with a thin, somewhat acute, at length flexuous margin; but the margin disappearing with age, and the apothecia often finally heaped and conglomerate. *Fr. Lichenogr.* p. 316. *L. fumosa*, Ach. *L. athro-carpa*, Ach.


Rocks in alpine and subalpine districts; White Mountains.


17. *L. enteroleuca*, Fr. Cr. at first contiguous, glaucescent; deliquescent and leprous, somewhat limited by the black hypothallus; apoth. adnate; exciple annular, with a thin margin; disk somewhat waxy (often hyaline or cerulescent), whitish within. *Fr.* *Lichenogr.* p. 331. — *L. olivacea*, Fr.; cr. yellowish-virescent; apoth. often irregular and rugose, xerugineous-black. *Fr.* l. c. *L. elaeochroma*, Ach. *Syn.*


Subsect. II. GRANULOSÆ, Fr. Crust at length becoming somewhat granulose. Hypothallus white.


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Scaly bark of old pines; New England.

21. *L. melancheima,* Tuckerm. Cr. cartilaginous, areolate-verrucose, becoming somewhat lobulate, glaucous-white, confused with the hypothallus; apoth. appressed, somewhat plane, disk equalling the very thin margin, at length convex, scarcely excluding the margin, very black, polished, and shining.

Trunks; and very common on rails on the coast of Massachusetts (Ipswich, *Mr. Oakes,* Lynn, Hingham, &c.), and occurring on dead wood at the White Mountains. Disk sometimes a little pallescent, but the margin always very black.

22. *L. sabuletorum,* Fr. Cr. cartilaginous, at first contiguous, becoming rimose-areolate, granulate and somewhat lobulate, cinereous or fuscous, confused with the hypothallus; apoth. produced from the crust, horny; exciple annular, with an evanescent margin; disk naked, often fuscescent. *Fr. Lichenogr.* p. 339. *Lichen s. Lecidea muscorum, Auct. quorum.*


Upon mosses in alpine districts; White Mountains.

24. *L. milliaria,* Fr. Granules of the crust at first discrete, fuscous, and cinereous-white, often deliquescent and leprous; apoth. produced among the granules, globose, somewhat immarginate, naked; exciple

On old rails (γ), common; New England.

Tribe III. GRAPHIDACEÆ, Fr.

XVII. UMBILICARIA, Hoffm.

Apothecia superficial; an originally closed thalline exciple converted into a carbonaceous proper exciple, becoming more or less open, of various form. Disk horny, ascigerous, at length chinky, or gyrose-pli cate, with an incurved margin. Thallus horizontal, cartilaginous, foliaceous, somewhat monophyllous, affixed by a central point.

This most natural genus can, perhaps, still be retained in the place given it in the Lichenographia Europaea, though I have, in pursuance of Fries's suggestion (l. c. p. 347), confirmed by all the observations that I have been able to make, preferred to alter the generic character, and make it indicate more fully the relations of the group. It appears to me as analogous to Biatora as to Sticta; and as the former genus is considered to indicate a Lecideaceous type, irrespective of its approximations to Parmelia, so Umbilicaria may perhaps be taken as typically representative of a peculiar (perhaps properly lirellifom, or Graphidaceous) type, irrespective of the approach which some of the species make to the characters of Parmeliaceae.

Sect. I. PATELLATE. Apothecia orbiculate-patelliform; disk at length chinky, plicate, or proliferous-papillate.


Rocks. Pennsylvania, Muhl. (North Carolina, Mr. Curtis !) Very distinct from the next.
LICHENES OF THE NORTHERN STATES


Rocks. α. New York, Halsey. — β, Nova Scotia, 'used for dyeing reds and browns'; Gov. Wentworth, 1795, Herb. Smith ! Newfoundland, Bory in herb. Kunth! New York, Torrey. Pennsylvania, Muhl. ! New England, common and fertile, and ascending to alpine districts, where it is often smaller, thicker, and glaucous-pruinose. β does not seem to afford any constant characters to distinguish it from the European Lichen but the luxuriant development of the apothecia. In the var. papillata, Hampe ! a Cape of Good Hope Lichen, the apothecia are papillate, and perhaps also by a proliferous growth of the patelliform apothecium; but this variety, though in other respects resembling ours, is distinct from it. The small, fruticulose tufts almost characterizing this species in Europe, which I have also observed in the Swedish U. vellea, are generally wanting in the American plant, which is almost always normal and fertile.

tate-verrucose, rugose at the central point. Schær. l. c. Fr. l. c. — γ. reticuluta, Schær.; th. reticulate-rugose above. Schær. l. c. Fr. l. c.

Rocks in alpine districts. a, Newfoundland, Bory in herb. Willd.! — γ, Bear Lake, and elsewhere in Arctic America, Hook.! (Parry's Sec. and Third Voy.).


Rocks on mountains; a, alpine; — β, descending. White Mountains, infertile. Northward to Newfoundland, Pylaie, and Greenland, Herb. Banks!


Alpine and subalpine rocks. White Mountains; and Chin of Mansfield in the Green Mountains, fertile. Northward to Arctic America, Rich:


Alpine rocks. A single specimen from Bear Lake, Herb. Hook.!
is perhaps referable to this species, which has escaped notice, but probably occurs within our limits.


Rocks. Common in mountainous, and ascending to alpine districts, New England, fertile. Northward to Arctic America, R. Br. The New England Lichen does not appear to differ from those of Sweden and Switzerland, unless, perhaps, in attaining to a larger size, and, like the foreign ones, is near the U. vellea of Sweden, which differs in its tumid-marginate, papillate apothecia. Of the last species I have not seen American specimens, unless, with Schaerer, and in accordance also with the earlier view of Fries, we consider the present species as a variety of it.

9. U. Dilleni, Tuckerm. Th. coriaceous, rather rigid, smooth, from glaucous-fuscouscent becoming dark-fuscous; on the under side black, and closely hirsute with short, black, crowded fibres (or lacerate, and papillose-scabrous); apoth. convex, at first orbiculate and concentrically plicate, becoming at length lirellate, with a thin (canaliculate) margin. Lichenoides coriaceum latissimo folio, &c., Dill. Musc. p. 515, & t. 82, f. 5. U. vellea, Michx. ! Fl. 2, p. 323, & Auct. Amer.

Rocks. Paiqualian Mountain, New Jersey; J. Bartram (Dill.). Canada, Michaux ! Newfoundland, Herb. Montagne! Pennsylvania! Muhl. New York, Torrey. Very common in New England, and fertile. The apothecia are often abortive (very small, and forming sometimes a continuous black crust); but in a single specimen from the White Mountains they are perfect, and agree with the minute description in Michaux, whose Lichen was certainly the same with that of Dillenius. The species is widely diffused in North America, and preserves its peculiar features from Newfoundland to the Alleghanies of Pennsylvania; contrasting in this respect with the more limited and
northern U. hirsuta. It was considered certainly distinct, in 1841, by Montagne. Linnaeus cites the figure of Dillenius under his Lichen vel-
leus, and his description includes also U. hirsuta, the differences in the
apothece being disregarded; but the specimen that I saw in the Lin-
nean herbarium was the L. vellea of Sweden, which I have collected
abundantly in that country, and which seems to me very distinct from
the present.

Sect. II. Lievellate. Apothecia somewhat lirellæform, becoming at
length angulate-patellate, or finally crowded together in a hemispher-
ical, subimmarginate, lirellate tubercle.

10. U. hyperborea, Hoffm. Th. corinaceous-membranaceous, papu-
lose-rugose, dark-olivaceous-fuscous, and blackish; on the under side
lacunose, smooth, and fuscous-nigrescent; apoth. appressed, originally
somewhat lirellæform, at length angular, substellate-multiform, plicate
and papillate, with an apparent margin. Fr. Lichenogr. p. 353. Gy-

Alpine and subalpine rocks (and perhaps a flocculose state, β. deus-
ta, Enum. Lich. N. Amer., descending), White Mountains; Chin of
Mansfield and other of the Green Mountains, fertile. Arctic America,
Rich. Rocky Mountains, Herb. Hook.!! In separating this section of
the genus from the other, I have endeavoured to indicate the features
of difference that seem, at the first view, to distinguish the lirellate
from the patellate apothece; but I am uncertain how far the proposed
characters are constant. The ternary division, incidentally proposed
by Fries (Lichenogr. p. 349), suggested the present; but my present
acquaintance with the species has not enabled me to adopt the former
entire.

11. U. erosa, Hoffm. Th. carilagineous, rigid, cribrose-reticulate,
at length rugulose, dark-fuscous-nigrescent; on the under side papil-
lose-granulate, subfibrillose-lacerate in somewhat anastomosing ridges,
dark-fuscous and cinerascent; apoth. originally somewhat lirellæform,
at length patellate, becoming convex and gyrose-plicate, and finally
substellate-multiform, and immarginate. Fr. Lichenogr. p.354. Schar.!
Spieil. p. 93.

Northward to Arctic America, R. Br., Hook. Northwest Coast, Men-
zies!


13. *U. angulata*, Tuckerm. Th. coriaceous-cartilagineous, very rigid, smooth, and somewhat polished, becoming dark-fuscous and nigrescent; on the under side very black, papillose-granulate, lacerate at the centre, with paler fibres; apoth. somewhat impressed, originally sublirellseform, becoming angulate-patellate, lirellate, and at length convex, with an obtuse margin.


XVIII. OPEGRAPHA, Humboldt.

Apothecia somewhat lirellseform, elongated, margined by a free, carbonaceous, proper exciple. Disk canalicate, at first closed by the inflexed-connivent margin, becoming open, indurated, and horny. Thallus crustaceous.

The Graphidiæ proper, excluding Umbilicaria, constitute a peculiar subtribe, which attains to its full development only in the tropics; passing there into several genera not found elsewhere. *Eschweiler (Systema, & Lich. Brasil. in Mart. Fl. Bras.), Chevallier (Histoire des Graphidés), and Feé (Essai sur les Cryptogames des Écorces Exotiques Officinales)* have illustrated these genera, which are probably represented in our Southern States, where also several remarkable species of the present genus, inhabiting the South of Europe and extending north as far as the warmer parts of England (Borrer), may be expected to occur.
Sect. I. Apothecia superficial, destitute of a thalline margin.

1. O. varia, Pers., Fr. Crust somewhat leprous, indeterminate (rarely innate in the matrix); apothecia superficial, tumid; margins of the entire exciple at length distant, becoming thin, or disappearing; disk somewhat plane, at first subpruinose, blackish within. Fr. Lichenogr. p. 364. O. cymbiformis, Schair. ! Spicil. 1, p. 50. — u. pulicaris, Fr.; apoth. rather elliptical; disk a little concave, margin inflexed. Fr. l. c. O. pulicaris, Fr.


Thick bark of oaks and other trees, and degenerate on dead bark and wood, and stones; New England. New York (α and β), Halsey. Pennsylvania (α and β), Mühl.

3. O. herpetica, Ach., Fr. Cr. innate in the matrix, at length erumpent, and verruculose; apoth. emergent, elliptical or obtusely lanceolate, opake (somewhat ocellate or marginate by the white thalline verrucæ); margins of the entire exciple thin; disk canaliculate, naked,
horny within, becoming tumid, and covering the margin. *Fr. * Lichenogr. p. 368.

Bark of oaks, and other trees, New England.

4. O. abnormis, Ach. Cr. thin, softish, white; apoth. immersed, very slender, short or very long, flexuous, confluent, rugose-crisped, opaque, black; disk and margin somewhat confluent and indistinct. *Ach. Syn. * p. 74.


Sect. II. Graphis. Apothecia erumpent, coronate for the most part with a thalline margin.


North America (Pennsylvania ?), *Muhl.* A common Lichen of Cascarilla bark, which Eschweiler (l. c.) has illustrated at length. The arrangement of Muhlenberg’s catalogue leaves it probable that he considered it to occur within our limits.

7. O. inusta, *Ach.* (sub Graph.). Cr. membranaceous, somewhat rugulose, pale-virescent, decussated by black lines; apoth. minute, immersed, rather short, straight, simple or somewhat stellate-ramose, ob-

Bark of *Prinos verticillata*, Canada, *Kalm.* (Ach.). In this variable genus, long observation is essential to any correct settlement of the species. The present appears to be wholly unknown here.

**XIX. LECANACTIS, Eschw.**

Apothecia immersed, rounded-irregular and lirelliform, always open, the cupular, carbonaceous, proper exciple connate with the thallus, which constitutes sometimes an accessory margin. Disk horny, somewhat plane, never connivent, veiled at first by the pruinose thallus, and bordered by the erect margin of the exciple. Thallus crustaceous.


**Tribe IV. CALICIACEÆ, Fr.**

**XX. TRACHYLIA, Fr.**

Apothecia sessile, discrete from the thallus, orbiculate. Disk somewhat compact, ascigerous, margined by the innate, carbonaceous, proper exciple, or the exciple obsolete. Asci oblong. Thallus crustaceous.

This genus, for which I am not able to furnish a complete character, is distinguished from the other genera of the tribe by the sporidia being contained in asc. Several of the species have also a peculiar habit, quite different from that of the true Calicia.


**XXI. CALICIUM, Pers., Fr.**

Apothecia crateriform; a carbonaceous proper exciple margining a compact or powdery disk, composed of coacervate, naked sporidia. Thallus crustaceous.

Eschweiler's (Lich. Bras. l. c. p. 61) reference of the Calicia to Fungi seems, so far as I can venture an opinion on his observations, hardly satisfactory. The crustaceous thallus, though often, from various causes, deficient, exists normally in every species, except the parasitical and doubtful *C. turbinatum*; and the structure of the exciple connects the genus, together with the related *Trachylia* and *Coniocybe*, closely with *Lecideaceae*, quasi, to use Fries's expression, *Lecidinarium degeneratio praecepta*.

**Sect. I. Apothecia stipitate.**

*Glauc escentia*, Fr. Exciple more or less whitish-cinereous-pruinose.


3. *C. curtum*, Turn. & Borr. Cr. filmy, whitish; stipes short, thick, firm, very black; apoth. turbinate-cylindrical, with a coarctate, whitish margin; the disk becoming at length protruded-prominent. *Turn.*
Decaying wood in the New Hampshire mountains. The protruded "disk often as long as the capitulum itself; and in the latter case giving the pilidium a miniature resemblance to a painter's brush." Lich. Brit.


Decaying wood. Dead trees from which the bark has fallen in mountain forests; New England. Arctic America, Rich. Apothecia at first white-pruinose. Fr.


Rough bark of trees, as of hemlock; and on decaying wood; New England.

** Fuscescensia, Fr. Apothecia more or less ferruginous.

6. C. phaeomelanum, Tuckerm. Cr. of scattered, dissected squamules, green (and fuscescent); apoth. subsessile, ferruginous-fuscous, at length black; the powdery, black disk at length surpassing the tuftid, smooth margin.

Fir-bark in the New Hampshire mountains, common. I should most readily compare this with Trachylia tympanella, Fr., from which it differs in its slightly stipitate apothecia, &c. It is very unlike any European Calicium that I am acquainted with, but I think must be referable to the genus.


Decaying wood in the mountains of New England.

8. C. trachelinum, Ach. Cr. filmy, somewhat smooth, grayish; stipes elongated, slender, firm, ferruginous-fuscous, becoming at

Decaying wood, and on trunks; New England. New York, Halsey. The stipes sometimes branched in this, as in C. subtile, and other species.


Decaying wood in the New Hampshire mountains. The crust deficient in my specimens, but the apothecia appear to me like those of the Swedish Lichen. Sommerfelt remarks that he has gathered it but rarely, and is uncertain whether it is any thing else than a variety of the last, to which Fries also originally referred it.

10. C. *brunneolum*, Fr. Cr. very thin, smooth, whitish; stipes elongated, very slender, often branched, black; apoth. (small) turbinate-globose, dark-yellowish-ferrugineous; the disk of the same color, obliterating the margin of the exciple. *Fr.*! *Lichenogr.* p. 393. C. *parietinum*, Scher.! *Spiecl. p.* 4.

Decaying wood in the mountainous districts of New England.

***Flavo-virescentia, Fr.* Apothecia yellowish-pruinose.


Rough bark of hemlock and other trees, and on decaying wood; New England.


Decaying wood (β), Arctic America, *Rich.* (Herb. Hook.!).
Sect. II. Apothecia sessile; without crust; parasitical.


XXII. CONIOCYBE, Fr.

Apothecia stipitate, spherical, suberose, without margin, bursting at the apex and becoming at length entirely pulverulent, and concealing the proper exciple. Thallus crustaceous.

C. nigricans, Fr. Crust very thin, leprous, white; stipes naked, from whitish becoming black; apothecia globose, naked, black. Fr. Lichenogr. p. 384.

Rough bark of hemlock and rock-maple; New England. It is with hesitation that I refer our plant to the European species, though it appears to agree with a specimen from Flotow. The genus is at once distinguishable from the other genera of the tribe, and several other species, as C. furfuracea, with yellow-pulverulent apothecia, and C. pallida, with pale, white-pruinose apothecia, not improbably occur with us.

Div. II. ANGIOPARPI, Schrad., Fr.

Tribe I. SPHÆROPHORACEÆ, Fr.

XXIII. SPHÆROPHORON, Pers.

Apothecia terminal, spherical, the thalline exciple at first closed, becoming at length lacerate-dehiscent. Nucleus globose, within cottony-cortilagineous, without powdery with naked, black sporidia. Thallus vertical, fruticulose, crustaceous-cortilagineous without, solid within.

1. S. compressum, Ach. Thallus fruticulose, whitish, irregularly branched, compressed, fibrillose-ramulose; apothecia globose-depressed,


Tribe II. **ENDOCARPACEÆ, Fr.**

**XXIV. ENDOCARPON, Hedw.**

Apothecia included in the thallus, globose; a membranaceous, thin, pale thalline exciple inclosing a gelatinous, colored, deliquescent nucleus; ostioles somewhat prominent. Thallus horizontal, cartilagineous-foliaceous, subpeltate.


as well as Sprengel, refers E. glaucum, Ach. (North America, Ach.), to the variety α of the present species. I have not found this variety, but the next species is near to it.


3. E. fluviatile, DC. Th. cartilagineous-membranaceous, flaccid, lobed, green, becoming fuscescent when dry; lobes rounded, somewhat auriculate-lobulate, on the under side naked, reticulate-rugulose, pale-fuscos, becoming black; ostioles somewhat prominent, black. Fr.!

Rocks (granite), suffused with water; New England. New York, Halsey. Newfoundland, Pylaie. — β, alpine. Lake of the Clouds, White Mountains, at an elevation of five thousand feet. Fries remarks, in comparing the present species with E. miniatum, α, that monophyllous specimens of the former are always minute; but in β these occur nearly as large as average specimens of the latter. The very brief indication given by Persoon (Act. Wetterav.) of his E. Americanum answers to our variety.


5. E. latevirens, Turn. Th. thin, membranaceous, irregularly orbicular, somewhat concave, round-lobed, grass-green, margins very entire,

On the earth in alpine districts. White Mountains. Arctic America, Rich. The apothecia are unknown, and the plant is a very doubtful member of the present genus. Fries regards it a metamorphosis of the squamules of Cladonia.

XXV. SAGEDIA, Ach., Fr.

Apothecia included in the thallus, globose; nucleus gelatinous, deliquescent, and, as well as the membranaceous, thin exciple, becoming at length blackish; ostioles discrete, attenuated into a thin neck, and dilated at the apices, pertuse. Thallus horizontal, subcrustaceous.


(On the earth. Fr.) New York (rocks), Halsey. We have perhaps a Sagedia, on rocks, in New England.

XXVI. PERTUSARIA, DC.

Apothecia verrucæform, formed from the thallus, including (1—00) naked, waxy-gelatinous, colored nuclei. Thallus crustaceous, often passing into soredia and isidia.


2. *P. faginea*. Cr. tartaric-carilaginous, cinereous-white, the circumference zonate, often thin, polished, and somewhat bluish; apoth. hemispherical, bursting into mealy soredia. *Lichen fagineus*, L. & Auct. (e Fr.). *Variolaria multipuncta*, Turn. in Linn. Trans. 9, p. 137, t. 10, f. 1. *P. faginea*, Floerke. & *P. sorediata*, Fr. — *β. orbiculata*; apoth. lax, explanate; the nuclei expanded into a submembranaceous, denudate, flesh-colored disk, which at length falls out, leaving the sorediiform verrucae. *P. communis, β. sorediata, c. orbiculata*, Fr. *Lichenogr. p. 422. Variolaria faginea, communis, & corallina, Auct. var.*

Trunks, dead wood, rocks, and stones; New England and westward. New York, Torrey. Pennsylvania, Muhl. Arctic America, Rich. The *Variolariae* have been illustrated most largely by Turner and Borrer, in the Lichenographia Britannica, and by the first-mentioned author in the Linnean Transactions. That they are sorediferous states of various crustaceous *Lichens* has been shown at great length by Meyer, Wallroth, and Fries, and this view is confirmed by the observations of Eschweiler and of Schäfer. To the present species, and the last, most of our common *Variolariae* are to be referred.


Upon mosses, Pennsylvania, Muhl., Ach.


Tribe III. VERRUCARIACEÆ, Fr.

XXVII. CONOTRÉMA, Tuckerm.

Perithecia mostly solitary, horny, black, at first pertuse, becoming at length open, with a coarctate, inflexed margin, including a depressed nucleus, which is elevated at the centre into a somewhat marginate disk. Thallus crustaceous.


Trunks. North America, Swartz. (ex Ach.). Pennsylvania, Muhl. in herb. Willd. ! New York, Halsey. New England, very common. Probably the Lecanora urceolata of Muhl. Catal., but the above-cited specimen in the herbarium of Willdenow is without name. The Lichen appears to me an aberrant form of the present tribe. Thelotrema ? atratum, Feé Crypt. Exot. t. 13, f. 4, seems to be distinguished from Thelotrema precisely as the present genus (passing over the other essential differences) is, by its black proper exciple, but the structure of the nucleus in the former plant removes it from ours.

XXVIII. VERRUCARIA, Pers.

Perithecia hemispherical-globose, solitary, horny, black, closed, with a simple or papillæform ostiole ; becoming sometimes at length subsutelliform, or rarely inclosed in a thalline verruca. Nucleus gelatinous, hyaline, deliquescent. Thallus crustaceous.

* Saxicolæ. Crust somewhat tartaceous.


2. *V. elæochroa*, Tuckerm. Cr.planate, rimose-areolate, olivaceous; perith. with a wide base, globose, emerging and conical at the apex, becoming at length depressed and umbilicate.

Rocks (limestone), Ohio, *Mr. Lea*! Apparently related to *V. elæina*, Borr. (E. Bot. Suppl. t. 2623, f. 2), and *V. olivacea*, Fr. (Lichenogr. p. 438), but very different from *V. olivacea*, Pers. (Borr. l. c. t. 2596, f. 1), which is a bark-Lichen.


4. *V. umbrina*, Wahl. Cr. verrucose-granulate, or smoothish, from fuscous at length dark-brown; perith. entire, globose, somewhat prominent above the crust, papillate. *Fr. Lichenogr.* p. 441.

Rocks and stones (granite), near water; New England. We have doubtless other saxicoline species, but they occur often in imperfect states, and are easily overlooked. I have an alpine Verrucaria, from the White Mountains, but the crust is deficient.

**Cortical.** Crust innate in the matrix, often deficient.


Trunks; the hue varying with the different epidermis of the matrix; New England. Pennsylvanina, *Muhl*. V. composita, Schwein. in Hals. Lich. N. Y. l. c. p. 9, has apothecia clustered, forming dark spots, but I have not been able to find in my specimens, which agree apparently with the description, any constant characters to separate it from the present.

6. *V. alba*, Schrad. Cr. innate in the matrix, becoming at length denudate, white; perith. subglobose, entire, denudate, persistent, immersed at the base, ostiole papillate, or pertuse. *Fr. Lichenogr.* p. 444. — β; cartilagioeous, smoothish; perith. smaller. *Fr. l. c.* *V. glabra-*


7. *V. gemmata*, Ach. Cr. innate in the matrix, effuse, smoothish,
white-hoary; perith. hemispherical, dimidiate (not immersed at the base), persistent; nucleus whitish. *Fr. Lichenogr. p. 444.*


S. V. *epidermidis,* Fr. Cr. innate in the matrix or obsolete; perith. dimidiate, the base patent, innate-superficial, at length collapsing, and, together with the nucleus, planaplanate-depressed. *Fr. Lichenogr. p. 447.* — a; perith. larger, orbiculate. *Fr. l. c. V. analepta, Ach.* — β; perith. larger, elliptical. *Fr. l. c. V. Cerasi & epidermidis, Ach.* — γ; perith. small, punctiform (with the habit of the next species). *Fr. l. c. V. stigmatella, Ach. part.*

Trunks, mostly on smooth bark; New England, and westward. New York (a and β), Halsey. Arctic America, Rich.

9. V. *punctiformis,* Pers. Cr. innate in the matrix or obsolete; perith. innate-superficial, semiglobose, subdimidiate, the base inflexed; nucleus globose. *Fr. Lichenogr. p. 447.* V. *stigmatella, Ach. part.*


Bark of *Dirca palustris,* Ach., who compares it with V. carpinea, which is referred to the last species by Fries.

**Tribe IV. LIMBORIACEÆ, Fr.**

**XXIX. PYRENOTHEA,** Fr.

Perithecia round, carbonaceous, closed, pertuse at length with a simple ostiole, and protruding the somewhat gelatinous, bursting nucleus, finally dehiscent, explanate, and empty. (A disciferous state occurs in a single species.) Thallus crustaceous.


Trunks (β), Arctic America, Rich.
COLLEMACEÆ.

Filamentous, or foliaceous gelatinous-conglutinate plants without discrete layers. Sporidia included in asci, and immersed in a thalamium, which is contained either in a thalline exciple or a proper exciple.

Several genera are included here formerly referred to Lichenes, but separated by Fries, and with other genera constituted a distinct family, intermediate between Lichenes and aquatic Algæ. Collema and Leptogium may be said to have the thallus of Phyceae with the apothecia of Lichenes, and Ephebe is considered by Fries nearly related to the Byssi.

SYNOPSIS.

Tribe I. COLLEMEÆ, Fr. — Thallus gelatinous-conglutinate, caulescent or foliaceous.

2. Leptogium. Apothecia scutelliform, with a proper exciple.

Tribe II. EPHEBIDEÆ. — Thallus filamentous, not gelatinous.


Tribe I. COLLEMEÆ, Fr.

I. COLLEMA, Hoffm.

Apothecia at first subglobose, becoming at length discoid-open and scutelliform, with a thalline exciple. Thallus corneous-gelatinous, somewhat pulpy, of a moniliform-filamentous texture, variously lobed.

* Thallus imbricate-porate, becoming thick and turgid when wet.

1. C. pulposum, Ach. Thallus thick, suborbicular, very compact, blackish-green, of numerous, somewhat imbricate, plicate, rather entire or repand-crenate, erectish lobes, those of the circumference larger, somewhat appressed; apothecia somewhat crowded, slightly concave, rufous, with an elevated, irregular margin. Ach. Syn. p. 311. Schær.

Upon rocks, among mosses. Pennsylvania, Mühl. I have not observed this species in the granite region of New England.


Rocks (limestone, Schär.), New York, Russell! I have seen only a small fragment, but it appears to belong to this rather than to the preceding species.


Rocks among mosses, Pennsylvania, Mühl. ! New York, Spreng! The cited specimens belong probably to the variety β of Acharius, but were not considered to differ from α by Floerke.


5. C. pustulatum, Ach. Th. substellate, lacerate-laciniate, the laciniae expanded, plane, irregularly crenate, besprinkled above with paler pustules which pass at length into apothecia; disk punctiform, black. Ach. Syn. p. 351. Parmelia leucoderma, Willd. herb.?

Upon mosses, North America, Ach., who says it is a minute species, very distinct from the last. Pennsylvania (P. leucoderma, Willd.), Mühl. !

6. C. grumulatum, Hook. Th. foliaceous, membranaceous, corrugated, granulated on both sides, imbricate-complicate, blackish-olive, the lobes somewhat rounded, waved and crisped, rather entire; apoth.


** Thallus thin, foliaceous, gelatinous-membraneous, lobed principally at the circumference.


Rocks (especially limestone, Ach.). Pennsylvania, Muhl. in herb. Willd. ! The specimen appeared to me to agree with an original one from Acharius. Schærer refers the species to C. flaccidum. It is said to occur in Massachusetts.

12. C. pulchellum, Ach. Th. membranaceous, orbicular, plane, somewhat laciniate, round-lobed at the circumference, plicate-papulose and dark-green above, beneath paler and deeply lacunose; apoth. crowded, elevated, the disk urceolate, pale, the margin thin, coarctate, very entire, at length somewhat rugulose. Ach. Syn. p. 321.

Trunks and rocks, New England. Pennsylvania, Muhl. ! Ohio, Mr. Lea !


Trunks and stones. New England. Arctic America, Rich. I have omitted several species of this genus, which require more observation.

II. LEPTOGIUM, Fr.

Apothecia rounded, becoming discoid-open and scutelliform, somewhat pedicellate, with a proper exciple. Thallus gelatinous-membranaceous, subdiaphanous, texture cellulose.

1. L. Tremelloides, Fr. Thallus foliaceous, membranaceous, very thin and somewhat diaphanous, smooth on both sides, or powdery above, lead-colored; lobes oblong, rounded, very entire; apothecia scattered, elevated, plane, rufous-fuscescent, with a paler margin. Fr. Fl. Scan. p. 293. Collema, Ach. Hook. Br. Fl. 2, p. 213.


AND BRITISH AMERICA.


Trunks. Mountains of New England.

Tribe II. **EPHEBIDEÆ.**

III. **EPHEBE, Fr.**

Apothecia formed from the thallus, from concave becoming plane, and at length convex, black, the margin evanescent. Thallus filamentous, not gelatinous.

