

the working piston, by exposing it at each stroke to the current of entering cold air; and in the system of cranks, rockshafts, levers, and their connecting-rods, by which the varied, complicated, but necessary motions of the supply and working pistons are regulated and connected with each other and the fly-wheel.

The minority recommend that the Rumford Medal be awarded to Mr. Ericsson for his improvements in the management of heat, particularly as shown in his air engine of 1858.

E. N. HORSFORD,

DANIEL TREADWELL.

CAMBRIDGE, April 8, 1862.

The two Reports being accepted, the subject was discussed in detail by Professors Horsford, Lovering, Winlock, Peirce, and Treadwell.

And, on motion of Professor Horsford, an adjourned meeting was voted to be held on the 22d instant, for the further consideration of the subject.

Five hundred and seventh meeting.

April 22, 1862. — ADJOURNED MONTHLY MEETING.

The VICE-PRESIDENT in the chair.

The Corresponding Secretary read a letter from Professor Trendelenburg, of Berlin, in acknowledgment of the notification of his election as a Foreign Honorary Member of the Academy.

He presented, from the author, a paper entitled *Plantæ Wrightianæ e Cuba Orientali*, a A. GRISEBACH: Pars II.

Also the following communication from Professor Tuckerman.

Observations on North American and other Lichenes. By EDWARD TUCKERMAN, A. M. (Continued from Vol. IV. p. 407.)

OMPHALARIA LEPTOPHYLLA, sp. nov.: thallo membranaceo-cartilagineo glabro atroviridi subtus subconcolore e centro in lobos undulatos apice latiori rotundatos repandos mox sinuato-lobatos diviso;

apotheciis minutis submarginalibus innato-prominulis demum pallidis tuberculiformibus disco punctiformi impresso. Sporæ in thecis elongato-clavatis octonæ, ellipsoideæ vel demum oblongo-ellipsoideæ, incolores, simplices, protoplasmate in guttulas (1-2) secedente diam. $1\frac{1}{2}$ - $2\frac{1}{2}$ -plo longiores. "On rocks in rivulets, overflowed after rains," in the island of Cuba, *Mr. Wright*. Thallus rather thin, but firm, smooth, blackish-green or nearly black, (the largest specimens, perhaps, an inch in their longest diameter,) dividing at the centre into wavy lobes, with wider, rounded, repand tips, and becoming more or less sinuate-lobate, with often a plume-like aspect; or, less regularly, passing into narrower divisions. Gonimous granules of scarcely middling size, subsolitary, the filamentous elements amongst which they are interspersed being exceedingly delicate. Apothecia minute, superficial, becoming at length a little paler than the fronds, disposed in necklace-like chains, or sometimes in heaps, at or near the margin of the lobes, tuberculiform, and the disk punctiform-impressed, or more rarely at length flattened and sublecanorine. Spores in eights, in long-club-shaped spore-sacks, colorless, ellipsoid, or at length oblong-ellipsoid, simple; the protoplasm dissolving more or less into roundish drops; once and a half to twice and a half longer than wide. Paraphyses distinct, filiform. The subsolitary gonimous granules and more delicate filamentous elements separate this plant, as does also the thinner and more divided thallus, from *Omphalaria Girardi*, DR. & M., the type of the genus, both with Montagne and Nylander; but I know of no lichen with which I should sooner compare it. *O. Girardi* is, however, only known to me in infertile specimens (determined by Dr. Nylander, Syn., p. 99) which were detected by T. M. Peters, Esq., in Alabama. *Collema laciniatum*, Nyl. l. c. p. 116, which accompanies the Alabama lichen, grows intertangled with the present in Cuba. The apothecia of the present are at length rather prominent, for the most part peritheciiform; but they assume at length, in the oldest condition, a more regular and sublecanorine aspect.

OMPHALARIA LINGULATA, sp. nov.: thallo subcartilagineo viridifuscescente (fusco-nigrescente) e basi umbilicato-affixo in lobos spathulato-oblongos subsimplices plano-convexos subtus obscuriores diviso; apotheciis sparsis minutis crinatis pallidis disco impresso margine integro subprominulo demum cincto. Sporæ octonæ in thecis clavatis, incolores, oblongo-ellipsoideæ, simplices, protoplasmate granulosa vel guttulosa diam. 2-3-plo longiores. On rocks, "Farallones la Cavalina

(M. Revel, near Sagra)," in the island of Cuba, *Mr. Wright*. Thallus rather thinnish, but cartilaginous, fragile, of a brownish-green becoming at length blackish-brown color above, and mostly, or at length, darker below, dividing at the umbilicate base into oblong, spatulate, or tongue-shaped lobes, which are commonly subsimple, but occur also irregularly, and similarly but sparingly lobulate; slightly convex above, and margined for the most part, but scarcely canaliculate, below. Gonimous granules glomerulate, interspersed among anastomosing filamentous elements. Apothecia minute, scattered, innate, pale; the small impressed disk bordered by an at length slightly prominent and entire thalline margin. Spores in eights, in club-shaped spore-sacks, colorless, oblong-ellipsoid, simple; the protoplasm becoming guttulose or granulose; twice to thrice longer than wide. The apothecia resemble the smaller ones of *Collema pustulatum*, Ach. (nor does it appear otherwise than likely that the commonly verrucarioid apothecia of the last species express anything else than the lecanorine type, in a state the perfect development of which is for the most part precluded), and are sprinkled pretty thick over the thallus, much as in that species; but the gonidia are not concatenate, but glomerulate in the present, which is also affixed at a single point at the base, as in *Omphalaria*. The dimensions of the lichen vary from half to three quarters of an inch in the longest diameter, but single lobes occur among the specimens, which are much broken, of the same length.

COLLEMA COCCOPHORUM, sp. nov.: thallo minuto orbiculari crasso nigro lobis periphericis expansis crenato-incisis centralibus adscendentibus granulato-lobulatis; apotheciis majusculis subplanis disco rufo-fusco margine thallino tenui cincto. Sporæ octonæ, incolores, ellipsoideæ l. ovoideo-ellipsoideæ, diblastæ $1\frac{1}{2}$ – $2\frac{1}{2}$ -plo diametro longiores. On sandy earth in the valley of the Rio Grande, Texas, *Mr. Wright*. Small, roundish fronds, the largest of which a little exceed an inch through, of very small, thickish, black lobes, which are radiose-expanded, and crenate-cut, at the circumference, with mostly raised, at length granulate margins; and becoming towards the centre densely lobulate-granulate (with the aspect of a crust of black granules). Gonimous granules concatenate, amongst anastomosing filaments. Apothecia largish (often a line and a half through), flattish or plano-convex, the dark-reddish-brown disk enclosed by a thin, at length uneven and even granulate thalline margin. Spores colorless, ellipsoid and ovoid-ellipsoid, simple, or at length diblastish, once and a half to

twice and a half longer than wide. This little species, of which abundant specimens were collected by Mr. Wright, is comparable with small states of *C. cheileum* (as Moug. & Nestl., n. 1056); but is more minute, with a different habit of thallus, and spores which appear never to be more than diblastish. The latter feature, if constant, separates it also from other allied species.

COLLEMA CALLIBOTRYS, sp. nov.: thallo mediocri suborbiculari membranaceo-cartilagineo rigidulo glauco-virescente lobis radiose expansis mox angustatis costatis lobulis adscendentibus capituliformi-dilatatis vel botryoso-diformibus apotheciis confertissimis mox coopertis; apotheciis minutis disco concavo-plano rubello excipulo thallino integerimo fusciscenti-pallido recepto. Sporæ octonæ in thecis subcylindraceis, incolores, primo subquadratae, sporoblastis 4 cruciatim dispositis dein longiores, ellipsoideæ sporoblastis pluribus muriformi-dispositis vel oblongæ, diam. $2 - 3\frac{1}{2}$ -plo longiores. On trunks of *Carya*, Santee Canal, South Carolina, *Mr. Ravenel*. Thallus exceeding an inch in diameter, of rather separate, radiose-expanded, somewhat membranaceous but rigid, glaucescent-green lobes, which become narrowed and laciniform, and more or less ribbed, as well as sparingly divided, and pass into short, erectish, dilated branches or clusters, covered at length and concealed by the crowded apothecia. Gonimous granules concatenate, amongst distinct, much branched, anastomosing, filamentous elements. Apothecia in crowded clusters, very minute, depressed-globose; the concave, or at length flat, dark-reddish disk received in an entire, pale-brownish, thalline exciple. Spore-sacks subcylindraceous, octosporous. Spores at first somewhat square; the four sporoblasts arranged cross-wise, but becoming longer and with more and smaller sporoblasts (more or less murally-polyblastish), and at length ellipsoid or oblong-ellipsoid, and from twice to thrice longer than wide; the longer ones sometimes pretty regularly tetrablastish, but the sporoblasts more often, or some of them, divided longitudinally. The affinity of this plant is not doubtful. *C. verruciforme*, Nyl. (*C. furvum*, var. *verruciforme*, Ach.) is its European analogue, differing (as in Schær. Lich. Helv. n. 416, and in the excellent description of Mr. Th. Fries, Lich. Arct. p. 279) in its minuteness, its ascending, densely complicate lobules, and shorter spores, which do not appear to attain to the same development; and an Asiatic also exists, in *C. coccophyllum*, Nyl. Syn. p. 112, from the Nilgherry Mountains in India, presenting spores agreeing exactly (Nyl. l. c., t. 4, f. 20) with the first-described state of the spores of the

present, but also, it should seem, not advancing beyond it; with apparently a different thallus. As this last is described, and as *C. verruciforme* is represented in the European specimens, we can scarcely avoid considering the American lichen as, to appearance, and so far as we yet know, distinct.

COLLEMA CYRTASPIS, sp. nov.: thallo mediocri suborbiculari membranaceo-cartilagineo rigido fusco-viridi subtus pallido laciniato-lobato lobis mox angustatis subradiantibus lobulis adscendentibus granulato-rugulosis; apotheciis mediocribus disco convexo nigro-castaneo nitido demum tumidulo marginem thallinum crassiusculum crenulatum excludente. Sporæ octonæ in thecis subclavatis, incolores, subfusiformes, tetrablastæ (3-septatæ) diam. 4–6-plo longiores. On trunks near the ground, in woods; common in Southern Pennsylvania, Maryland, and Virginia. Ohio, *Lea*. Illinois, *E. Hall*, in Hb. Lapham. North Carolina, *Rev. Dr. Curtis*. South Carolina and Georgia, *Mr. Ravenel*. Alabama, *Mr. Peters*. Thallus of middling size (from an inch to an inch and a half in diameter) at first roundish, of cartilagineous-membranaceous, rigid, brownish or blackish green, expanded lobes, which become at length much narrowed, and more or less radiant, passing here and there into short, ascending, branch-like lobules, the dilated and divided summits of which are wrinkled-plaited, and at length densely granulate. Gonidia concatenate. Apothecia of middling size (the largest often a line in diameter), the blackish-chestnut polished disk soon becoming tumid, and quite excluding the originally thick and crenulate thalline margin. Spores in eights, rather broad-spindle-shaped (navicular-subfusiform, *Koerb.*), normally tetrablastish, with regular, mostly roundish sporoblasts, the three dissepiments, obscurely more or less visible, four to six times longer than wide. The almost monophyllous thallus of *C. nigrescens* becomes irregularly somewhat lobed (“lobis cæspitoso-fasciculatis,” Sommerf. Suppl. Fl. Lapp., p. 119) in *C. aggregatum*, Nyl. (*C. fasciculare*, var. *aggregatum*, Ach.), and passes, still further, in the present lichen, into at length laciniiform, often radiant divisions. The present is sufficiently distinguished from *C. aggregatum* by its different spores, but in this respect agrees better with the European *C. conglomeratum*, Nyl. Syn. p. 115, t. 3, f. 1 (*C. fasciculare*, var. *conglomeratum*, Ach.), which differs especially in its minute size; the far less divided and less granulate thallus and more entire apothecia (“margine tenui integerrimo,” Sommerf. l. c.) being perhaps less to be relied upon. — Growing with the present lichen in

Pennsylvania, and also by itself in New York and Western Massachusetts, I have found another, nearly-related plant, sent to me also from Carolina by Dr. Curtis and Mr. Ravenel; the smaller fronds of which pass almost wholly into short, erect lobules, crowned with "almost contiguous," smaller, and paler apothecia, with thin, entire margins, and containing ovoid, or soon oblong-ovoid (ovoid-ellipsoid) diblastish (once-septate) often nebulous (or, apparently, nebulous-monoblastish) spores, from once and a half to scarcely more than thrice longer than wide, and rather larger gonimous granules; this is probably *C. pycnocarpum*, Nyl. Syn. p. 115, described from a North American specimen in the Paris Museum, and clearly distinguishable, so far as appears, as another link or knot in the knotted line of related forms which we have been considering. *C. pycnocarpum* is not so easily referable to the "genus *Synechoblastus*" (comp. Koerb. Syst. p. 411); but nothing could be less natural than to separate it generically from the present species, which is clearly a "*Synechoblastus*." The relation of *C. conglomeratum* of Europe to *C. cyrtaspis* is perhaps the same with that of the European *C. verruciforme* to *C. callibotrys*; and the two foreign lichens might be taken, possibly, for reduced forms of the American; *C. pycnocarpum*, Nyl., being in that case regarded a small form, with simpler spores, of *C. cyrtaspis*. But I am not ready, at present, to go beyond the *distinction* of these states, — a distinction based, as above, in each case, upon a large collection of specimens.

COLLEMA STELLATUM, sp. nov.: thallo cartilagineo firmo viridiglauescente e laciniis anguste linearibus convexis parce vageque ramosis ramis subsimplicibus vel demum fastigiato-divisis intricatis subtus pallidis canaliculatis; apotheciis mediocribus adnatis rufo-fuscis mox convexis marginem thallinum tenuem excludentibus. Sporæ octonæ, mediocres, incolores, lato-fusiformes, uniseptatæ diam. $2\frac{1}{2}$ –3-plo l. demum $3\frac{1}{2}$ -plo longiores. — On wet rocks, in beds of mountain rivulets, La Perla, island of Cuba, *Mr. Wright*. Occurs in roundish or irregular, rather dense masses of narrow, very sparingly and irregularly branched, convex lobules, the projecting tips of which are either simple, or at length forked, or even fastigiately divided, greenish, or brownish-green, with more or less of a glaucescent tinge above, and paler and channelled below; the gonimous granules being connected in necklace-like strings. Apothecia of middling size, convex. Spores in eights, of middling size, broad-fusiform; once-septate, about thrice, or even thrice and a half, longer than wide. Comparable with *C.*

laciniatum, Nyl. Syn. p. 116, an Alabama lichen, which Mr. Wright has detected in Cuba; but differs in color, in the peculiar habit due to its more simple, elongated, teretish, densely intertangled, substellate, rather than radiant lobes; also in the slenderer filamentous elements, and the constantly once-septate spores. The spores of *C. laciniatum* (Alabama, Mr. Peters) are described by Nylander, l. c., as simple or once-septate, and about thrice longer than wide; and I have never observed any differing, unless possibly a little in length; but in the Cuba lichen they become 6-nucleolate and thrice-septate, the length exceeding also more than four times the diameter, — which taken together with the narrower, less uneven lobes, more distinctly channelled beneath, may indicate a variety (var. *solenarium*).

CALICIUM RAVENELII, Tuckerm. in litt.: thallo granuloso glaucescente; apotheciis turbinato-globosis margine incurvo radiato-striatulo stipiteque brevi firmulo fusco-nigris. Sporæ octonæ, fuscescentes, ellipsoideæ) vel fusiformi-ellipsoideæ, simplices, diametro $1\frac{1}{2}$ – 3-plo longiores. On old garden palings, St. John's (Berkley), South Carolina, H. W. Ravenel, Esq. Thallus of glaucescent granules (or obsolete). Apothecia smallish, globular, or a little turbinate; the incurved margin radiately wrinkled or striated, and, as well as the short, rather slender, but firm stipe, brownish-black. Spores fuscescent, from ellipsoid becoming irregularly somewhat fusiform-ellipsoid, simple, from once and a half to thrice longer than wide. This species, which is well distinguished by its striated exciple, is dedicated to my valued friend and correspondent, the discoverer.

CALICIUM LEUCOCHLORUM (sp. nov.): thalli granulis in crustam tenuem subcontiguam inæqualem flavidam hypothallo nigro decussatam confluentibus; apotheciis clavato-turbinatis subtus ferrugineis disco nigro stipite valido atro. Sporæ octonæ in thecis cylindraceis, majusculæ, biscociformes, diblastæ, medio nunc constrictæ, atro-fuscescentes, diam. $1\frac{1}{2}$ – 2-plo longiores. — On trunks of palm, island of Cuba, Mr. Wright. Granules soon confluent, and forming a thin, uneven, pale-yellow crust, irregularly here and there decussated by distinct, black lines (much as in *Lecidea parasema*, var. *exigua*) which I refer to the hypothallus. Apothecia large, from tubular- becoming clavate-turbinate, rusty beneath; the disk flattish, black; the stipes of middling length, stout and strong. Spores larger and shorter than those of *C. hyperellum*, from roundish- becoming short obtuse-ellipsoid, more or less constricted at the middle, or a little longer and more regularly

ellipsoid, the tips often acutish; diblastish, at length blackish-brown; the length scarcely exceeding twice the diameter. Nearly akin to *C. hyperellum* and *C. trachelinum*; but differing from both in the crust, and especially in the club-shaped apothecia and large spores, which exceed in size those of *C. roscidum*.

TRACHYLIA LEUCAMPYX (sp. nov.): thallo tenui pulveraceo dein subcontiguo rimoso e viridulo cinerascente; apotheciis minusculis innato-prominulis (subelevatis), disco subplano atro margine intus albo-pruinoso cincto. Sporæ octonæ in thecis lineari-clavatis, e cocciformi mox oblongæ, sæpius 3-blastæ, dein fuscescentes 2- rarius 3-4-septatæ ad septa constrictæ diam. 2-3-plo longiores. On trunks, Monte Verde, island of Cuba, *Mr. Wright*. Thallus very thin, leprous, but becoming here and there compacted and chinky, and from greenish at length ash-colored. Apothecia small, a few of the larger ones occasionally a quarter of a line in diameter, rounded, or occasionally oblong, innate, at length a little elevated in the manner of *T. tympanella*, but (like *T. Javanica* (M. & V. d. B.), Nyl.) not dilated above; the black margin, which, as in *T. Javanica*, is always thicker than in the European species, conspicuously white-powdery within. The elevation of the apothecia is comparatively slight, and often even obscure, and they thus contrast evidently enough with the remarkably conical fruit of *T. Javanica*. Spores in long and narrowed spore-sacks, colorless and smallish at first, and from short-obtuse-ellipsoid (cocciform, *Koerb.*) becoming oblong, and commonly 3-blastish, crossed next by colored, rather irregular dissepiments, and finally dark brown, and for the most part twice, or much more rarely thrice, or even four times septate, and more or less strongly constricted at the dissepiments; the length from twice to thrice, or more rarely four times, exceeding the diameter. This lichen is nearest allied to a curious subtropical type of the Calicieï, found by my liberal correspondent, the late Dr. Joseph Hale, on Cypress trunks in Louisiana, in 1851, and named by me (in herb. Fries), the following year, *Trachylia Pyrgilla*. Mr. Wright has since found the plant not uncommon in the island of Cuba, and he detected it also (as botanist of the U. S. North Pacific Exploring Expedition) in the Bonin Islands, southeast of Japan. From the last, which is inseparable from the American lichen, the Java plant found by Junghuhn, and described by Montagne and Van den Bosch, in 1856, as *Calicium Javanicum* (Mont. Syll. p. 357, M. & V. d. Bosch, Lich. Jav. p. 54) can scarcely differ. Dr. Nylander referred the lat-

ter the next year (Monog. Calic. p. 33) to *Trachylia*; and this construction is perhaps still preferable to the opinion expressed later, in his Synopsis (p. 168), that the plant constitutes a genus; the variation from the type of *Trachylia* being only such as might be presumed possible within *Trachylia*. From *T. Javanica* the species above described differs in its thin and powdery thallus (that of the former plant being much better developed, and even approaching, at length, the thickish and warted crust of *T. tympanella*); its much smaller and far less prominent, more conspicuously white-edged apothecia; and especially in the curious differentiation of the spores, which exhibit the blunt ellipsoid (or *biscociform*) type of the genus, not merely (as in *T. Javanica*) extended to spores with three dissepiments, but also twice or even thrice constricted. So strange is the effect of this latter variation, that I have hesitated to describe the plant as a lichen; but though there is no coloration of the hymenium with iodine, any more than in *T. Javanica*, both species equally possess an evident thallus; and their apothecia and spores, as already remarked, are explicable as variations from, or rather developments of, the type of *Trachylia tympanella*. — The genus *Trachylia*, as here understood, (indicated by Fries in his Flora Scanica, 1835, and again in his Summa Veg. Scand., 1846, and taken in the same sense by Torssell, a little earlier, and by the present writer in his Synops. Lich. N. Eng., in 1848, as also in the various important works of Dr. Nylander, q. v. in Lich. Scand. p. 44,) appears preferable to the very indefinite *Acolium* of Fée (Ess. Crypt. p. 28, the name adopted being the same as that given by Acharius to the section of his genus *Calicium* which included *C. tympanellum*), as it is also older than the later *Acolium* of Massalongo, &c. And *Cyphelium*, Ach. in Vet. Ac. Handl. 1815 (lately proposed by Th. Fries, in Gen. Heterolich. Eur. p. 100, for the group represented by *T. tympanella*), though it included *Trachylia*, by no means expressed it; and is a less distinct conception.

CLADONIA DILLENIANA, Floerk.: thallo squamuloso-dissecto, podetiis superne infundibuliformibus prolifero-ramosis, axillis perviis sub-squamulosis e stramineo albicantibus, fertilibus subcymosis; apotheciis fuscis.

a. CRISPATA: straminea; podetiis turgidis, axillis apicibusque infundibuliformi-dilatatis foliolis lineari-multifidis exasperatis irregulariter demum proliferis. *C. stenophylla*, Nyl. Syn. p. 201. On rotten logs, Monte Verde, Cuba, Mr. Wright.

β. ELONGATA: albicans; podetiis gracilioribus subsimpliciter repetitoproliferis elongatis, axillis hiantibus foliolis multifidis cristatis. Coral-

loides pulchrum geniculis acetabuliformibus crispifoliosis. Dill. Hist. Musc., p. 100, t. 16, f. 23. Floerk. Clad. l. c. On rotten logs, Monte Verde. Thallus of rather elongated, much and narrowly-lobed squamules, which are greenish-straw-colored above, and very white beneath. Podetia, in the more simple states of α , turgid, and dilated above into funnel-shaped expansions, which are finally more or less irregularly proliferous-ramose, and, as well as the dilated axils, often squamulose; the fertile ones at length much divided above and crowned by the clusters of brownish (from pale at length dark-brown) apothecia. This state, which exceeds at length four inches in height, appears quite analogous to *C. furcata*, var. *crispata*, though the larger and more branched specimens are more readily comparable with fine ones of *C. uncialis*, var. *turgescens*. Var. β is a paler, more slender, much elongated form, attaining to the height of eight inches; the less dilated, often subcylindrical podetia extended upwards by commonly a single proliferation, and the gaping but not dilated axils elegantly fringed by the dissected squamules already described, which retain above their greenish hue, and thus contrast pleasingly with the white podetia. The scyphiform-dilatation of the podetia above, which is more or less evident in α , as in the already cited form of *C. furcata*, disappears at length entirely in β , as in *C. furcata*, var. *racemosa*; but the Cuban lichen differs from the latter (occurring in an equally fine condition in Venezuela, Mr. Fendler) in a simpler and less-branched habit, in color, and in the elegant fringe of squamules which borders (and often conceals) its gaping axils. It is this last, most developed condition of the lichen, as I think scarcely doubtful, which Dillenius describes and figures, from a specimen brought by Catesby from the Isle of Providence. He places it next to, and compares it with, *C. uncialis*. But Floerke more satisfactorily referred the described plant, which he had not seen, to his "*Cladoniae infundibuliformes*," placing it next to *C. squamosa*; and remarking, in a note at the end, that *C. furcata*, var. *crispata*, in itself considered, would scarcely be separable from the same section. The cited variety of *C. furcata* is represented in North America by a rich series of forms; and one of these from the New England mountains, with the axils crested with dissected squamules, is exceedingly like, except in the important respect of color, small states of the present. *C. furcata*, var. *cristata*, Fr., also an inhabitant of our mountains, is a form of the last-mentioned variety in which the dilated axils, and especially apices, are fimbriate-cristate; but the crests are due here (so far as my

specimens go) solely to an excessive proliferation of the margin. Fries (Index Dillenianus, in Lich. Eur. p. 464) has referred the Dillenian lichen to *C. verticillaris*, Raddi; and Nylander (Syn. p. 192) takes the same view: but the last-named plant possesses true scyphi which are proliferous from the centre, and the fringe-like extension of the margins of these scyphi differs entirely from the crest of dissected squamules which borders the axils (as fully described and figured by Dillenius) of *C. Dilleniana*. *C. stenophylla*, Nyl. l. c., was founded on the first-received, smaller specimens of our *a*, which were on several accounts puzzling, and scarcely to be referred to any known species; but these are now fully explained by Mr. Wright's further collections, and the correctness of Floerke's opinion as to the Dillenian plant, if I mistake not, sufficiently established. The species is worthy to be adorned with the name of the illustrious author of the *Historia Muscorum*.

CLADONIA HYPOXANTHA, sp. nov.: thallo parvulo cæspitoso subfoliaceo; foliolis lineari-angustatis elongatis ramoso-multifidis margine crenulatis supra viridi-stramineis subtus fusco-aurantiis podetia turbinate-cylindrica cartilagineo-corticata verrucoso-rugulosa scyphis concavis margine subradiatis aut obliteratis apotheciis coccineis proferentibus. On trees in dense woods, Monte Verde, island of Cuba, *Mr. Wright*. Folioles (scarcely exceeding half an inch in length, the podetia being about a quarter) palmately or pinnately many-cleft; the elongated, branched, plano-convex or flattish divisions finely crenulate; greenish-glaucous, or, at length, straw-colored above, and beneath convex, or at the base teretish, and brownish-orange, with white edges. Podetia short, rather slender, subturbinate, verrucose-rugulose, the scyphi at length sparingly radiated, or obliterated. Apothecia scarlet. Folioles comparable rather with the dissected squamules of *C. squamosa*, than with those of *C. alpicornis*; and it is possible that the lichen may be rather a macrophylline form of some species (unknown as yet as to Cuba, or, I think, Tropical America) analogous to *C. cornucopioides* in Northern regions, than an analogue of the typically macrophylline species of the glaucous series. Epiphylline forms, with reduced folioles, also occur, and these suggest similar ones of *C. cornucopioides*. But the characters of the plant are too striking not to require separate notice. *Cenomyce corallifera*, Kunz. msc. in Herb. Berol., from Surinam (Weigelt, 1827), is very probably a state, with better developed podetia, and reduced or squamulose, convex folioles, of the present;

and, except as regards the squamules, is also similar to small forms of *C. cornucopioides*.

CLADONIA CRISTATELLA, Tuckerm. Suppl. 1, in Amer. Journ. Sci. 25, p. 428, char. emend.: thalli squamulis firmis crenatis mox subelongatis incis; podetiis ascyphis validis ventricoso-cylindricis cartilagineo-corticatis glabris e flavo- mox pallido-virescentibus apice dilatato digitato-subdivisis, ramulis fastigiatis fertilibus; apotheciis coccineis. *C. Floerkiana*, Tuckerm. Syn. p. 55, & Exs. n. 133, non Fr. On dead wood; and on the earth. New England to Virginia, very common. Westward to Indiana, Herb. Van den Bosch; Wisconsin, *Mr. Lapham*; and Lake Superior, *Prof. Agassiz*. Southward, small forms occur (North Carolina, *Rev. Dr. Curtis*; South Carolina and Georgia, *Mr. Ravenel*; Alabama, *Mr. Peters*), apparently belonging here; but the species is a Northern one, and the Southern lichen taking its place more commonly exhibits the peculiar features of *C. pulchella*, Schwein., which is rather to be regarded a northern state of the subtropical *C. muscigena*. Thallus of small, firm, crenate, or at length a little elongated and lobed squamules, colored like the podetia above, and white below. Podetia ventricose-cylindrical, becoming often more or less regularly elongated-turbinate; the largest specimens two inches long and three or even four lines in diameter at the thickest part below the branches, but passing into slender and shorter states; with a smooth, but at length verruculose (never mealy) or even subsquamulose epidermis; the squamules being, however, rarely other than adnate, and the whole aspect rather glabrous; from greenish-yellow becoming pale-green (varying also to greenish-glaucous, or even cinerous) dilated at the apex, which is never scyphiferous, and passing there into subdigitate, fastigiate branchlets, always crowned by the scarlet apothecia. The name now applied to the above-described lichen was originally proposed by the writer to distinguish a remarkable state which has proved to be inseparable from the other, this last having passed, with especial reference to its paler, more slender condition, for an American form of the European *C. Floerkiana*, Fr. But the affinity of a plant is to be determined, not by its individual peculiarities, which may apparently relate it to other types, but by its own type, which it may quite imperfectly express. And the type of the dwarf forms of the lichen before us, which have been referred to *C. Floerkiana*, is really remote from the type of the latter. *C. Floerkiana* (Fr. Lich. Suec. n. 82. Schær. Lich. Helv. n. 36, pro parte) is, in fact,

scarcely more than a smoothish state of *C. macilenta* ("verbis magis quam re vera diversa," Th. Fr. Lich. Arct. p. 156); while most perfectly developed specimens of the American lichen are, as respects color, size, and, quite commonly, shape, so similar to fine ones of *C. cornucopioides*, as to be readily at the first glance mistaken for the latter, or even — the constant dissolution of the scyphus in *C. cristatella* being interpreted as in some other species — plausibly to be reckoned a hitherto unknown, symphy carpious variety of it. Such symphy carpious states should, however, be connected with the scyphiferous states from which they descend by intermediate conditions; and these appear to be wholly wanting in *C. cristatella*, as in *C. mitrula*; both being always ascyphous, and the dissolution of the apices into branchlets appearing therefore to be, in both cases, normal.

b. RAMOSA: podetiis cæspitose-conjunctis hic illic inferne patulo-ramulosis superne demum sub-dichotomo-divisis. *C. cristatella*, Tuckerm. l. c. On the earth, in sterile places; White Mountains, *Oakes*. Sub-cæspitose; the podetia here and there sending out short branchlets below, not unlike similar ones in some fruticulose species; and above, very much dichotomously divided. A luxuriant form of *a*, exhibiting sometimes an approach to a fruticulose habit, and the axils now and then subperforate. The apices are commonly much more divided than in *a*; but the cristate habit, which suggested the name, is also conspicuous in the latter.

c. OCHROCARPIA, apotheciis carneo-luteolis. *C. Floerkiana*, *ochrocarpia*, Tuckerm. Exs. l. c. *C. substraminea*, Nyl. Syn. p. 204. On the earth in high, sterile regions, many years since burnt over, on the lower ridges of the White Mountains (Mount Crawford); frequent, in various states, and passing directly into *a*. Less common in lower districts. Saratoga Springs, New York. Manchester, Massachusetts, *Mr. Oakes*.

CLADONIA GRACILENTA (sp. nov.): thalli squamulis minutis lacinatis stramineis subtus albis; podetiis scyphiferis elongatis gracilibus membranaceo-corticatis glabris stramineis (flavidis) vage elongato-ramosis, ramis patulis intricatis hic illic ramulisve subulatis; scyphis angustatis margine dentato proliferis, fertilibus superne incrassatis fimbriato-radiatis; apotheciis coccineis. Rotten logs in the edge of savannas near Sagra, island of Cuba, *Mr. Wright*. Thallus minute, of scattered, at first crenate, but finally linear-lobed, thin, straw-colored scales. Podetia slender, or very slender, and much elongated (reach-

ing six inches in length); the thin, smooth epidermis becoming here and there uneven, but not squamulose; straw-colored, becoming pale-yellow towards the summits; dividing sparingly and irregularly into elongated, spreading, more or less intertangled branches, which are mostly scyphiferous, but occur occasionally with subulate tips. Sterile scyphi very small, proliferous from the margin (or very rarely from the centre), toothed; the teeth often crowned with the spermagones. Fertile podetia somewhat dilated, especially above, when the epidermis becomes less regular, and the axils are sometimes (atypically) perforate; the scyphi, by proliferation from the margin, becoming in this condition much divided or fimbriate-radiate. Apothecia scarlet. As *C. leporina*, Fr., represents *C. rangiferina*, in the scarlet series, the present may be taken as analogous, in that series, to *C. gracilis* in the *Fuscescentes*, Fr., and *C. amaurocræa* in the *Ochroleucæ*. It is slenderer than the last-named, but sometimes not wholly unlike it. Of the scarlet-fruited group, *C. bellidiflora* is possibly nearest, and passes into states distantly approaching some specimens of the present, but the former is confined to arctic and alpine districts; and the extreme slenderness and smoothness of the delicately-corticate, long-branched podetia of *C. gracilentia*, and their different habit, is quite enough to separate this inhabitant of tropical savannas.

DACTYLINA, Nyl. Syn. p. 286. — The genus *Dufourea* was proposed by Acharius (Lichenogr. pp. 104, 524, t. 11, f. 2) for a Cape of Good Hope lichen (*Parm. mollusca*, Ach.) akin to *Roccella*, which has since been separated by De Notaris as *Combea*. Only this was illustrated by the author, as expressing the type of the new genus; and though he associated with it a plant not congeneric (*P. flammea* (L.), Ach., also from the Cape, the spores of which relate it to *Physcia parietina*), and even gave precedence to this last in the Synopsis, the citation here, immediately after the name of the genus, of his figures (of *D. mollusca*) in the Lichenographia, apparently showed that his type remained the same. It is not, therefore, without reason that Mr. Th. Fries (Genera Heterolich. Eur. p. 113) proposes to retain *Dufourea* for *D. mollusca*. But Acharius added to the above-named, as "species dubiæ," several lichens of more or less similar habit, the fructification of which he was unacquainted with, and one of these (*D. madreporiformis*), though still only known in a sterile condition, which can ill determine a generic type, has represented *Dufourea* with many lichenists. To this, the remarkable lichen of Arctic America upon which

Dr. Nylander has founded his distinct genus *Dactylina*, stands in obvious affinity ; and the equally obvious differences of the two plants seem to be fully mediated by our second species, fertile specimens of which were first detected on islands of Behring's Straits, by the careful eye of Mr. Wright.

DACTYLINA ARCTICA (Hook.), Nyl. l.c. *Dufourea*, Hook. in Richards. Append. to Frankl. Narr. p. 762, t. 31. *Evernia*, Tuckerm. Syn. p. 11. Bear Lake and elsewhere in Arctic America, *Richardson*. Rocky hill-sides, Behring's Straits, *Mr. Wright*. Thallus becoming erect, simple, or very sparingly divided, ventricose, smooth and shining, rather attenuated above towards the obtuse apices, pale yellow, becoming brownish at the base, within hollow, the medullary filaments only thinly or even obscurely clothing the walls. The taller of these specimens rather exceed two inches in height, by two to three, or at the base four lines in width ; but they reach nearly twice these dimensions (Hook., Nyl.). Rarely, specimens are more divided above, the (2 or 3) simple branches showing something of the fastigate habit of *D. madreporiformis*. Apothecia largish (two lines in diameter in my fertile specimen), a single one occupying the summit of a branch, or branchlet, which is wrinkled below and passes above into a crenulate, at length obscure margin, enclosing the flat, shining, dark chestnut-colored disk. Spores in eights, in somewhat ventricose or wedge-shaped spore-sacks, small, colorless, spherical, limbate ; the paraphyses being indistinct. Spermatogonia unknown.

DACTYLINA RAMULOSA. *Dufourea ramulosa*, Hook. Append. to Parry's 2d Voy. p. 414. *Evernia*, Tuckerm. Syn. p. 11. Arctic America, Hook., l. c. Rocky Mountains, Herb. Hook. Hill-sides (on rocks), Behring's Straits, *Mr. Wright*. Thallus very much smaller than in the last (the specimens scarcely exceeding half an inch in height, except in the branched state, when they do not exceed an inch), but at first not wholly unlike it ; the inflated and rarely somewhat finger-shaped, obtuse branches becoming, however, soon nodose (it would be interesting to compare here the scarcely known *Dufourea nodosa*, R. Br., in Ross's Voyage) and lacunose-uneven, and passing into the dichotomously branched state, almost muricated with short, elongated-papilliform branchlets, which is, if I mistake not, (the specimen from the Hookerian Herbarium referred here being without name,) the type of the species as understood by Hooker. Some of the specimens of the simpler condition are pale straw-colored, the tips only being brownish ; but

the latter hue soon prevails, and becomes at length, in the fully developed dichotomous lichen, olivaceous-brown. Within, the branches are hollow, as in the last, the wall being clothed with a thin web of medullary filaments. Apothecia either lateral, and clearly sessile, or terminating branches, when they appear sometimes as if stalked; the shining, chestnut disk at length equalling the crenulate, thalline margin. Spores in eights, in cuneate-clavate spore-sacks, spherical, like those of the last; but occurring also, now and then, a little oblong. *Dufourea ryssolea*, Ach. Lichenogr. p. 525 (not, as is affirmed in the Index Dillenianus of Professor Fries, Lich. Eur. p. 468, the plant of Dill. Hist. Musc. p. 545, t. 82, f. 4, which seems clearly to be *Cetraria Richardsonii*, Hook.), from Siberia, appears almost to approach, so far as the brief character goes, to some less developed states of the present, but is really, according to Dr. Nylander (Syn. p. 397) a *Parmelia*, nearly related to *P. olivacea*; the branches of *D. ramulosa* being in fact, as already remarked, mostly hollow, or in the narrower forms only very loosely webby within, and by no means, as Acharius describes his plant, "*subfistulosi, tela bombycina farcti*." But I possess a lichen from Tyrol, collected by Funk, (probably *Dufourea muricata*, Laur. in Sturm D. Fl. 2, 24, t. 12, but my specimen, instead of being straw-colored, is rather olivaceous-brown, often more or less white-pruinose,) which possibly differs from the next (as Laurer's is said to) in having a rather looser medullary web, or in being even subfistulous, and in other respects sufficiently resembles specimens of *Dactylina ramulosa*. The last-named lichen is clearly congeneric with *Dactylina arctica*, and it also nearly approaches the next.

DACTYLINA MADREPORIFORMIS. *Lichen madreporiformis*, Wulf. in Jacq. Coll. 3, t. 3, f. 2. *Dufourea*, Ach. Lichenogr. p. 525; Syn. p. 247; Koerb. Parerg. p. 15; Nyl. Syn. p. 287. *Cladonia*, Schær. Spicil. p. 48, & Lich. Helv. n. 85. *Evernia*, Fr. Lichenogr. p. 25. *Cetraria nivalis*, var. *madreporiformis*, Schær. Enum. p. 14. On the earth, on alpine ridges east of Middle Park, Rocky Mountains; sterile; Dr. C. C. Parry. Thallus softish, turgid, about an inch in height, rather sparingly, subdichotomously divided; the branches short, lacunose-uneven, obtuse, ochroleucous; the medullary filaments rather closely filling the interior, which is seldom subfistulous. Apothecia unknown. Readily distinguishable from the others by its paler color, and from the last by its simpler habit, and more compact medullary

tissue. The place of the species just referred to being determined, I cannot hesitate to place this next to it, and in the same genus.

PARMELIA JAPONICA, sp. nov.: thallo foliaceo-imbricato subcoriaceo lævi glaucescente, laciniis sinuato-multifidis moniliformi-constrictis plano-convexis apice palmato-cristulatis subtus albis pulvinulis spongioso-pannosis fusco-atris interrupte tectis; apotheciis mediocribus spadiceis margine incurvo subcrenato. On birch trunks at the summit of mountains, N. E. of Hakodadi, Japan, *Mr. Wright*. Thallus more rigid than that of *P. physodes*, and agreeing rather in this, as in some other respects, with *P. colpodes*, from which it differs in the remarkable constriction of its narrowed, many-cleft lobes into short, joint-like, wedge-shaped, or irregularly-rounded portions, — a feature noticeable throughout, but especially so in the repeatedly-palmate or crested apices, — and in the spongy hypothallus (consisting, like that of the American lichen, as described by Nylander, l. c. p. 404, of much-branched, anastomosing, short-jointed, brown filaments) being broken up into separate, roundish-irregular, convex cushions. The only published species with which I can compare this is *P. moniliformis*, Babingt. N. Zeal., p. 23, t. 127, f. 3, referred to the older *P. angustata*, Pers., by Nylander, Syn. p. 403), the lobes of which appear by the description to be “constricted, especially towards the apices, or even moniliform-constricted,” and the underside clothed “interruptedly with spongy pulvinules” (Nyl. l. c.). But the plant of Babington, as figured, is a small lichen of the ochroleucous series (“facie fere *Parmeliæ incurvæ*,” Nyl. l. c.) with “attenuate apices”; while the present belongs to the glaucescent series, and has the size and aspect of the finest conditions of *P. physodes* and *P. colpodes*. I have entirely failed to detect spores in the apothecia of either of the five specimens. The spores of *P. colpodes*, which are crowded in large numbers in the polysporous, wedge-shaped spore-sacks, are more or less oblong or fusiform-oblong, and soon hooked or crescent-shaped; the length from three to six times exceeding the diameter. Those of *P. physodes*, on the other hand, occur in eights, and vary from spherical to ovoid; and those of *P. angustata*, as described, appear to be similar.

PHYSCIDIA, Genus novum. Apothecia scutelliformia, excipulo thallino recepta. Discus ceraceus, hypothecio tenui strato medullari imposito enatus. Sporæ aciculares incolores. Thallus foliaceus, expansus, hypothallo byssino pannoso-intertexto aut crustaceus subsquamaceo-granulosus. Habitu ad *Physciam* proprie sic dictam accedit, at distincta hypothallo sporisque.

PHYSCIDIA WRIGHTII. *Physcia?* *Wrightii*, Tuckerm. Suppl. 2, in Amer. Journ. Sci., 28, p. 204. On various trees, in dense woods, in the island of Cuba, *Mr. Wright*. Thallus foliaceous (with much of the aspect of *Physcia* proper, as also of smooth states of *P. Domingensis*, Montag.), suborbicular, thin, narrowly lobed; the largest states four inches in diameter, and the flat or flattish lobes often exceeding, in such states, a line in width, but perhaps as common in smaller and more narrowly divided conditions; imbricated now closely, with even a subconnate aspect, and now very loosely, when the delicately linear lobes appear often as if ciliated; irregularly and above somewhat palmately many-cleft; sending out here and there terete, simple, or rarely a little branched, finally crowded, coralloid branchlets, the longest of which exceed three lines in length; from pale greenish becoming greenish-straw-colored (the larger states often darker, or even glaucescent), and at length a little yellowish, when the color of the fruit is also intensified. Hypothallus of very delicate, colorless, much-branched, anastomosing filaments (resembling those of *Parmelia* (*Amphiloma*) *gossypina*, Montag. Cub. p. 217, but less slender), which are closely intertangled into a sometimes dense, but more commonly thinnish, and at length even obsolescent web. Apothecia scattered, middling-sized (about a line in diameter), or largish; the inflexed, plicate-crenulate (or, as it were, effigurate) margin becoming flexuous-lobulate, when the exciple reaches two or even three lines in diameter; the naked, waxy disk varying in color from pale yellow to orange, and imposed upon a thinner, colorless hypothecium, which rests upon the white medullary layer. Spores in eights, in club-shaped spore-sacks, smallish, colorless, acicular, commonly tri-septate (tetrablastish), but at length (if I mistake not) pluriseptate (pleioblastish), the length from eight to sixteen times exceeding the diameter. Paraphyses indistinct. Spermogones not observed. — But beside this typical condition of the plant before us, there occurs (and is represented by a large set of specimens) another, which, though inseparable in essential characters, differs so much as to appear at first sight scarcely congeneric. “Hypothallus optimas præbet differentias, sed in speciminibus perfectis et junioribus observandus.” Fr. Lich. Eur. p. 130. It has been observed already, that the lichen above described recedes obviously from *Physcia* in its pannose hypothallus, in which it approaches *Pannaria*, and especially the aberrant tropical type (*Parm. gossypina*, Montag.) which Dr. Nylander (Enum. Gen. p. 110) has provisionally connected with his genus *Am-*

philoma. And *Pannaria* (proper) furnishes similar degenerations of the foliaceous type to that we are about to describe, but scarcely a hypothallus offering in the young state the precise features of this.

PHYSCIDIA SQUAMULOSA, sp. nov.: hypothallo fibrilloso radiante demum byssino-pannoso granula squamacea albida mox lobulata ramulis coralloideis nunc obsessa crustaceo-coacervata proferente; apotheciis planis crenulatis dein flexuoso-lobatis subaurantiis. Sporæ aciculares, gracillimæ, diam. 6–12-plo longiores. On trees, in dense forests in Cuba, *Mr. Wright*. Thallus crustaceous, of minute, roundish scale-like granules, scattered over the hypothallus (which does not attain at once to its pannose development, but appears at first as rather sparse, elongated, radiant, white fibrillæ), becoming later lobulate, and often beset with coralloid branchlets, as in *P. Wrightii*, and finally crowded together into a granulose white crust. Apothecia very like those of *P. Wrightii* and equally large, perhaps more commonly orange: spores as in that, or possibly a little slenderer. As respects habit, a *Lecanora*; but in fact a degeneration of the foliaceous type expressed by *Physcidia Wrightii*. Large sets of specimens of both lichens have afforded me no clear indication of the passage of one into the other; but such passage appears probable.

PANNARIA FLABELLOSA, sp. nov.: thallo minuto livido-cinerascente, laciniis lineari-angustatis dissectis, centralibus teretiusculis congestis, periphericis flabelliformi-expansis planis striatis, hypothallo viridi-cærulescente; apotheciis minutis biatorinis sparsis, margine integerrimo mox viridi-cæruleo (nigro) discum planum rufum (nigricantem) vix superante. Sporæ octonæ, oblongo-ellipsoideæ, dein subdactyloideæ, tetrablastæ, diam. $2\frac{1}{2}$ –3-plo longiores. On talcose schist and on granite in Vermont, *Mr. Frost*. A minute species, occurring in rounded or irregular patches, smaller in its parts than *P. crossophylla*; found on similar rocks in Vermont by Mr. Russell, and described in this journal, 4, p. 404,—and comparable rather, except as regards size, with *P. tryptophylla*; from which it differs in the color and division of its thicker, narrower, plano-convex, or, in the circumference, flat, but never concave, finely striate lobes, which never become granulose-corallinoid. The apothecia are not a little like those of *P. nigra* (Huds.), Nyl. Lich. Scand. p. 126 (*Collema nigrum*, Ach.; *Parm. tryptophylla*, var. *corallinoides*, Auct.), with which (separated by Koerber and other late writers as a distinct generic type of Collemacei) the spores also appear to connect it. But the thallus sufficiently distin-

guishes the present plant, which is properly, if I mistake not, inseparable from *Pannaria*. Gonimous granules bluish-green, several not unfrequently concatenate.

COCCOCARPIA STELLATA, Tuckerm. in litt.: thallo parvulo orbiculari membranaceo plumbeo, laciniis radiantibus lineari-angustatis multifidis subtus albis fibrillosis; apotheciis sessilibus rufo-fuscis (nigricantibus) subtus albo-fibrillosis. On Holly (*Ilex opaca*), Santee Canal, South Carolina, *Mr. Ravenel*. The larger fronds scarcely surpassing half an inch in diameter, rather darker than *C. molybdæa*, and conspicuously differing from the small forms of this last, which often accompany it, in its linear, many-cleft lobes. The apothecia are also scarcely appressed, but they possess the other features of those of *C. molybdæa*; and exactly similar ones, which are also fibrillose beneath, occur in an Alabama specimen of the latter, collected by Mr. Peters. Spores immature in all the apothecia examined.

LECANORA ERYTHRANTHA, sp. nov.: thallo crustaceo tenui rimuloso albo-glaucescente; apotheciis mediocribus sessilibus, disco plano marginato fulvo-miniato margine thallino crenulato tenuescente. Sporæ octonæ, incolores, ellipsoideæ, polari-diblastæ, diam. 2 – 2½-plo longiores. On trunks, island of Cuba, *Mr. Wright*. *L. aurantiaca*, on bark (occurring in the low country of Carolina, in Louisiana, and in Texas), is undoubtedly near to this, but contrasts strongly with it in its black hypothallus, yellow thallus, and orange fruit. The present and the two following species belong to a group, which on the one hand appears almost to descend from the yellow *Placodiums* and *Physcia* (these closely akin elements of the system are brought together in *Physcia*, Massal., and perhaps more happily in *Xanthoria*, Th. Fr.), while it passes, on the other, into conditions not at first sight to be distinguished from *Lecidea*. The group is understood to constitute several genera, in the system as developed by the school of Massalongo (though these genera, and, in addition to them, *Amphiloma*, Koerb., and *Pyrenodesmia*, Massal., are now brought together in one, in the "*Placodium*" of Anzi, Cat. Lich. Sondr. p. 39,—an arrangement determined solely by the spores): but the not inconsiderable difficulties of this disposition are perhaps to some extent avoided by the simpler view of Dr. Nylander (Enum. Gen. p. 112), which accords very much with the profoundly considered arrangement of Fries (Lich. Eur. p. 161).

LECANORA FLORIDANA, sp. nov.: thallo parvulo crustaceo tenui contiguo inæquabili glauco-cinerascente hypothallo nigricante sublimi-

tato ; apotheciis minutis adnatis, disco plano fusco-nigro opaco submarginato marginem thallinum integrum demum subcoloratum æquante. Sporæ octonæ, incolores, ellipsoideæ, polari-diblastæ, diam. 2-plo longiores. On trees, Western Florida, *Mr. Beaumont*. On bushes, thickets of the Blanco, Texas, *Mr. Wright*. Thallus thin and smooth, becoming ash-colored, limited more or less by the blackening hypothallus. Apothecia small and closely sessile, lecanorine ; the flat, nearly black, opaque disk scarcely or indistinctly marginate ; but the rather thickish and entire thalline exciple at length more or less colored. A small lichen with much of the aspect of some states of *L. sophodes*, but the spores of the present section.

LECANORA CAMPTIDIA, sp. nov. : thallo crustaceo tenui inæquabili dein rimuloso cinereo-fuscescente hypothallo nigro sublimitato ; apotheciis mediocribus biatorinis sessilibus, disco plano-convexo rufo-fusco albo-pruinoso marginem integrum albidum mox flexuosum fuscescentem demum superante ; excipulo thallino excluso. Sporæ octonæ, incolores, ellipsoideæ vel oblongo-ellipsoideæ, diam. 2 – 3-plo longiores. On various trees, and on rails, in Southern Pennsylvania, Maryland, and throughout Virginia (Alexandria, near Richmond, and in Sussex County), where it becomes common. North Carolina, *Rev. Dr. Curtis*. South Carolina, *Mr. Ravenel*. Texas, *Mr. Wright*. Thallus thin, smooth, becoming chinky and at length much broken, and more or less brownish-ash-colored ; the hypothallus, which sometimes appears as a white fringe, at length blackening, and in that way conditioning the thallus, which it sometimes decussates. Apothecia of middling size, biatorine, sessile, the smooth and entire, at first nearly white, but soon fuscescent and flexuous margin, at length exceeded by the plano-convex reddish-brown disk, which is besprinkled with a white, fugacious bloom ; the thalline exciple for the most part quite obsolete, but sometimes obscurely recognizable as a depressed crenulate border ; or much more rarely (as in *L. ferruginea*) conspicuous, when the apothecium becomes zeorine, or lecanorine, according as the proper margin is more or less evident. The lichen is thus (like *L. ferruginea*) now, in its lecanorine state, a *Callopusia* of Koerber ; and now, in its lecideine condition, a *Blastenina*. In its more perfect states this species is sufficiently distinct-looking ; but small forms are not unlike *Lecidea spadicea*, Ach., and large ones may sometimes be passed over for *Lecanora subfusca*.

LECANORA BERICA. *Maronea Berica*, Massal. in Flora, 1856, n.

19. Koerb. Parerg. p. 90. *Lecanora constans*, Nyl. Prodr. Gall. p. 89; & Lich. Par. n. 124. *Maronea Kemmleri*, Koerb. l. c. p. 91. *Lecanora polyphora*, Tuckerm. in litt. On trunks and dead wood. (Italy, Massal. l. c. France, Nyl. l. c. Germany, Koerb. l. c.) Not uncommon in New England, and southward to Virginia. Pennsylvania, Dr. Michener. Ohio, Lea. North Carolina, Rev. Dr. Curtis. South Carolina, Mr. Ravenel. Alabama, Mr. Peters. Thallus smallish, verrucose-granulate, the granules now and then flattened, or even subconfluent, often at first greenish-gray, but with more or less of an ashy tinge, which finally (the hypothallus more strongly conditioning) prevails, and becomes even fuscous, limited, rather conspicuously, by the blackening hypothallus. Apothecia of middling size (often large for the plant, the diameter exceeding half a line), sessile, lecanorine, or more or less perfectly zeorine; the flattish, brownish-black, opaque disk, which is received in a stratum of the medullary layer, submarginate, and bordered by a thickish or even tumid, inflexed, finally crenulate, or flexuously-irregular margin. Spores very numerous, in lanceolate-clavate spore-sacks, very minute, colorless, from roundish-ellipsoid becoming a little oblong, twice or even twice and a half longer than wide, and finally diblastish. A plant which Dr. Koerber has thoroughly described; but his second species (*Maronea Kemmleri*) scarcely indicates anything more distinct than a state of the first, in which the proper margin, perhaps always potentially present, and by no means rarely observable, becomes especially developed. Such states occur here, but they are not separable from the others. The lichen has the aspect of a common bark form of *L. sophodes*. The spores are described as simple by all the authors who have remarked upon them, but I cannot but consider the protoplasm ("so weit es erkannt werden kann, grösstentheils wolkig-trüb," Koerb. sub *Maronea Berica*, l. c.) as dividing finally into two pretty regular, opposite parts, as observable as could be expected in so minute an object, and in the European as well as the American specimens; this differentiation of the spore resembling that of the younger conditions of the biscoetiform type; as if, in fact, the plant were a remarkable micro- and polysporous deviation from the type of *L. sophodes* (*Rinodina*, Massal., Koerb.), in which the final development of the spore peculiar to that type has been precluded, rather than from the type of *Lecanora* proper. *L. sophodes* varies with spore-sacks containing twenty or more spores; and is also comparable with the present in its often luxuriantly fertile hymenium.

THELOTREMA, Ach. Nyl. Some of the species differ no little in aspect from the well-defined *T. lepadinum*, Ach.; and Fée (Ess., Suppl. p. 88) and others have proposed to separate the latter generically. But though the distinction of the excipular margins is often obscure in the tropical species, and these vary also very considerably in the figure, coloring, and internal differentiation of the spores, which are commonly smaller and more simple than those of *T. lepadinum*; it appears to me that the Cuba lichens referable here, in accordance with Dr. Nylander's limitation of the genus (Enum. Gen. p. 117), or, at least, those of which the descriptions follow, are none of them properly separable from it, or from *T. lepadinum*. And this view is, if I mistake not, in full accordance with Eschweiler's laborious observations (Lich. Bras. p. 173).

THELOTREMA LEPADODES, sp. nov.: thallo effuso tenuissime membranaceo diffracto cinereo-albicante; apotheciis submediocribus superficialibus e conoideo tympaniformibus, apertura ampla excipulo exteriori urceolato albido (fuscescente) thallo vestito discum nigricantem albo-pruinose excipulo interiori discreto membranaceo albo marginatum margine demum subrecurvo integro cingente. Sporæ suboctonæ in thecis clavatis, majusculæ, fuscescentes, oblongæ, serialiter polyblastæ (ser. transversis 16–24, longitudinalibus in medio 4), diam. 3–5-plo longiores. On trunks, Filanthropia, island of Cuba, Mr. Wright. Thallus membranaceous, much and finely broken, or scurfy, ashy-white. Apothecia a third of a line in diameter, superficial; the younger ones exactly truncate-conoidal, but the oldest more cylindraceous or drum-shaped, with an ample aperture; a proper urceolate exciple, more or less clothed by the thallus, but occasionally denuded and fuscescent above, bordering with an entire, finally a little recurved margin a blackening white-pruinose disk, which is itself loosely edged by a white, membranaceous, inflexed, sometimes obscure interior exciple. Spores large, fuscescent, oblong, serially polyblastish. Paraphyses filiform, flexuous. Appearing at first sight to differ from *T. lepadinum*, mainly in the more erect, finally recurved outer margin, and the colored and otherwise somewhat discrepant spores; but the real difference is, if we accept the common definitions of *T. lepadinum*, much greater; the so-called thalline, outer exciple of the latter being represented in the present by what is plainly a proper exciple; that is, one not formed from the thallus, though more or less covered by it. This structure (that is to say, a sporigerous disk, veiled by a more or less distinct interior exciple,

and contained by a proper exciple, clothed by or concrete with the thallus surrounding it) is, however, though very variously conditioned, and often in this or that respect obscurely expressed, (the interior exciple being now scarcely distinguishable, and now the proper exciple, and the thallus now so predominant as to give a lecanorine character to the apothecium, and now without any other than an accidental relation to the apothecium,) if I do not mistake, the typical structure of the genus; and recognizable even in the well-known species, common to the Northern hemisphere, cited above.

THELOTREMA PLATYCARPUM, sp. nov.: thallo effuso tenui lævigato dein ruguloso pallido (subfuscescente); apotheciis majusculis innatis dilatatis subscutelliformibus, disco plano cæsio-pruinato excipulo interiori membranaceo viridulo inflexo cincto, exteriori reflexo substellatim fisso. Sporæ octonæ, parvulæ, leviter fuscescentes, oblongo-ellipsoideæ, tetrablastæ, diam. $2\frac{1}{2}$ – 3-plo longiores. Trunks, in the island of Cuba, *Mr. Wright*. Thallus thin and often obscure, but becoming interruptedly thicker, and at length rugulose, and pale-brownish-cream-colored. Apothecia large, reaching a line and a half in diameter, innate, much dilated; the flat, thin, pale-fuscescent disk, which becomes blackish above and delicately pruinose, bordered by the thin, obscurely greenish, erose, inflexed margin of the interior exciple; the exterior margin splitting in a somewhat stellate manner into reflexed divisions. Spores small, slightly fuscescent, oblong-ellipsoid, often a little narrowed towards one end or dactyloid-ellipsoid, from diblastish (when a thin dissepiment is observable) becoming finally and regularly tetrablastish, the sporoblasts roundish. Paraphyses filiform, conglutinate. The near affinity of this elegant *Thelotrema* to *T. lepadinum* can scarcely be denied, notwithstanding the marked divergence of its spores.

THELOTREMA SANTENSE, sp. nov.: thallo crassiusculo tenuissime ruguloso excrescentias coralloideas proferente e glaucescente demum cinerascete; apotheciis majusculis innatis urceolato-scutelliformibus dilatatis, apertura amplissima, disco plano nigro albo-pruinoso excipulo exteriori incurvo lacero-crenato cincto, interiori indistincto. Sporæ octonæ, fusæ, ovoideo-ellipsoideæ, demum oblongo-ellipsoideæ, 4 – 5-blastæ, sporoblastis irregularibus subdivisis $1\frac{1}{2}$ – 4-plo diam. longiores. On trunks of elm (*Ulmus Americana*) in the low country of the Santee, South Carolina, *Mr. Ravenel*. In Southern Alabama, *Mr. Beaumont*. Thallus at first appearing in thin, roundish, somewhat powdery patches, but becoming a quarter of a line thick, with a very delicately uneven,

as if powdery, at length finely rugulose, or rimulose-verruculose surface, which is beset, more or less thickly, with isidioid, elongated, rarely at length branched excrescences, attaining to more than a line in length; from pale greenish-gray becoming ashy-gray. Apothecia large (the larger ones little less than a line in diameter), innate, urceolate-scutelliform, at length much dilated; the exterior exciple bordering, with an incurved lacerate margin, the black disk, which is covered with a white bloom (becoming thicker, and more crustaceous, when it is broken and perforated, as in *T. schizocarpum*, herein described, and other species), and is seen, in a section, to be enclosed by a pale-brownish line, extending above it into the thalline margin. Interior exciple indistinct. Spores of middling size, dark-brown, from subcocciform becoming ovoid-ellipsoid, and at length rather oblong, or attenuate at one end (dacryoid, *Koerb.*), the length from once and a half to four times exceeding the diameter. Certainly akin to a much smaller southern lichen, which is referred by Dr. Nylander to a variety of his *T. compunctum*. The latter was regarded a species of *Urceolaria* by Acharius, and the present has much of the same aspect; but it is, I think, inseparable from *Thelotrema*. Paraphyses indistinct, but apparently filiform.

THELOTREMA LEIOSTOMUM, sp. nov.: thallo tenui effuso lævigato rimuloso-verruculoso glaucescente; apotheciis immersis rotundatis aut confluenti-diformibus (lirelliformibus), excipulo exteriori urceolato margine prominulo integerrimo albido discum nigricantem velo subcrustaceo margini concolore demum perforato vestitum cingente. Sporæ octonæ, fusæ, ellipsoideæ, demum oblongo-ellipsoideæ, septis 3 sporoblastisque regularibus 4, diam. 2-3-plo longiores. Trunks, island of Cuba, *Mr. Wright*. Thallus smooth, glaucescent. Apothecia immersed, minute, rounded, but confluent at length, and passing into irregular, often lirelliform shapes, often approaching a line in length; the exterior exciple bordering the sunken, blackening disk, with a slightly prominent, smooth and entire, white, or pale cream-colored margin; the thickish, smoothish veil, which covers the disk, and becomes at length, in the larger apothecia, perforated, in the manner of *T. Auberianum*, being of the same color with the margin. Spores regularly ellipsoid, brown, with three dissepiments and four regular sporoblasts; the length from twice to thrice exceeding the diameter. Paraphyses filiform, distinct.

THELOTREMA CUBANUM, sp. nov.: thallo effuso tenui lævigato ru-

gulosos rimosos e glauco-virescentes pallide luteo-virentes; apotheciis majusculis e conico-hemisphaerico mox dilatatis scutelliformibus aut difformibus adnatis, excipulo exteriori margine crasso demum fissisublobato recurvo albo-velato discum cinereo-nigricantem velo albo subcrustaceo coopertum cingente. Sporae octonae, fuscae, ellipsoideae, tetrablastae, sporoblastis dein subdivisis diam. duplo longiores. On trunks, Monte Verde, island of Cuba, *Mr. Wright*. Thallus thin, but at length well developed, becoming wrinkled and chinky, from glaucescent-greenish at length acquiring a pale yellowish tinge. Apothecia soon superficial, and depressed-globular, the sides often gibbously irregular (much as is observable in *Ascidium Cinchonarum*, Fée); the rounded aperture white-edged (such apothecia measuring half a line in diameter), but becoming finally dilated and scutelliform (or variously irregular), and from a line to two lines in the longest diameter; the exterior exciple, which is (in section) black within, bordering with an erectish and rather acute, but at length cleft and recurved, white-veiled margin, a thickish, grayish-black disk, closely covered with a crustaceous, white veil. Spores in eights, brown, short and broad-ellipsoid with rounded tips (cocciform, *Koerb.*), tetrablastish, the flattened sporoblasts at length irregularly subdivided. The thick, smooth veil sometimes assumes the color of the thallus, or is overspread with it; and, more rarely, the thalline exciple in its earlier subglobose condition becomes continuous above, with the whole aspect of *Pertusaria*, the interior exciple being indicated, here and there, by differently-colored cracks, or these cracks even assuming at length the appearance of ostioles or of young apothecia. And such pertusariiform apothecia appear also to be compound, a cross section showing that the disk is divided more or less by processes from the veil. Compare the anamorphosis of *T. Auberianum*, alluded to by Montagne in *Crypt. Guyan.* p. 55, as depending on a "hypertrophie des cloisons des excipulum confluent, qui constituent les verrues composées de l'espèce." And what appears a further atypical variation of structure in the same direction, "analogue à l'état varioloïde des *Pertusaires*," is described by the same author in *Crypt. Cuba*, p. 167.

THELOTREMA AURATUM, sp. nov.: thallo laevigato ruguloso demum verrucoso crasso pallide stramineo; apotheciis majusculis superficialibus subglobosis, apertura rotundata ampla, excipulo exteriori urceolato margine coarctato-incurvo eroso nigro-punctato discum flavo-pruinoseo cingente, interiori indistincto. Sporae octonae, incolores, obtuse ellipsoideae vel oblongo-ellipsoideae, 4-6-blastae, sporoblastis mox subdivisis

diam. 2 – 2½-plo longiores. On trunks, island of Cuba, *Mr. Wright*. Thallus smooth, and at first pretty even, but soon becoming wrinkled, and at length coarsely verrucose, pale straw-colored; the specimens varying from a greenish to an obscurely brownish tint. Apothecia subglobose, oftener a little depressed urceolate, with an ample rounded aperture; the largest exceeding a line in diameter. Exterior exciple including, within a thalline layer (as seen by a section), the black walls of the proper exciple, which disappears or loses its color below (perithegium laterale, *Eschw.*), and is pruinose above, like the disk; the incurved margin being erose, and black-dotted by the protrusion of the edge of the proper exciple. Disk flat, thin, fuscous, clothed with a bright lemon-yellow bloom; becoming at length brick-colored. Spores in eights, of middling size, colorless, from short-obtuse-ellipsoid (cocciform, *Koerb.*) becoming oblong-ellipsoid, 4 – 6-blastish; the sporoblasts once, or even twice, more or less divided, the length from twice to twice and a half exceeding the width. Paraphyses filiform. The larger apothecia not unfrequently become compound, processes from the walls of the proper exciple dividing it into two or three small ones; and these smaller exciples, which are externally more or less brownish-brick-colored, (a modification of the coloring not uncommonly affecting also the summit of the common margin,) are, of course, entirely free of the thallus, and distinct from it, or, in other words, proper exciples, and perfectly visible. But in the otherwise sufficiently different *T. Auberianum*, Montag. (which *Mr. Wright* has abundantly collected), as explained by my valued friend, the author of the species, in the place already cited, the thick veil covering the disk conceals its subdivision, though this is seen in a cross-section to accord with the subdivision of the veil; the irregularly-radiate processes into which the latter passes being continued downward, more or less, through the disk.

THELOTREMA WRIGHTII, sp. nov.: thallo crassiusculo fragili lævigato inæquabili glauco-virescente; apotheciis majusculis mox apertis dilatatis subsessilibus scutelliformibus, excipulo exteriori margine elevato pulverulento crasso obtuso carneolo demum flexuoso discum planum pallidum albo-pruinose cingente veloque pulverulento margini concolore interrupte demum vestiente. Sporæ octonæ, incolores, lato-ellipsoideæ, apicibus acutis demum fusiformi-subelongatæ, 4 – 6-blastæ, sporoblastis inæqualibus subdivisis diam. 2 – 4-plo longiores. Trunks in woods. Monte Verde, island of Cuba, *Mr. Wright*. Thallus thickish, with at

length a diameter of a quarter of a line, very brittle, glaucous-greenish. Apothecia soon open, suburceolate, becoming scutelliform, and sessile, or at length often a little elevated, and larger than in any other known species (exceeding two lines in diameter); the exterior exciple bordering with a somewhat elevated, thick, obtuse, powdery, pale-flesh-colored, finally flexuous margin the thin, colorless, white-pruinose disk (seen, by a section, to be included within a fuscescent layer, passing upwards into, and conditioning, the margin), which it also, at length, interruptedly covers with thick processes of the same color and substance as the margin; this development (veil) being, however, less continuous than in other species, and often deficient. Spores colorless, ventricose-ellipsoid with acute tips, or at length longer and rather broad spindle-shaped, 4-6-blastish; the sporoblasts unequal in size, and one or more of them finally divided, from twice to four times longer than wide. Paraphyses filiform, rather distinct. What is above described as the veil appears to be analogous to what Montagne (sub *T. Auberiano*, Cuba, l. c.) has called by the same name; this being understood by him as indicating an extraordinary condition of the interior exciple. But in the species before us this veil appears rather to be a result of a *nisus* of the proper exciple (which I understand as concrete with, or making the inner wall of, the exterior exciple) to become compound, exactly as in *T. auratum*; the processes which make it up being evidently similar in all respects to the inner wall, and their color conditioned, in both the species mentioned, by the color of that. It cannot, therefore, if these observations are correct, correspond with the interior exciple of *T. lepadinum*, which must be regarded as deficient in these species, or only represented by the bloom of the disk.

THELOTREMA GLOBULARE, sp. nov.: thallo cartilagineo-membranaceo lævigato e glaucescente pallide fuscescente, hypothallo nigro-limitato; apotheciis submediocribus superficialibus depresso-globosis urceolatis excipulo exteriori margine obtuso aperturam impressam poriformem cingente, disco plano-concavo pallido subvelato. Sporæ octonæ in thecis lineari-clavatis, incolores, obtuse ellipsoideæ vel oblongæ, tetrablastæ; sporoblastis regularibus diam. $1\frac{1}{2}$ - $2\frac{1}{2}$ -plo longiores. Trunks, in the island of Cuba, *Mr. Wright*. Thallus thin, but well-developed, smooth, from glaucescent becoming very pale brownish, bordered, often conspicuously, by the black edge of the hypothallus. Apothecia of the color of the thallus, becoming whiter above, a few of the larger ones half a line in diameter, depressed-globular, the

base becoming inflexed; an urceolate outer exciple bordering with an obtuse, smooth, or at length radiate-striate margin an impressed, rounded, and pore-like aperture. Disk not visible until exposed by the knife, a little concave, pale within, more or less white-veiled; a section showing it to be included within a brown line, which extends upwards into the exterior exciple. Spores at length broad-oblong, colorless, from diblastish becoming regularly tetrablastish; the sporoblasts, or at least the middle ones, flattened; from once and a half to twice and a half longer than wide. Paraphyses filiform. A neat and distinct *Thelotrema*, which I cannot refer to any published species. *T. urceolare* Ach. Syn. p. 115, as described, appears in some respects similar, but the spores, according to Nylander, (*Lich. exot. in Ann. Sci.* 4, 11, p. 222,) are brown and murally divided.

THELOTREMA ACTINOTUM, sp. nov.: thallo effuso membranaceo glaucescente mox granulato, granulis minutis demum congestis cæsionigricantibus; apotheciis majusculis scutelliformibus sessilibus subplanis, excipulo exteriori margine crassiusculo obtuso albicante discum nigricantem velo margini concolore radiatim perforato vestitum cingente. Sporæ parvæ, incolores ex ellipsoideo subfusiformes, tetrablastæ, diam. $2\frac{1}{2}$ –4-plo longiores. On trunks, incrusting small ferns and mosses, Monte Verde, island of Cuba, *Mr. Wright*. Thallus very thin, glaucescent, at length besprinkled with minute granules, which become heaped, and grayish-black. Apothecia large, often a line in diameter; scutelliform, adnate, flat; a rather thick and entire, white, outer margin bordering a thin, pale disk, which blackens above, and is veiled by processes from the inside of the margin, which meet in the centre, from which they appear to radiate. Spores small, colorless, tetrablastish. Paraphyses filiform, distinct. In this species, which is strikingly *Lecanorine* in aspect, the veil, as in the last species, appears to be made up of processes from the inner side of the outer exciple, and, as in that, to indicate the otherwise evident tendency of the *Thelotremaceous* apothecium to develop, atypically, into a composite one; sometimes curiously suggestive of that of *Pertusaria*.

THELOTREMA SCHIZOSTOMUM, sp. nov.: thallo tenui lævigato inæquabili e glauco-viridulo lutescente, hypothallo nigricante sublimitato; apotheciis mediocribus innato-prominulis demum dilatatis e rotundato difformibus, excipulo exteriori erectiusculo mox fisso recurvo discum planum pallidum albo-pruinatum vel velatum cingente. Sporæ suboc-tonæ, incolores, fusiformes, 4–10-blastæ, diam. 4–8-plo longiores. On

trunks, Monte Verde, island of Cuba, *Mr. Wright*. Thallus thin, but well-developed, smooth, from glaucescent-greenish becoming somewhat obscurely yellowish-green, limited more or less by the blackening hypothallus. Apothecia from a quarter reaching sometimes three quarters of a line in diameter, innate, or at length a little prominent, dilated, from roundish becoming irregular; the cleft and recurved margin, which is white-powdery within, and flecked more or less on the torn edges with brown, from the protrusion of the interior layer, bordering a thin, pale, white-pruinose disk, sometimes at length veiled irregularly, in the manner of the last species and *T. Auberianum*. Spores colorless, fusiform. Paraphyses filiform, conglutinate. In some species which possess a distinct interior exciple (as *T. lepadodes* and *T. albilabrum*, described here) this is sometimes obscure, as if deliquescent and confluent with the powder of the disk; and it would not be difficult, on the other hand, to describe (or misdescribe) some younger apothecia of the present as clothed with a delicate, or deliquescent, white, interior exciple, bursting in the manner of the other species cited; though there is no trace of anything but the bloom, divided, more or less, by somewhat radiant cracks, in the older ones. These older apothecia are, at length, as already observed, closed more or less by a thicker, subperforate vesture, due in part, it should seem, to a mere thickening of the powder of the disk, but accompanied also with the extension of processes from the inside of the outer exciple, or, in other words, finally confluent with the latter.

THELOTREMA MYRIOPORUM, sp. nov.: thallo tenui subcartilagineo verruculoso dein æquabili lævigato subpruinoso glaucescente; apotheciis minutis immersis rotundatis apertis vel sparsis vel in series confluenti-difformes aggregatis cribroso-pertusis; excipulo exteriori urceolato margine demum subprominulo discum plano-concavum pallidum subvelatum cingente. Sporæ octonæ, parvulæ, incolores, ellipsoideæ, regulariter diblastæ, diam. $1\frac{1}{2}$ – $2\frac{1}{2}$ longiores. On trunks of various trees, Monte Verde, island of Cuba, *Mr. Wright*. Thallus thin, but rather firm, at first finely warted, but becoming even, glaucescent, dull, or even obscurely pruinose, pierced thickly with the minute rounded aperture of the very numerous apothecia, which are either scattered, or disposed in irregular, confluent groups; these apertures being either even with the thallus, or this last a little raised at their edges, or even at length making a slightly prominent, very entire margin; the white proper exciple more or less apparent within. Disk a little concave,

pale, clothed at length with a white, perforated, irregular veil, in the manner of many other species. Spores small, colorless, ellipsoid, regularly and constantly diblastish; the two opposite, conoidal sporoblasts being separated by a (not always visible) thin dissepiment; the length from once and a half to twice, or even twice and a half, exceeding the width. Paraphyses conglutinate. The only described species of *Thelotrema* with diblastish spores. Though the habit of the lichen is sufficiently peculiar, and the little group to which it belongs (*Myriotrema*, Fée, Ess. p. 103, t. 1, f. 25; and Suppl. p. 92, t. 41, f. 1–3) is distinguished also by the small size of its colorless spores, there seems to be no good reason (as compare Montagne, Pl. Cell. Exot. in Ann. Sci. 3, 10, p. 131) for distinguishing it.

GYALECTA, Ach. It was remarked by Mr. Turner, in describing his *Parmelia carneo-lutea* (Linn. Trans. 9, p. 145), the apothecia of which, he well says, “are very different from those of any other *Parmelia*, and more resemble the apothecia of *Urceolaria exanthematica*,” that its place in the system “is that immediately following *P. rubra*.” But it was not till 1852 that the two last-named species were brought together in the same genus (*Gyalecta*, Massal. Ricerch. p. 146), nor till 1857 that *G. carneo-lutea* (*Lecidea* § *Gyalecta*, Nyl. Prodr. Gall. p. 101, n.) was added to them. The group is an exceedingly difficult one; but the remark may be ventured, that however some species, scarcely to be excluded from it, appear to pass into *Lecidea*, others are conditioned by the thallus, or by other elements, in a way quite alien to *Lecidea*; while these differing subsections show obvious points of agreement in the internal details of their fructification. The relation of *G. rubra* to *G. foveolaris*, &c., is illustrated by Th. Fries in Lich. Arct. p. 138. Acharius’s type of *Gyalecta* (Lich. Univ. p. 29, t. 1, f. 7) was *G. epulotica*, since understood differently by Fries and later writers; but Nylander (Lich. Scand. p. 189) adds this little-known lichen (of which a fine specimen from Mr. v. Krempelhüder is before me), together with the nearly akin *G. Prevostii*, Fr., with apparently full reason, to his section *Gyalecta*,—from the other species composing which the two spoken of especially differ in their simple spores. The contrast between such spores and the tetrablastish, and finally pleio-blastish spores, which have been understood as characteristic of *Gyalecta*, is however lessened by the intermediate differentiation of the spores of *G. asteria*, described below; and the genus, in this respect, as well as in the variously modified external characters and

habit of the apothecia, may be considered as analogous to *Thelotrema*, as here taken.

GYALECTA ASTERIA, sp. nov.: thallo contiguo rimoso dein granuloso-verruculoso glaucescente; apotheciis minutis superficialibus depresso-globosis thallo adscendente subvestitis, excipulo connivente radiato-rugoso albido-carneolo demum denudato nigricante poriformi-aperto discum subnucleiformem incolorem fovante. Thecæ elongatæ, subcylindræo-clavatæ, polysporæ. Sporæ parvulæ incolores ex ovoideo ellipsoideæ regulariter dyblastæ diam. $1\frac{1}{2}$ – $2\frac{1}{2}$ -plo longiores. On shrubs, Santiago, island of Cuba, *Mr. Wright*. Thallus well developed, becoming granulose-verruculose, glaucescent; the sometimes radiant hypothallus from white becoming brownish at the edge. Apothecia minute, superficial, globular, clothed more or less by the thallus, a pale flesh-colored proper exciple, which is connivent and radiately notched above, opening by a pore-like aperture, and enclosing a nucleiform colorless disk. With age the exciple becomes denudate above and brownish-black, which is seen, in section, to be the color of the whole interior portion. Spore-sacks poly- (12 – 20-) sporous. Spores small, colorless, simple at first, but becoming regularly diblastish; the outline varying from ovoid to ellipsoid, and the length from once and a half to twice and a half exceeding the width. Nearest, in aspect, to the following species; but remarkably distinguished by its blackish exciple, the color of which is concealed below by the ascending thallus, and above by a paler vestiture, which is cleft, pretty regularly, into portions appearing to radiate from the pore-like aperture; also by the spores.

GYALECTA ABSCONSA, sp. nov.: thallo tenuissimo leproso albido; apotheciis minutis mox superficialibus thallo vestitis excipulo urceolato carneo-rubello margine incurvo radiato-crenato discum pallidum cingente Thecæ subcylindrææ, octosporæ. Sporæ incolores, primo ellipsoideæ, diblastæ, dein lato-fusiformes, tetrablastæ, septis vix irregularibus, diam. $2\frac{1}{2}$ – $3\frac{1}{2}$ -plo longiores. On trunks of red maple, in the low country of South Carolina, accompanying *Arthonia spectabilis*, Flot.; *Mr. Ravenel*. Near to *G. abstrusa* (Wallr.), Arn. (*G. Wahlenbergiana*, var. *truncigena*, Ach.), and the apothecia of about the same size, but more prominent, less open, and higher-colored, with a whitish (pruinose?) disk, and, except the radiately-cleft margin, always loosely clothed by the thallus. The spores of *G. abstrusa* (Herb. Borr.; Zw. Exs. n. 80) are not unlike those of *G. cupularis*, having an equally irregular internal configuration; and

contrast with the shorter, quite uniformly thrice-septate spores of the present. The spaces between the sporoblasts which represent dissepiments in spores of this kind, are commonly (as in other species) not quite straight. The sporoblasts are sometimes arranged more loosely, with wider interspaces; but no indication has appeared of a passage into the spores of *G. abstrusa*. — The last-mentioned lichen appears (by the citations of the German writers, the original description being perhaps hardly sufficient) to have been first recognized as a species by Wallroth (Fl. Crypt. Germ. 1, p. 38), and, this being so, should bear the name which he gave it. The fact that Acharius called the same plant *G. Wahlenbergiana*, var. *truncigena*, can give no precedence to the later specific name, *Gyalecta* or *Lecidea truncigena*, because the Acharian designation expressly asserts the exact opposite to the latter, namely, that the plant, instead of being a new, is an old species. And, if this opinion is not mistaken, we may venture to say generally, what there are some reasons for saying, that the name which may happen to be given to a variety has no precedence, but may be adopted, or not, if the plant is taken up as a species.

GYALECTA NANA, sp. nov.: thallo tenuissimo leproso albido vel obsolescente; apotheciis minutissimis innato-emergentibus subplanis, excipulo pallido integro ab exteriori thallode lacero-dehiscente evanido primitus velato discum carneo-fuscescentem cingente. Thecæ subclavatae, 8–12-sporæ. Sporæ parvulae, incolores, ex ellipsoideo dactyloideae vel subfusiformes, tetrablastae, diam. 3–5-plo longiores. Thallus obscure or deficient. The very minute apothecia (scarcely more than half the size of those of *L. abstrusa*) are flattish, with much the aspect of those of *G. carneo-lutea* (Turn.), and similarly at first innate and afterwards emergent; the here entire, pale proper exciple being covered at first by a dehiscent and soon disappearing outer veil. Disk pale brownish-flesh-colored, for the most part exceeded by the margin, easily falling out, as in other species. Paraphyses filiform, flexuous, the summit thickened into a small head. Spore-sacks rather club-shaped, commonly 10–12-sporous. Spores small, colorless, from ellipsoid becoming dactyloid or subfusiform; and from diblastish at length regularly tetrablastish; for the most part four, more rarely five times longer than wide. The similar spores of *G. carneo-lutea* (Herb. Borr.; Welwitsch, Crypt. Lusit. n. 67) are at length regularly 6-blastish.

GYALECTA CERATINA, sp. nov.: thallo subobsoleto; apotheciis minutis sessilibus concavis e fusco-rufo nigricantibus, margine subintegro

discum concolorem cingente. Thecæ clavato-cylindræ, octosporæ. Sporæ incolores, parvulæ, cymbiformes vel subfusiformes, 4 – 8-blastæ, sporoblastis subregularibus, diam. 3 – 5-plo longiores. Trunks of elms and ashes, Massachusetts. Perhaps not rare, but easily passed over, though the apothecia are visible to the naked eye. The lichen is externally exceedingly like *G. cornea* (*Lecidea carneola*, Auct.), and long passed for it in my herbarium; but it is darker, and the spores are different. These, in our American lichen, are at first exactly cymbiform, with three to four regular sporoblasts, and about twice and a half longer than wide; but the tips are often acuminate, and the spore becomes at length more spindle-shaped, with four to eight sporoblasts, and from four to five or even six times longer than wide: while in *G. cornea* (Herb. Borr.; Nyl. Lich. Par. n. 132; Rabenhorst, Lich. Eur. n. 445) we have constantly acicular, plurilocular spores, with from twelve to twenty sporoblasts, and as many times longer than wide. *L. cornea* has been regarded by almost all lichenists as belonging to Lecidea; but Mr. Borrer considered it, in 1842, nearly related to Gyalecta; and Dr. Nylander, in his later works, places it with the same group, considered by him as making the first section of Lecidea. Paraphyses not unlike those of the preceding species.

CÆNOGONIUM MONILIFORME, sp. nov.: thallo effuso margine laxiori pallidiori sublimitato e filamentis breviusculis gracillimis articulis ad septum constrictis mox subglobosis centro crustaceo-agglomeratis e glauco-viridi fulvescentibus; apotheciis appressis subplanis, excipulo cupulari discum carneolo-rubellum margine albo cingente. Sporæ octonæ in thecis lineari-clavatis, incolores, oblongæ, diblastæ, diam. 3 – 4-plo longiores. On trunks, in the island of Cuba, *Mr. Wright*. Thallus effuse, more crust-like than in other species, made up of short moniliform filaments; the joints, by constriction at the dissepiments, becoming more or less rounded, from glaucous-green at length tawny-brown; the margin of the fronds a little paler. Apothecia quite those of the genus. Spore-sacks clubshaped; the eight spores disposed, now in a single, and now rather in a double series. Spores oblong-ellipsoid, or somewhat fusiform-ellipsoid, scarcely as long as those of *C. confervoides*, Nyl. (to which, described in Lich. Exot. l. c. p. 242, I refer a Cuba lichen collected by Mr. Wright), typically septate-diblastish. Paraphyses aciculiform, as in all the species. Beside *C. confervoides*, extending northward as far as Louisiana, and approaching near to, though it appears distinct from, *C. Linkii*, upon which Ehrenberg constituted

the genus, Dr. Nylander has described another (*C. complexum*, Lich. Exot. l. c. p. 222), with shorter, coarser, *tomentose* filaments, larger apothecia, and diblastish spores, which (first collected in Bolivia by Weddell, and since in Venezuela by *Mr. Fendler*) has not yet occurred in the Cuba collections. The apothecia of *Cænogonium* especially resemble those of *Gyalecta* (or *Lecidea*) *lutea*; as if the former were, in fact, to use Fries's words (S. O. V. p. 301), "Biatora in thallo Byssaceo." But the supposed collemaceous structure appears not to be made out, and the plants are perhaps therefore better taken, as by Nylander (comp. Enum. Gen. p. 140, note) as expressing an aberrant type of the *Lecideei*.

LECIDEA (PSORA) RUSSELLII, sp. nov.: thalli squamis crassis lævigatis subimbricatis undulato-lobatis e pallide viridi rufescentibus subtus margineque albis; apotheciis sessilibus, margine obtuso flexuoso rufo discum e subconcolore viridi-nigrescentem demum tumidulum cingente. Sporæ incolores, ellipsoideæ, limbatae, diam. 2–2½-plo longiores. On lime-rocks, Burlington, Vermont, *Mr. Russell*; and at Brattleborough, on schist, *Mr. Frost*. Northward, at Behring's Straits, *Mr. Wright*. Frederick County, Maryland, on lime-rocks. Alabama, on the same rocks, *Mr. Peters*. Texas, (on the earth, and in crevices of lime-rocks near the Blanco,) *Mr. Wright*. Jurassic rocks, head of Powder River, Rocky Mountains, *Dr. Hayden*. Scales at first closely appressed, smooth, from pale-greenish becoming brownish, and at length reddish-brown; the ascending white-powdery margins waved and sinuously lobed; white beneath. Apothecia middling-sized or largish, sessile; the thick, reddish-brown, shining, at length flexuous margin (which becomes sometimes paler, or white-powdery) finally excluded by the convex, rufous, at length greenish-nigrescent disk. Rather resembling *L. testacea* than *L. globifera*; but the colors appear to distinguish it. The lichen has also much of the aspect of fine specimens of *Lecanora cervina*, α, *glaucocharpa*. The disk is pale-brownish within, and rests upon a pale hypothecium. — The genus *Biatora*, in the sense of Fries, much as its separation facilitated the study of an obscure tribe, appears hardly maintainable, otherwise than as a section of *Lecidea*; and that part of it to which the present and next-following species belong (*Psora*, Massal.), though obviously analogous to the squamulose *Lecanorei* (*Squamaria* and *Placodium*, DC., Nyl., *Placodium*, Auct.) is by no means so easily to be distinguished. The spores furnish an elegant criterion of the affinity of species, but the significance

and value of the sporal differentiation seem not yet sufficiently well understood to make this a safe guide, or, at least, more than a guide, in the distinction of genera; as it surely is an insufficient ground, in the case of such constructions as *Synechoblastus*, Trevis., and *Menegazzia*, *Ochrolechia*, *Secoliga*, Massal., &c. And this opinion, which, it is proper to say, has resulted from the description and preparation for publication of more than ninety North American, beside numerous other species referable to *Lecidea*, as understood by Acharius, during which constant use has been made of the instructive works of Koerber, as well as of the earlier writers of the same school, is in accordance with, as it was first suggested by, the only universal system of Lichenes of the present day, — that of the learned Dr. Nylander. This species, which is perhaps the finest representative of *Lecidea* known to North America, is dedicated to our colleague, my valued friend and fellow-student of the Lichenes, the Rev. John Lewis Russell.

LECIDEA (PSORA) LURIDELLA, sp. nov.: thallo squamoso imbricato e viridi-cervino fuscescente, squamis parvulis appressis lævigatis subcrenatis; apotheciis adnatis convexis immarginatis rufo-nigris. Sporæ octonæ, parvulæ, incolores, ovoideæ et oblongo-ovoidæ, protopl. in guttulas secedente, diam. $1\frac{1}{2}$ – 2-plo longiores. On the earth. Mountains of Santa Fe, New Mexico, *Mr. Fendler*. On the Snake Fork of the Columbia River, in the Rocky Mountains, alt. 6,000 ft., *Dr. Hayden*. Scales of the thallus much smaller, and also thinner, than those of *L. lurida* and *L. globifera*, the nearest allied species, from roundish becoming oblong, appressed, but the edges free, and at length a little elevated, crenate, or even obscurely lobed, or also reduced and glebulose, from pale-brownish with a greenish tinge when wet becoming tawny-brown. Apothecia small, adnate, convex and apparently immarginate from the first, finally subglobose, from blackish-rufous at length black. This little lichen (of which more than fifty excellent specimens are before me) appears to approach nearest to *L. lurida* in coloration, the thallus never showing the ferruginous tinge of *L. globifera*, and in the more appressed scales; and to *L. globifera* in the convex, subimmarginate, at length a little elevated fruit. I have sought in vain for any clear trace of a margin. The spores scarcely furnish distinctive characters in the present group (*Psora*, Massal.): but those of the lichen in hand perhaps agree rather with those of *L. lurida*, both in shape, and in the variableness of the sporoblast (a feature taken into his specific character of the just-mentioned species by Dr. Koerber), though

they are smaller. In one of the specimens from New Mexico the scales are white-pruinose.

LECIDEA (BIATORA) PYRRHOMELÆNA. *Biatora*, Tuckerm., Suppl. l. c. Trunks, in the island of Cuba, *Mr. Wright*.

LECIDEA (BIATORA) PHÆASPIS. *Biatora*, Tuckerm., Suppl. l. c. With the last.

LECIDEA (BIATORA) VIRELLA. *Biatora*, Tuckerm., Suppl. l. c. With the last.

LECIDEA (BIATORA) MELAMPEPLA, sp. nov.: thallo leproso-tartareo diffracto-rimoso ferrugineo-fuscescente, hypothallo nigricante; apotheciis submediocribus appressis e plano tumidulis intus incoloribus, disco nigro primitus albo-pruinoso margine crassiusculo pallidiore demum concolore cincto. Sporæ fusiformi-oblongæ, subincurvæ, diblastæ, diam. 3-5-plo longiores. On shrubs; hills near Simon's Town, Cape of Good Hope (U. S. N. Pacific Expl. Exp.), *Mr. Wright*. Thallus making small roundish patches, from scurfy at length compacted and chinky, rusty-brown, rarely black-bordered by the hypothallus. Apothecia grouped somewhat concentrically, almost middling-sized or smallish (the larger ones from a third reaching rarely half a line in diameter), appressed; a thickish, pale, biatorine exciple bordering a black, originally white-pruinose, flat, or at length rather tumid disk (which is colorless within), and becoming finally of the same color with it. Spores in clubshaped spore-sacks, small, colorless, from oblong-ellipsoid becoming fusiform-oblong, often very slightly or scarcely bent, diblastish; the length from thrice to five times exceeding the diameter. Paraphyses conglomerate. Near to *L. mixta* (Fr. Lich. Suec. n. 40), of which *Mr. Wright* collected excellent specimens at the Cape of Good Hope, but very distinct in its rusty-brown, subtartareous thallus, and larger apothecia. *Biatorina*, Massal. (Ric. p. 134, Koerb. Syst. p. 189, to which the present lichen is referable), however unavoidable a part of the system to which it belongs, appears none the less a forced association of forms, of distinct and sometimes even remote affinities, held together by nothing but the diblastish differentiation of the spores.

LECIDEA (BIATORA) CHLOROSTICTA, Tuckerm. Lich. exs. n. 139: thallo effuso e granulis subsparsis rotundatis lævigatis viridi-glauciscentibus; apotheciis minutis sessilibus primitus convexis subimmargatis e livido nigris nitidis dein turgidulis papillatis, hypothecio nigricante. Sporæ suboctonæ, incolores, aciculares, di-tetrablastæ, diam. 6-12-plo longiores. On trunks of white cedar (*Cupressus thyoides*) in Hingham,

Massachusetts. On pine and cypress trunks; low country of South Carolina, *Mr. Ravenel*. Thallus of rounded, smooth, commonly scattered, greenish-glaucous granules. Apothecia minute, convex and subimmarginate from the first; sessile or at length a little elevated; the black and shining disk finally turgid and papillate, and imposed upon a black hypothecium. Spores small, from broad-spindle-shaped with acuminate tips becoming more elongated, and at length clubshaped or acicular, commonly diblastish, but at length tetrablastish; the length from six to twelve or even sixteen times exceeding the diameter. Belonging to the group of which *L. rubella* is a type (*Bacidia*, De Not.); but the black apothecia and sometimes slightly curved spores rather approach those of *L. holomelæna*, Floerk. (*Scoliciosporum*, Massal., only differing from *Bacidia* in the contortion of the spores), not uncommonly occurring on granitic stones, and, in another form (*L. asserculorum*, Ach.) on old rails.

LECIDEA GRANOSA, sp. nov.: thalli effusi granulis minutis congestis vel confluentibus e viridulo cinerascens; apotheciis minutis appressis plano-convexulis, disco nigro (livido-pallescente) marginem tenuissimum nigrum demum excludente. Sporæ octonæ, incolores, e dactyloideo subbacillares, di-tetrablastæ, diam. 3-6-plo longiores. On brick walls, near New Orleans, *Dr. Hale*. On bricks, and also on mortar, in the low country of South Carolina, *Mr. Ravenel*. Thallus of very minute granules, which are heaped, more or less densely, into an irregular, broken crust, or occur more scattered and inconspicuous, or grow together into a thin, chinky one, from greenish becoming at length glaucous or cinerous. Apothecia very small, closely appressed (or even immixt) and flat; the black (or livid-palescent) disk bordered by a thin black margin, which disappears as the disk finally becomes a little convex. Hypothecium black. Spores varying no little, colorless, from ellipsoid soon elongated and narrowed, and from dactyloid or often clubshaped becoming cylindraceous or staff-shaped; perhaps more commonly diblastish, but also and often regularly tetrablastish (regular 5-blastish spores occur rarely, but no regular ones have been observed with a greater number of sporoblasts), the length from three to six or even seven times longer than wide. Paraphyses not distinct. A smaller lichen, in all respects, than *L. aromatica* (Sm.) Ach. (Herb. Borr.; Desmaz. in Herb. Ravenel; Herb. Krempelh.) with slenderer spores.

LECIDEA SIMODENSIS, sp. nov.: thallo primitus contiguo subtar-

tareo mox diffracto verrucoso albicante; apotheciis mediocribus sessilibus nigris, disco aterrimo demum convexo margine obtuso tenuescente. Sporæ octonæ in thecis clavatis, parvulæ, incolores, oblongæ, diblastæ, diam. 2 – 3-plo longiores. Maritime rocks, Simoda, Japan (U. S. North Pacific. Expl. Exp.), *Mr. Wright*. Thallus thickish, apparently at first contiguous, but in the specimen much broken and warted, whitish. Hypothallus appearing bluish-black at one point of the circumference. Apothecia from the thallus, middling-sized, thickish, at length convex-protuberant; the obtuse shining margin finally much excluded by the swelling very black disk, which appears, in section, brownish-violet within; the hypothecium being of this color, especially above, and tinging the hymenium. Spores small, oblong, often slightly oblique (fabæform), regularly diblastish, the sporoblasts tinged obscurely yellowish, from twice to thrice longer than wide. The lichen, of which but a single specimen was collected, has much the aspect of *L. contigua convexa* (Fr. Lich. Suec. n. 378); but the spores connect it with *L. grossa*, Nyl. (*L. premnea*, Fr. Lich. Suec. n. 26; Borr. herb.), which has a different thallus, and is confined to trunks. The spores of *L. grossa* are larger than those of the present, and blunt-ellipsoid; while those of *L. Simodensis* are often not ill represented by Dr. Koerber's figure of the spores of *Ramalina* (Syst. t. 2, f. 10). *Catillaria*, Massal. (Ric. p. 79), to which both these lichens are referable (*L. grossa* being regarded as the type of the genus by Koerber), is admitted to be a more than commonly difficult construction; but the type at least is perhaps easily considerable as a colorless expression of *Buellia*, De Not. The last-named group appears better defined; but, considered as a genus, its relations with *Rhizocarpon*, Massal. (as see especially Th. Fries, Lich. Arct. p. 226) are sufficiently puzzling.

LECIDEA JAPONICA, sp. nov.: thallo effuso e granulis minutis applanatis sublobatis squamuloso-imbricatus viridi-fuscescentibus (lutescentibus); apotheciis parvulis appressis nigris, margine tenui distincto discum plano-convexum scabridum demum hemisphæricum hypothecio nigro impositum cingente. Sporæ octonæ in thecis clavatis, mediocres, fuscescentes, ellipsoideæ, uniseptatæ, sporoblastis isthmo junctis, diam. $2\frac{1}{2}$ -plo longiores. On bark of *Cryptomeria*, Simoda, Japan (U. S. N. Pacif. Expl. Exp.), *Mr. Wright*. Thallus of minute, confluent, lobed and scale-like, somewhat imbricated, brownish-green, or also obscurely yellowish, granules; which are confused with the hypothallus. Apothecia smallish, at first flattish; a thin, distinct, or even slightly prom-



Tuckerman, Edward. 1862. "Observations on North American and other lichens. 2." *Proceedings of the American Academy of Arts and Sciences* 5, 383–422.

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