

OBSERVATIONES LICHENOLOGICÆ. *Observations on North American and other Lichenes.* By EDWARD TUCKERMAN, A. M. (Continued from Vol. V. p. 422.)

COLLEMA LEPTALEUM, sp. nov.: thallo membranaceo-cartilagineo suborbiculari lobato-plicato fenestrato-lacero margine elevato rugoso-granulato e læte-viridi obscuriore subtus pallido; apotheciis majusculis planis disco e castaneo nigricante margine tenui evanido. Sp. in thecis oblongo-clavatis 6–8næ, vermiformi-bacillares apicibus obtusis, rectiusculæ, 4–12-blastæ, diam. 8–14° demum 20° longiores. On trunks, not uncommon from New England to Virginia. New York, *Mr. Russell*. South Carolina, *Mr. Ravenel*. Alabama, *Mr. Peters*. Louisiana, *Dr. Hale*. Island of Cuba, *Mr. Wright*. Long regarded by me as identical with that state of *C. fasciculare*, Ach., which constitutes *C. aggregatum*, Nyl., but differing from the European lichen (Fr. Lich. Suec. n. 50. Moug. & Nestl. Cr. Vog. n. 453) in its smaller, narrower spores, no less than in its better-developed fronds. In the latter respect, *C. implicatum*, Nyl. (Lindig. Lich. N. Gran. n. 749) rivals, and is indeed much like it, but the spores are more diverse than those of *C. aggregatum*.

TRACHYLIA CALIFORNICA, sp. nov.: thallo crustaceo gyroso-plicato superficie rimuloso-ruguloso ambitu lobato glaucescente; apotheciis in verrucis thallinis majusculis mastoideis innatis disco subplano nigro margine albido sub-obsolete. Sp. in thecis lineari-elongatis octonæ, obtusissime ellipsoideæ, diblastæ, medio demum constrictæ, obscure fuscæ, diametro subduplo longiores. On metamorphic sandstone rocks, Oakland hills, California, *Mr. H. N. Bolander*. May be considered, as respects the thallus, the most remarkable species of the genus. The granules of *T. lucida*, Th. Fr., become indeed scale-like, and those of *T. tympanella* pass at length into a more or less distinctly plaited crust; but the thallus of the present is originally plaited, and the lobation of its circumference is as distinct as, and resembles, that of *Lecidea* (Thalloidima) *candida*, (Web.) Ach., with which species, and *L. mamillaris*, it also agrees in the minute wrinkling, looking often like mealiness, of the surface. Apothecia immersed in conoid-hemispherical warts (about half a line in diameter at the base and often a little exceeding that in height); the flattish, black disk, scarcely a little grayish under a glass, appearing as if bordered only by the very white edge of the thalline receptacle. Examined, however, with a more powerful lens, this edge

is found to include, or often conceal, a white or whitish true margin, not containing gonidia, and appearing to belong to the proper exciple, (but compare here the observations of Koerber, *Parerg.*, p. 286,) being traceable, in a vertical section, if I do not greatly mistake, downward to the base of the apothecium; which is, in that case, not lecideine (as is assumed or asserted, by several writers, of the exciple of *Trachylia*), but biatorine. And this biatorine structure appears, indeed, unquestionable in *T. tigillaris*, the apothecia of which (often conditioned by the thallus similarly to those of the present), though finally and commonly black, and so described by all writers (Turner and Borrer observing, however, *Lich. Brit.*, p. 133, that the wall of the exciple, seen in section, is "not black but grayish," to which reference will again be made below), occur also in Lapland specimens collected by Wahlenberg, and in others from this neighborhood, brownish, and even whitish, both externally and in section. Nor does there seem to be any difference of color, in a section of the palest of these apothecia between the base (hypothecium) and the margin; but, as the exciple blackens above, a very thin continuous line of the same color is observable also below, and, within this, the more conspicuous white layer, extending also upwards, to which we have already referred. And this double hypothecium, variously modified, appears in fact characteristic of *Trachylia*, as a genus. It is seen in *T. Californica* (showing in section a white hypothecial layer, and below that a thicker blackish-brown one, disappearing, or at least the color, below the excipular margin), and is marked in *T. tympanella* (where the white layer is readily traceable into the powdery inner border characterizing that and other species, as indicated in Acharius's figure, *Lichenogr.* t. 3, f. 1, while the much-thickened, dark-brown or blackish, inferior layer forms the outer, black one), with which last *T. lecideina*, Nyl. (*Lich. Par.* n. 18), *T. stigonella* (Moug. & Nestl. *Cr. Vog.* n. 858), and *T. lucida* (Th. Fr.) sufficiently agree; and the structure is also the same in *T. leucampyx*, Tuckerm. (*Wright. Lich. Cub.* n. 21), a species especially remarkable for the prominence of the white margin, which finally overlays and conceals the proper black one, as well as in *T. javanica*, (M. & V. d. B.) Nyl. (*Lich. Cub.* n. 22), in which the white layer is reduced to a mere film, and the black exciple has its most extraordinary development. The view of the structure of the exciple of *Acolium ocellatum*, Koerb. (*Trachylia*, Flot.), otherwise unknown to me, taken in the learned author's exhaustive description (*Parerg.* pp. 285, 286),

has been already cited, and should be compared with that which I have ventured to prefer; but it may be added that no other species appears so fully illustrative of the present one.

STEREOCAULON PILOPHOROIDES, sp. nov.: podetiis elatis erectis validis simpliciusculis apicem versus parce ramosis ruguloso-subcorticatis etomentosis albidis phyllocladiis e verrucæformi dein subelongatis exasperatis; apotheciis terminalibus mediocribus disco mox semigloboso nigro margine albedo flexuoso-irregulari. Cephalodia scrobiculato-foveolata, granulis gonimis in nodulis cylindraceis irregulariter dispositis. Sp. in thecis oblongo-clavatis octonæ, e fusiformi aciculares, 4–10-blastæ, diam. 10–24° longiores. Spermatia acicularia, falcato-curvata, sterigmatibus simplicibus. Sandwich Islands, *Dr. W. Hillebrand*. With the aspect of *Pilophorus*, but the apothecia, spores, and spermatia of *Stereocaulon*; in which genus it belongs to the neighborhood of *S. ramulosum*. Podetia four to five inches high, stout but brittle, dividing into two or three long branches above the middle, which part distichously, or send out irregularly, short branchlets terminated by the subglobose, black apothecia. Phyllocladia more or less confluent, especially above, but passing into *papillæ*, which towards the base are elongated and terete. The thin hypothecium is blackish-brown; the thalamium proper less colored, with filiform, sometimes branched, brown-headed paraphyses.

PLACODIUM CLADODES, sp. nov.: thallo erecto dichotomo-ramoso ramis teretibus fastigiatis in crustam papillatam aurantiacam cæspitoso-stipatis; apotheciis sub-mediocribus sessilibus disco plano pulverulento fulvescente submarginato, margine thallino demum crenulato. Sp. in thecis brevibus saccato-oblongis singulæ, mediocres, incolores, obtuse ellipsoideæ, diblastæ, diam. subduplo longiores. On the earth, in the alpine regions of the Rocky Mountains, *Mr. E. Hall*. Apparently crustaceous, but in fact fruticulose, and, so far as I am aware, the first distinct indication of that type of thallus in the yellow, *Parmeliaceous* Lichens with bilocular spores. Thallus of the lichen before us rather exceeding (in the specimens, which do not show the organic or other *substratum* upon which it grows) a quarter of an inch in height; the erect branches solid, not very fragile, terete, much and fastigiately branched, and closely crowded together, blackish at the base, but becoming paler above, where they pass into the papillæform branchlets which constitute the crust-like, warted, orange-yellow surface. Apothecia a little darker than the crust, powdery, the disk sometimes margi-

nate; the thalline border somewhat entire, or at length more or less crenulate. Paraphyses rather stout, branching, especially towards the thickened yellowish summits. Spore-sacks short, oblong, never appearing to contain more than a single spore, which varies from roundish to ovoid, and at length obtuse-ellipsoid; the contents very often irregularly disposed, but passing at length into two approximated sporoblasts, scarcely showing any trace of an isthmus. Spermatogones indicated by their darker-colored ostioles; spermatia very minute, short, appearing to be ellipsoid, or a little oblong.

PLACODIUM PHÆUM, sp. nov.: thallo subcartilagineo lævigato mox interrupto subareolato viridi-glauescente hypothallo nigro prominente; apotheciis sessilibus biatorinis plano-convexulis disco fusco margine integerrimo sub-concolore. Sp. parvulæ, incolores ovoideo-ellipsoideæ, polari-diblastæ, diam. $1\frac{1}{2}$ – $2\frac{1}{2}^{\circ}$ longiores. *Lecanora*, Tuckerm. in Wright Lich. Cub. n. 112. On calcareous rocks in the island of Cuba, *Mr. Wright*. The colors well distinguish this lichen, which is scarcely comparable with any other of the group known to me.

LECANORA (Squamaria) *BOLANDERI*, sp. nov.: thallo cæspitoso dichotomo-ramosissimo viridi-stramineo, ramis teretibus fastigiatis, extremis papillæformibus obtusis; apotheciis mediocribus terminalibus sessilibus disco e carneo-luteolo fulvescente nudo, margine thallino tumido integro. Sp. octonæ in thecis clavatis, incolores, mediocres, ovoideo-ellipsoideæ, simplices, limbatæ, sporobl. dein variabili, diam. $1\frac{1}{2}$ – $2\frac{1}{2}^{\circ}$ longiores. Spermatia acicularia, arcuata, sterigmatibus simplicibus infixa. On rocks ("metamorphic sandstone") in Marin county, California, *Mr. H. N. Bolander*. Comparable, as respects the colors and size, with *L. rubina*, but differing remarkably in its fruticulose thallus, which is divided much as that of *L. fruticulosa*, Eversm., from the Kirguis steppes. Sods irregularly rounded, and not much exceeding an inch in diameter; a central trunk dichotomously dividing into thickish, short branches, (cartilagineous and greenish straw-colored without, and with a densely compacted, white medullary layer,) which pass at the summits into obtuse *papillæ*. Apothecia not unlike those of *L. rubina*, except in the persistently thicker margin, and the lighter-colored disk. The present and two following species are associable with *Squamaria*, Nyl. (*Placodium* (Massal.) Th. Fr.),—a group undistinguishable, however, from *Lecanora* (as compare Nyl. Lich. And. Boliv. in Ann. Sci. 4. 15, p. 377, note) except by the more or less effigurate thallus.

This type of frond (intermediate, apparently, between the foliaceous and the crustaceous) is in fact nearest to the latter, and often most manifestly a modification of it, and its systematic value has, it appears to me, been well subordinated by Dr. Stitzenberger (*Beitr. z. Flechtensyst. in loco.*)

LECANORA (*Squamaria*) HAYDENI, sp. nov.: thallo subfoliaceo crassiusculo coriaceo-cartilagineo lacero-laciniato viridi-stramineo subtus rufo-fuscescente ambitu nigricante, laciniis lobato-divisis margine albo-crenulatis convolutis; apotheciis. . . . Upon the earth, Laramie plains, Nebraska, *Dr. F. V. Hayden*. "Covers the ground," says Dr. Hayden, in a letter of 28th December, 1861, "in many parts of the West, especially where there is much gypsum in the soil. In the Laramie plains it covered many square miles, in most places detached and blown about by the wind, sometimes even drifted. It is found *in situ* where the ground is moist, where it is most abundant oftentimes; there is no wood or rocks for it to be attached to." Agreeing in its remarkable history with *Lecanora esculenta*, (Pall.) Eversm., of the Asiatic and African deserts, but the thallus of the present (in the larger specimens a little exceeding an inch in the largest diameter) is foliaceous rather than crustaceous. It is, however, thickish, and easily broken, and the plant appears certainly to be comparable rather with *L. rubina*, than with any known form of *Parmelia conspersa*. The lobes are rolled closely together in all the specimens, and none of them show traces of having been gathered *in situ*. A fuller description is reserved, in the hope that other observers may be fortunate enough to detect fertile plants.

LECANORA (*Squamaria*) FROSTII. *Squamaria*, Tuckerm. Suppl. I., in *Amer. Journ. Sci.* 25, p. 425. On granitic rocks, from New England to Virginia.

LECANORA SUBFLAVA, sp. nov.: thallo cartilagineo primitus contiguo lævigato rimuloso granulatoque luteo hypothallo atro decussato; apotheciis mediocribus sessilibus disco plano-convexo fulvescente margine thallo subconcolore obtuso integro. Sp. in thecis clavatis incolores, submediocres, ovoideo-ellipsoideæ, simplices, diam. $1\frac{1}{2}$ - 2° rarius $2\frac{1}{2}^{\circ}$ longiores. Trunks in the island of Cuba, *Mr. Wright* (*Lich. Cub.* n. 167). Related, in habit and in the spores, rather to *L. subfusca* than *L. varia*.

LECANORA PINGUIS, sp. nov.: thallo crasso areolato-plicato sordide olivaceo-virescente intus pallido-sulphureo, hypothallo infuscato; apotheciis majusculis adnatis disco mox turgido lutescenti-carneo subtiliter pruinoso, margine thallino tenui subcrenulato demum excluso. Sporæ in thecis clavatis octonæ, incolores, ex ellipsoideo plus minus oblongæ, simplices, limbatae, sporobl. dein variabili, diam. $3-4^{\circ}$ longiores. On metamorphic sandstone rocks, at 2,000 feet, in Oakland county, California, *Mr. Bolander*. Thallus tartareous, often two lines in diameter, and the thickest specimens, made up apparently of several successive layers, reaching half an inch through, contiguous, the surface cracked into irregular, coarse, convex areoles, which are often plaited, and become sometimes effigurate at the circumference, and in young fronds, dull olivaceous-green without, and pale sulphur-colored within, the hypothallus being indicated by a purplish-brown discoloration. Apothecia from half a line exceeding at length a line and a half in diameter, from innate becoming superficial, and the pale-yellowish, at length a little flesh-colored, obscurely powdery disk (which is pale within) turgid, (much in the manner of conditions of *L. varia*, v. *polytropa*), when the thinnish, scarcely prominent, irregularly wrinkled or notched margin is sometimes excluded. Spores irregularly oblong-ellipsoid, and oblong. Spermogones scarcely a little prominent, with fuscous ostioles; the spermatia needle-shaped and bowed. There is some appearance in this lichen of a tendency toward the effigurate type of thallus, but it is not marked, and there is nothing else to distinguish the plant from *Lecanora* proper, where it is associable with the group represented by *L. varia*.

URCEOLARIA CHLOROLEUCA, sp. nov.: thallo tartareo rugoso e glaucescente flavido intus pallide sulphureo hypothallo albo; apotheciis ex urceolato margine proprio denticulato-fisso reflexo mox explanatis, disco convexulo nigro cinereo-subpruinoso margine thallino integro evanescente. Sp. 8næ, ovoideo-ellipsoideæ, mox fuscæ, 4-8-blastæ sporobl. irregulariter subdivisis, diam. $2-2\frac{1}{2}^{\circ}$ rarius 3° longiores. On the earth ("Cuchillas de Baracoa") in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 123). A distinct form (whatever its rank may prove to be), contrasting sharply with the elegant specimens of *U. cinereo-cæsia*, (Sw.) Ach., of Lindig's New Granada collection (n. 2,503), but not quite so diverse from those of Wright's Lich. Cub. n. 161. The spores of this last are perhaps longer, but in other respects like those of both the others, as also of *U. scruposa* (Fr. Lich. Suec. n.

282); and Nylander (Prodr. Fl. N. Gran. *in loco*) refers the West Indian lichen of Swartz (*U. cinereo-cæsia*) to the European; which, especially in the var. *gypsacea* (Welwitsch Cr. Lusit. n. 97, 100, saltem pr. p.), often resembles it.

THELOTREMA LATILABRUM, sp. nov.: thallo crassiusculo lævigato inæquabili dein ruguloso e glauco olivaceo-subfuscescente; apotheciis majusculis innato-prominulis ex urceolato-scutelliformi dein dilatatis difformibus, excipulo exteriori margine lato acuto stellato-fisso reflexo albo-pulverulento discum planum nigrescentem velo subcrustaceo multifore demum rupto coopertum cingente. Sp. in thecis cylindræo-clavatis octonæ, incolores, oblongæ apice altera nunc attenuatæ, 6-8-blastæ, diam. 3-6° longiores. Paraphyses filiformes. On trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 137). The spores connect this fine *Thelotrema* with *T. olivaceum*, Mont., but externally it is far more like *T. Auberianum* of the same author. Apothecia a line in diameter, but the largest reaching two lines; the exterior (proper) exciple brown within, where it is white-powdery, and concrete with the thallus without; the interior exciple deficient. As in *T. Auberianum*, the now only slightly recurved white margin of the exciple remains sometimes persistently entire, being either elevated and obtusish, or, again, scarcely exceeding the thallus; but more frequently perhaps it is deeply cleft into four or five acute, at length reflexed lobes, a state characterizing the larger apothecia, while also observable in others from the first.

THELOTREMA LEUCASTRUM, sp. nov.: thallo cartilagineo tenui lævigato pallide olivaceo-fuscescente hypothallo fusco-nigro; apotheciis majusculis innatis scutelliformibus dilatatis, excipulo exteriori reflexo stellato-fisso albo-pulverulento discum planum tenuem superne nigricantem albo-pruinose cingente, interno deficiente. Sp. in thecis subcylindræis uniserialiter octonæ, parvulæ, pallide fuscescentes, e cocciformi-ellipsoideo dein magis oblongæ apicibus obtusis, 3-4-blastæ, diam. 2-3° longiores. Paraphyses filiformes distinctæ. Trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 158).

Var. β *difforme*: apotheciis minusculis confluentibus elongatis aliterque difformibus margine pulveraceo sub-dissoluto. With the last. (*Wright* Lich. Cub. n. 159.) The species will be most readily compared with *T. platycarpum*, described in a previous part of these Observations, but the interior exciple, which is so distinct and elegant

in that species, is wholly wanting in this. The spores, though not dissimilar, generally, to those of *T. platycarpum*, are somewhat larger, and the outline is constantly a little different. It will not be easy to found any subdivision of the present genus on the presence or absence of the interior exciple.

THELOTREMA PLATYCARPOIDES, sp. nov.: thallo cartilagineo tenui æquabili dein ruguloso pallide viridi-fuscescente; apotheciis mediocribus innato-prominulis urceolato-scutelliformibus apertura ampla, margine exteriori elevato subintegro dein reflexo discum planum tenuem superne nigricantem albo-pruinose excipulo interno membranaceo albido connivente instructum cingente. Sp. octonæ, pallide fuscescentes, ex ellipsoideo apicibus acutis dein subelongatæ apice altera attenuatæ, 6-blastæ, diam. $3\frac{1}{2}$ – $4\frac{1}{2}^{\circ}$ longiores. Paraphyses filiformes conglutinatæ. Trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 157). Differs from *T. platycarpum* in its 6- (rarely 8-) locular, larger spores, as well as in its smaller, urceolate apothecia, in which the outer margin is more commonly erectish and nearly entire. But the latter feature is not to be relied upon (as already suggested under *T. latilabrum*), and the lichen occurs in states resembling *T. platycarpum* much as the variety of the last-described species does its type, except that here the distinction of the spores continues.

THELOTREMA LIRELLIFORME, sp. nov.: thallo crassiusculo tenuissime ruguloso-granulato lævigato dein tartareo-subfarinoso e glaucoviridulo cinerascete hypothallo fusco-nigro; apotheciis majusculis innatis lirellato-diformibus, excipulo exteriori prominulo margine crasso subintegro discum nigrum velamine albo coopertum cingente. Sp. octonæ, oblongo-ellipsoideæ, tetrablastæ sporobl. integris, dein nigrofusæ, diam. $2-2\frac{1}{2}^{\circ}$ longiores. Trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 150). Belongs to the same group with the variable *T. Auberianum*, Mont., and *T. Cubanum* of the present writer, but is rather remarkably distinguished by its much-elongated apothecia, sometimes nearly three lines long, and its blackish spores. The lirelliform exciple, which not unfrequently suggests that of some *Graphis*, not remote from *G. vernicosa*, Fée (Nyl. in Herb. Lindig. n. 751, 898) splits sometimes irregularly, becoming 3–4-radiate, recalling short-branched apothecia of the cited *Graphis*, and still more those of specimens of *G. Lyellii* (Sm.) Ach.

THELOTREMA CATASTICTUM, sp. nov.: thallo subtartareo inæqua-

bili dein subtiliter pulveraceo glaucescente; apotheciis minutis immersis urceolatis thallo submarginatis apertura ampla, excipulo laxo margine incurvo discum conoideum nigrescentem cingente. Sp. in thecis elongatis subcylindræis octonæ, pallide fuscescentes, lato-oblongo-ellipsoideæ, 6-8-blastæ sporobl. lentiformibus integris, diam. 2-3° longiores. Paraphyses filiformes conglutinatæ. On trunks in the island of Cuba, *Mr. Wright*. *T. compunctum* (Sm.) Nyl. (Herb. Lindig. n. 2,885) has not very dissimilar though smaller apothecia, but differs from the present in its muriform-pleioblastish, larger spores, as well as in general habit.

THELOTREMA SIMPLEX, sp. nov.: thallo crassiusculo rugoso-verrucoso lævigato pallide cinerascete; apotheciis confertis valde minutis thalli verrucis submarginantibus immersis, excipulo subgloboso pallido basi continuo superne nudo radiatim substriatulo poroideo-pertuso discum nucleiformem livescentem fovente. Sp. octonæ, mox fuscæ, ellipsoideæ, 4-8-blastæ sporobl. dein muriformi-partitis, diam. 1½-3° longiores. Paraphyses conglutinatæ. Trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 154). Belongs to the neighborhood of *T. Wightii*, (Tayl.) Nyl., and is especially comparable with *T. trypaneoides*, Nyl. (Wright. Lich. Cub. n. 156), but differs in the conspicuous denudation of the upper portion of the verrucarioid apothecium, and apparently in the spores. The proper (exterior) exciple of *Thelotrema*, for the most part so conspicuously conditioned by the thallus, has in the present lichen (as also in *T. album* (Fée), and others of that group) only an accidental relation to it. There can hardly be any doubt that the simple receptacle of *T. simplex* corresponds to the *exterior* exciple of species with compound receptacles (as compare the not dissimilar *T. sphinctrinellum*, Nyl. in Herb. Lindig. n. 2808): but when, as in *T. compunctum*, the exciple soon separates from the thallus, falling loosely inwards, it is difficult not to take it for the *interior*, and the rim of thallus, often a little prominent, which surrounds it, as in fact as well as appearance the exterior.

GYALECTA CARNEO-LUTEOLA, sp. nov.: thallo tenuissimo albo; apotheciis minutis innato-erumpentibus disco concavo-plano luteolorubello margine subconcolori subintegro, velo thallino dentato-lacero discrepante. Sp. in thecis elongato-clavatis octonæ, incolores, sub-dactyloideæ, sæpius diblastæ, diam. 3-5° longiores. Paraphyses filiformes capitulatæ. On trees in the island of Cuba, *Mr. Wright*. As in *G.*

carneo-lutea (Turn.) the innate disk is enclosed by a thin, thalline veil or exciple, which bursts as the mature apothecium emerges, and finally for the most part disappears. The lichen differs from the European, in being only one third of the size, in its higher-colored apothecia, and smaller, bilocular spores, passing only irregularly into 3-4-locular conditions. The spores of *G. carneo-lutea* are commonly quadri-locular, but pass irregularly and imperfectly into 5-6-locular states. The thalline veil is by no means peculiar to these species, being sufficiently obvious in *G. foveolaris* and *G. geonica*, as indicated by Th. Fries, and assuming the character of a genuine thalline exciple in *G. rubra*; and it is taken, and with reason as it appears to me, into his definition of the genus, by Dr. Fries (Lich. Arct. p. 137; Gen. Het. p. 73.)

LECIDEA (*Biatora*) *PARVIFOLIA*, Pers.: thallo squamuloso-microphyllo e viridi-glauescente fusciscente squamulis subcartilagineis imbricatis crenato-incisis laciniatisve hypothallo demum fusco-nigro; apotheciis plano-convexis mox prolifero-diformibus, margine obtuso tenuescente dein evanido, varie fusciscentibus rufo-fuscis denigratisque. Sp. in thecis clavatis sub-octonæ, incolores, simplices, ex ellipsoideo oblongæ, diam. e 2° dein 4-6° rarius 8° longiores. *Lecidea parvifolia*, Pers. in Gaudich. Bot. Uran. p. 192. *Biatora*, Mont. Prodr. Fl. Fernand. *Parmelia* (*Psoroma*), Mont. Pl. Cell. Cub. p. 214, t. 10, f. 3. The lichen appears to be common throughout the tropical regions of the earth, and reaches northward in America as far as the low country of Carolina. It is variable in the development and differentiation of the thallus and hypothallus, in the colors, and in the dimensions of the spores. The forms which follow are those collected in Cuba by Mr. Wright; and after a good deal of labor, lately repeated, I find it impossible to separate any of them from the type indicated by Persoon. Specimens of several of these were sent, before publication, to Dr. Nylander, in Paris, and this eminent lichenographer has since published his own determinations of the same, which will be cited below.

a. Sporæ majores magis elongatæ. (Wright. Lich. Cub. n. 179.) *L. longiuscula*, Nyl. in Prodr. Fl. N. Granat. in Ann. Sci. Nat. The larger specimen is remarkable, in the younger portions, for its white hypothallus; the squamules are also much divided, and the apothecia (not appressed as is more common in other conditions, especially where the thallus is less developed, but sessile on the ascending lobes) are especially perfect and well-bordered. The smaller specimen is a sub-

granulose condition (rather comparable, as respects the thallus, with Lich. Cub. n. 183, to be noticed under *b*, and also with Lich. Cub. n. 185), with a blackish-brown hypothallus, but apothecia and spores not unlike those of the other. In Lich. Cub. n. 179, the squamules are now white-pubescent beneath (a feature finally disappearing, with the hypothallus, in this form), and the same development is observable in n. 180, and also in n. 186, which last I take to be *L. parvifolia*, as limited by Nylander (l. c.), who brings this feature into his description.* Like everything else, the hypothecium also varies in these forms from pale to dark-brown.

b. Sporæ minores sæpius ellipsoideæ. (Wright. Lich. Cub. n. 181.) *L. breviuscula*, Nyl. l. c. The thicker, larger, crenate squamules of this form are more appressed, with something of an effigurate aspect, and are often bordered by the conspicuous, lurid-brown, here fibrillose hypothallus; while the thallus itself becomes at length more or less brownish. But there is nothing here to separate the lichen from states of *a*; and the ellipsoid spores become finally oblong. From this, the lichen in Lich. Cub. n. 183 (*L. intermediella*, Nyl. l. c.) appears to me to differ much as the subgranulose state of n. 179, from the squamulose one. The hypothecium varies in these forms, as in *a*.

c. Sporæ adhuc minores. (Wright. Lich. Cub. n. 182.) *L. parvifoliella*, Nyl. l. c. Thallus from greenish becoming pale yellowish and at length brownish, the crenate scales passing into narrowly lobed ones, the hypothallus and the apothecia (which are at first brown) finally black, and the hypothecium blackish-brown. Spores of the species, but smaller than in the other forms.

d. corallina: squamulis corallinis. (Wright. Lich. Cub. n. 184.)

e. subgranulosa: thallo diminuto squamaceo-granuloso. (Wright. Lich. Cub. n. 185.) Such appears to me to be the range of variation of this species, so far as exhibited in the rich collections of Mr. Wright. It is no more perhaps than were fairly to be presumed in a widely-spread, squamulose lichen, developed by tropical moisture and heat. Much as some of these forms diverge from others in the thallus and apothecia, these differences do not appear to afford satisfactory grounds

* *Biatora Fendleri*, Mont. & Tuck. in Ann. Sci. ser. 4, 8, p. 296, from Venezuela, is an elegant expression of this pubescent form, comparable with Lich. Cub. n. 186, and also with n. 181 of the same collection.

for specific distinction.* And, if I am not so far mistaken, the spores, in which a certain degree of variableness in dimensions is also presumable, seem hardly sufficient alone.

LECIDEA (Biatora) *ONCODES*, sp. nov.: thallo granulis minutis dein subconfluentibus rimoso viridi-cinerascente hypothallo fuscescente evanido; apotheciis mediocribus appressis, disco mox convexo rufo-fusco hypothecio nigricante imposito margine tenui pallidiori flexuoso, prolifero-diformibusve majusculis in soredia farinacea sæpe fatiscentibus. Sp. octonæ, parvæ, incolores, simplices, oblongæ, diam. 4–6° longiores. Paraphyses conglomeratæ. On trunks in the mountains of Cuba, *Mr. Wright*. (Lich. Cub. n. 187.) Remarkable for the frequent transformation of the apothecia into soredia.

LECIDEA (Biatora) *ORPHNÆA*, sp. nov.: thallo e granulis minutis dein coalescentibus subimbricatis rufo-fuscescentibus hypothallo tenui fuscescenti-pallido; apotheciis minutis sessilibus disco plano-convexo nigro-fusco intus nigricante margine obscuriore evanido demum proliferis. Sp. in thecis clavatis 10–15-sporis, parvæ, incolores, oblongæ, diam. 2½–5° longiores. Paraphyses mox distinctæ. On trunks in the island of Cuba, *Mr. Wright*. Comparable with *L. furfuracea*, Pers., Nyl. (Lindig. n. 840), but apparently quite distinct.

LECIDEA (Biatora) *FURFUROSA*, sp. nov.: thallo granuloso e pallido-fusco-cinerascente hypothallo dein nigro; apotheciis mediocribus sessilibus disco plano pallido-fusculo hypothecio nigro-fusco imposito margine tenui nigricante. Sp. octonæ, mediocres, incolores, simplices, ovoideæ, dein oblongo-ovoidæ apice altera nunc attenuatæ, vel fusiformi-ellipsoideæ, diam. 1½–3° longiores. Paraphyses conglomeratæ. Perhaps nearest to *L. Piperis*, (Spreng.) Nyl., which has a different thallus, and rather smaller spores.

LECIDEA (Biatora) *POLYCAMPIA*, sp. nov.: thallo subcartilagineo inæquabili rimoso mox sorediifero ex olivaceo cinerascente; apotheciis majusculis adnatis disco subplano opaco lurido-rufescente hypothecio crasso nigro imposito margine crasso obtuso pallidiori mox flexuoso. Sp. in thecis clavatis 6–8næ, incolores, simplices, ex ovoideo ellipsoideæ, nitidæ, diam. 1½–2° longiores. On trunks in the island of

* *Lecidea Halei* (Tuck.) Nyl. Enum. Suppl. (*Pannaria*, Tuck. Suppl. 1, l. c. p. 424), though differing from the other forms above considered, and in itself sufficiently distinct-looking, is, in the larger view we have been enabled here to take, by no means more separable than those.

Cuba, *Mr. Wright* (Lich. Cub. n. 194). It is impossible not to distinguish this lichen from *L. aurigera*, Fée (Lich. Cub. n. 193); but both may prove to be conditions of a single type. The granulate thallus of *L. aurigera* is (at least originally, or often) pale-sulphur-colored within, and the narrower margin of the thinner and darker apothecia is at length subcrenulate. *L. hypomela*, Nyl. (Lich. Exot. in Ann. Sci. Nat. 4, 11, p. 223) also occurring in Cuba, is another sufficiently distinct-looking member of the same group, with a thin, and, as compared with the others, depauperate thallus, and still darker, entire apothecia. The spores vary in dimensions in all three, and scarcely afford distinguishing characters.

LECIDEA (*Biatora*) CHLORORPHNIA, sp. nov.: thallo granuloso-farinoso ochroleuco; apotheciis valde minutis innatis planis rufo-fuscescentibus margine tenui evanido. Sp. in thecis clavatis 6–8næ, incolores, simplices, ellipsoideæ dein oblongo-ellipsoideæ, limbatae, diam. $2\frac{1}{2}$ –3° longiores. Paraphyses distinctæ. On Ficus, Hong Kong, China (U. S. N. Pacif. Expl. Exp.), *Mr. Wright*. Very like a minute form of *L. quernea*, (Dicks.) Ach. The European lichen is pronounced immarginate by several recent writers, but an obtusish, paler, flexuous excipular margin (contrasting with that of the present) is certainly evident in Nyl. Lich. Par. n. 134, and also in an equally fine specimen from Borrer. The spores of *Mr. Wright's* plant are always colorless, while those of *L. quernea* (passing from subglobose into ovoid-ellipsoid) are at length, in all my specimens, brown, as indicated by Dr. Koerber (Syst. p. 209), who distinguishes the lichen from *Biatora* by this certainly remarkable character. The hypothallus of *L. quernea* is originally whitish, according to Koerber, l. c., but it certainly appears to blacken (as indicated by Fries) in a specimen from Portugal (Welwitsch. Cr. Lus. n. 53) before me, which is both bordered and decussated by black lines.

LECIDEA (*Biatorella*) WRIGHTII, sp. nov.: thallo e granulis sub-tartareis globularibus conglomeratis glaucescentibus cum hypothallo confusis; apotheciis mediocribus adnatis e fusco nigricantibus disco subplano primitus cinereo-pruinoso hypothecio fusco-nigro imposito marginem obtusum integrum demum subexcludente. Sp. in thecis elongatis oblongis myriosporis minutissimæ, globulosæ, incolores. Paraphyses filiformes distinctæ. On the earth, growing upon mosses, in the eastern parts of the island of Cuba, *Mr. Wright* (Lich. Cub. n. 235).

Granules of the crust now vermilion-colored within, as in a not wholly dissimilar granulate condition of *L. parasema*. More rarely the exciple is colored like the thallus. There is a similarly whitish-margined state of *L. (Biatorella) conspersa*, Fée (Wright. Lich. Cub. n. 224). The lichen is dedicated to my excellent friend the discoverer, to whose ardor and acuteness, displayed in every quarter of the globe, Botany, and especially the knowledge of Lichens, has been indebted, as to few others.

LECIDEA (Bilimbia) LUTEO-RUFULA, sp. nov.: thallo cartilagineo contiguo lævigato rimuloso viridi-glauescente hypothallo albo submarginato; apotheciis mediocribus appressis planis dein flexuoso-lobatis disco e luteolo-rufescente demum fulvo marginem tenuem integerrimum pallidiorem subæquante. Sp. in thecis clavatis suboctonæ, parvæ, incolores, simplices, ex ovoideo-fusiformi-ellipsoideæ, diam. $2\frac{1}{2}$ – 5° longiores. Paraphyses conglutinatæ. On trunks, Loo Choo Islands (U. S. N. Pacif. Expl. Exp.), *Mr. Wright*. Hypothecium pale. Apothecia flatter and with a thinner margin than in the tropical lichens, known to me, nearest related to *L. vernalis*, as *L. lætior*, Nyl. (Wright. Lich. Cub. n. 197), and much more comparable, except in color, with *L. russula*. Like the lichen of Cuba first cited, as well as *L. subvernalis*, Nyl. (Lich. Cub. n. 198), the present also differs from the Northern plant (Fr. Lich. Suec. n. 224, Stenh. Suec. n. 54, a) in its smaller spores, which in *L. luteo-rufula* are always simple. As respects the size of the spores, *L. cinereo-rufescens*, Nyl. (Wright. Lich. Cub. n. 199) agrees better with *L. vernalis*, but differs in other respects from that, and especially from the present. I venture to refer this to *Bilimbia* in order to keep it in its natural relations to *L. vernalis*, which it is unnatural to place in a distinct group from *L. sphæroides*, the two latter species scarcely indeed differing in most respects, except that the simple spores of the first pass only into the bilocular state, while in the last the differentiation is carried further, to quadrilocular.

LECIDEA (Bilimbia) PELLÆA, sp. nov.: thallo tenuissime leproso viridi-cinerascente hypothallo nigro; apotheciis parvis adnatis margine tenui ruguloso fusco-nigro discum planum opacum livido-nigricantem intus nigrum cingente. Sp. octonæ, parvæ, incolores, ex oblongo subbacillares, sæpius diblastæ, dein tetrablastæ, diam. 4 – 6° longiores. On trunks in the mountains of Cuba, *Mr. Wright* (Lich. Cub. n. 206).

LECIDEA (Bilimbia) SCITULA, sp. nov.: thallo tenui contiguo in-

æquabili glauco-viridulo cum hypothallo confuso; apotheciis minutis appressis disco mox convexo carneo-rubello margine tenuissimo demisso integro albido. Sp. 8næ, incolores, dactyloideæ, 5-8- sæpius 8-blastæ, diam. 4-6° longiores. On trees in the eastern part of the island of Cuba, *Mr. Wright* (Lich. Cub. n. 202). Hypothecium brownish. Apothecia rather larger than those of *L. orphnæa*. One of a little group of closely allied lichens, of which the species next to be described, and also, if I mistake not, *Biatora pusilla*, Mont. Cuba, p. 199, t. 10, f. 2, "apoth. minimis carneo-luteolis excipulo granulato margine dentato-crenato," and quadrilocular spores, are other members.

LECIDEA (Bilimbia) PALMICOLA, sp. nov.: thallo tenuissimo contiguo æquabili stramineo-glauescente cum hypothallo confuso; apotheciis minutis sessilibus, disco subplano luteo fulvescente margine integerrimo concolore evanido, accessorio albo primitus subcinctis. Sp. in thecis clavatis octonæ, incolores, dactyloideæ, tetrablastæ, sæpe obliquæ vel curvulæ, diam. 2-3° longiores. On leaves of palms, in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 201). The colors make this little lichen easily distinguishable. The adnate apothecia become finally free at the circumference, and are rarely at length proliferous. The marginate disk rests upon, or is sometimes elevated by, a white layer, which often more or less borders it.

LECIDEA (Bilimbia) THYSANOTA, sp. nov.: thallo subtartareo leproso-granuloso dein granulis confluentibus rimoso albo hypothallo fibrilloso concolore fimbriato; apotheciis parvis sessilibus, disco plano e rufo-fusco nigrescente margine demisso pallidiore evanido instructo, strato albo subelevatis marginatisque. Sp. in thecis clavatis confertis octonæ, parvæ, incolores, ex ellipsoideo subdactyloideæ et oblongæ, 2-4-blastæ, diam. 2½-4° longiores. Trunks in the mountains of Cuba, *Mr. Wright* (Lich. Cub. n. 210). The extreme edge of the hypothalline fringe is finally darkened. Paraphyses scarcely to be distinguished. Hypothecium fuscescens. Compared by Dr. Nylander (l. c.) with his *L. byssomorpha*, occurring, "sub. n. 811 admixta," in the N. Granada collection of Lindig, and distinguished by its byssoid thallus, "verging towards the *Byssocaula*." The lichens of Mr. Lindig's collection were not put up by the eminent lichenographer who has so ably illustrated them, and there is here and there some confusion of specimens. In my copy of the collection, there is, mixed with *L. vigilans*, under No. 811, a not wholly dissimilar *Bilimbia* (th. granu-

loso albido hypothallo tenui fusciscente; apoth. mediocribus sessilibus lecanoroideis margine obtusiusculo mox demisso albido discum subplanum nigro-fuscum hypothecio concolore impositum cingente: sp. in th. elongato-clavatis octonis mediocribus incoloribus e dactyloideo fusiformibus 4-6-plerumque 6-blastis, diam. 3-5° sæpius 5° longioribus), which, with a thallus not unlike that of *L. thysanota*, a feature separating it from *L. byssomorpha*, Nyl., combines apothecia differing from those of both, and spores of almost twice the dimensions, and may, not inappropriately (with reference to the small size of the fruit in most of the species of this group), be called *L. majorina*.

LECIDEA (Bilimbia) LEUCOCHEILA, sp. nov.: thallo tenui cartilagineo mox contiguo inæquabili cinerascente; apotheciis mediocribus adnatis, disco plano-convexo fusco-nigro hypothecio fusco imposito margine integerrimo albido-livescente, demum proliferis. Sp. in thecis clavatis octonæ, parvæ, incolores, dactyloideæ vel subfusiformes, tetra-blastæ, diam. 2½-3° longiores. Paraphyses distinctæ filiformes. On dead wood in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 208). Comparable with *L. triseptata*, Hepp, but quite distinct from that species. The apothecia are a little smaller than those of *L. majorina*, and differ very considerably otherwise, but there is some observable resemblance in the colors.

LECIDEA (Bacidia) MICROPHYLLINA, sp. nov.: thallo squamuloso-microphylllo viridi-cinerascente (fusciscente aut dealbato) squamulis cartilagineo-membranaceis imbricatis crenato-incisis laciniatisve hypothallo tenui disparente; apotheciis plano-convexis e luteolo-pallido rufescentibus (rubellis aut denigratis) margine obtuso tenuescente dein evanido, demum flexuoso-lobatis proliferisque. Sp. in thecis clavatis octonæ, incolores, aciculares, graciles, diam. 15-30° longiores. On trunks in the island of Cuba, *Mr. Wright*.

a. Squamulæ magis appressæ crenatæ sporis longioribus. (*Wright*. Lich. Cub. n. 211.) *L. microphyllina*, Nyl. l. c.

b. Squamulæ adscendentes laciniatæ sporis brevioribus. (*Wright*. Lich. Cub. n. 212.) *L. tryptophyllina*, Nyl. l. c.

c. Squamulæ laciniatæ mox dealbatæ dein deliquescentes sorediatæ sporis diminutis. (*Wright*. Lich. Cub. n. 213.) *L. leucophyllina*, Nyl. l. c.

Var. β *subgranulosa*: thallo diminuto granulis squamaceis in crustam inæquabilem demum conglobatis. (*Wright*. Lich. Cub. n. 214-218.) *L. cognata*, & *L. pertexta*, Nyl. l. c.

A tropical *potentiation* of *L. rubella*, (Ehrh.) Schær. (considered as representing the group of which it is a member), analogous to and sometimes not at once distinguishable from *L. parvifolia*, which I take for a similar higher expression of *L. vernalis*.* The latter (*L. parvifolia*) appears the stronger species, and is represented by a larger suite of forms, externally, at least, not so well separable from each other, while the lichens approaching it, yet more closely akin to *L. vernalis* (*LL. subvernalis*, *lætior*, *cinereo-lutescens*, *luteo-rufula*, &c.), are also more varied and distinguishable from the Northern plant than the corresponding tropical conditions associable with *L. rubella*. Strikingly characterized, at their centres, as both species are, in the crustaceous sub-genera to which they belong, by their squamulose habit, this distinction disappears at the extremes, in granulose or scurfy forms not always separable by the eye from Northern members of their groups. Of the enumerated forms which make up *a* (as the lichen is represented in Mr. Wright's collection), *a* appears, so far as all the evidence from external characters goes, to pass directly into *b*; of which *c* is (as I understand it) no more than an abnormally whitened, finally deliquescent condition; and in this case, I take it, the evidence of diversity derivable from the difference of dimensions in the spores must be subordinated. The variety β is the granulose condition of the lichen, analogous to the similar state of *L. parvifolia*, and often very like it; but the former is perhaps more readily distinguishable from its type, or in other words less easily reducible to it, than the latter. The apothecia of *L. microphyllina* are originally not unlike those of *L. rubella*, and vary from pale-lutescent to rufous and reddish, at length blackening; and the hypothecium passes, in the same way (as in *L. rubella*, taken in its largest sense, or as expressed in Nyl. Prodr. Lich. Gall. p. 114, and Enum. Gen. Lich. p. 122), from almost colorless to brownish, vinous, and black. The spores, slender in all the forms, are especially diminished in *c*, but Mr. Wright collected another lichen, with a thallus scarcely distinguishable from that of *c*, in which they are more elongated than in any of the conditions here described,* thus approaching the filiform and still more elongated spores of *L. prasina*, Mont. & Tuck., a lichen externally most resembling Lich. Cub. n. 218.

* In all the larger specimens of my copy of Stenh. Lich. Suec. n. 53 (the lichen is *Bacidia rubella*, v. *fallax*, Koerb. Par. p. 131, and has been separated as a species by Lönnroth), I find the spores remarkably elongated.

It remains only to add, that specimens of most of the forms of the species, as distinguished here, being sent (before publication) to Dr. Nylander, that eminent lichenist has published his own determination of the same (in the place already cited under *L. parvifolia*), which should be compared with the above.

LECIDEA (Bacidia) MEDIALIS, sp. nov.: thallo granulis cartilagineis mox applanatis confluentibus diffracto-rimoso cinerascete cum hypothallo pallido confuso; apotheciis parvis plano-convexis e luteolo-pallido rufescentibus margine obtuso dein evanescente. Sp. in thecis clavatis suboctonæ, incolores, e dactyloideo-fusifor mi bacillares, sæpius tetrablastæ, diam. $5-10^{\circ}$ longiores. Paraphyses mox distinctæ. Trunks. In Nicaragua (U. S. N. Pacif. Expl. Exp.) *Mr. Wright*, who also collected it in Cuba (Lich. Cub. n. 203). Properly a *Bilimbia*, but the distinction between this group and *Bacidia* disappears in the lichen, which thus curiously illustrates Fries's reduction of the European types of both groups to a single species. I am at any rate unable clearly to distinguish the *Bilimbia* in Lich. Cub. n. 204, with dactyloid, quadricular spores, very like those of *L. sphæroides* (Stenh. Lich. Suec. n. 54, b), but smaller,* and finally a little elongated, from the above-described specimens; which yet may otherwise easily be taken (though differing apparently in the color of the thallus, and the smallness of the apothecia, and diverging considerably in the spores) for a tropical variety of *L. (Bacidia) rubella*.

LECIDEA (Bombyliospora) LEPTOCHEILA, sp. nov.: thallo tenui rugoso-verruculoso ex albido dein fuscescente hypothallo fibrilloso nigricante sublimitato; apotheciis mediocribus adnatis plano-convexis disco fusco-nigro opaco marginem tenuem integerrimum concolorem mox excludente. Sp. octonæ, sub-parvæ, incolores, oblongo-ellipsoideæ, diblastæ, dein obliquæ, diam. $2-3\frac{1}{2}^{\circ}$ longiores. Paraphyses conglutinæ. On trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 227). Distinct from *L. endochroma* (Fée), Nyl. (Wright Lich. Cub. n. 226), in its differently colored thallus, now elegantly fringed by the fibrillose hypothallus, thinner-margined apothecia, which are constantly white and not yellow within, and in its smaller spores. It seems impossible to deny the near affinity of these two species to *L. Taitensis*

* Not larger, as, *lapsu calami*, they are said to be in the ticket of the cited specimen. The spores differ, therefore, from those of the Northern lichen just as the spores of *L. letior* and *L. subvernalis* from those of *L. vernalis*.

(Mont.) and *L. vigilans* (Tayl.), or that the latter belong to the same natural group with *L. tuberculosa*, Fée ; and, in that case, the group cannot well be limited by the number of the sporoblasts, any more than *Bilimbia*. But the spores of *L. endochroma*, and of the species described above, are remarkable (as compared with other *Bombyliosporæ*) for their smallness, and are comparable rather with those of *L. atropurpurea* (Massal.), which is *L. intermixta*, Nyl. This is not always unlike small states of *L. tuberculosa*, &c., and I have seen similar states of *L. vigilans* referred to its neighborhood at least (under the name of "*L. carneola*," in which was understood possibly the rather unfortunate var. *arceutina*, Ach.) in European collections.

LECIDEA (Bombyliospora) PACHYCHEILA, sp. nov. : thallo contiguo inæquabili mox verrucoso glaucescente hypothallo demum nigro sublimitato ; apotheciis mediocribus adnatis disco subplano rufo-nigricante margine tumido obtuso albido persistente. Sp. 2-4næ in thecis oblongis, magnæ, oblongo-ellipsoideæ, 4-8-blastæ, sæpius curvulæ, diam. 3-5° longiores. Trunks. South Carolina, *Mr. Ravenel*. Mississippi, *Dr. Veitch*. Alabama, *Mr. Beaumont*. Island of Cuba, *Mr. Wright*. (Lich. Cub. n. 230.) Distinguished from *L. pachycarpa* and *tuberculosa* by its shorter, curved (now lunate, and now S-shaped) spores, which occur in twos, threes, and fours, in the sporesacks ; as well as by its thick, white exciple, which is often tumid, when there is some appearance of an accessory or false margin.

LECIDEA (Bombyliospora) AUREOLA, sp. nov. : thallo cartilagineo contiguo tenui rimoso flavido hypothallo tenui nigricante ; apotheciis parvis sessilibus disco plano-convexo opaco fulvo-aurantiaco hypothecio pallido imposito marginem tenuem integerrimum concolorem subæquante. Sp. 6-8næ in thecis clavatis, incolores, dactyloideæ vel subfusiformes, 5-6-blastæ, sporobl. rotundatis, diam. 4-6° longiores. Paraphyses mox distinctæ. Trunks, in the island of Cuba, *Mr. Wright*. Comparable with *L. Domingensis* (Pers.), Nyl. (Wright Lich. Cub. n. 231), but receding still further from the type of *Bombyliospora*.

LECIDEA (Heterothecium) VULPINA, sp. nov. : thallo tenui subcartilagineo contiguo inæquabili dein rugoso-verruculoso e glaucescente aurantiaco-flavido hypothallo tenui nigricante ; apotheciis submediocribus sessilibus margine obtuso integro ex aurantiaco sanguineo-rufo discum planum rufo-nigrescentem subpulverulentum hypothecio pallido impositum superante. Sp. 2-4næ in thecis, mediocres, fere semper

incolores, e cocciformi oblongo-ellipsoideæ, muriformi-pleioblastæ (ser. transv. 6–12, long. in medio 4–5), diam. $1\frac{1}{2}$ –3° longiores. Trunks in the island of Cuba, *Mr. Wright* (Lich. Cub. n. 233). With the thallus of *L. Domingensis*, and similar but smaller apothecia, this lichen presents the muriform spores of *Heterothecium*. In the latter group *L. leucoxantha*, Spreng. (Lich. Cub. n. 234) approaches it nearest, differing in its monosporous sporesacks, and larger, polyblastish (ser. tr. 18–20, long. in med. 8) spores, as well as in thallus, &c. According to Dr. Nylander (l. c.) the *L. leucoxantha*, v. *bispora* of his Enum. Gen. p. 125, relates to this lichen, but neither this name, nor that of *L. bifera*, Nyl. Lich. N. Caled., a plant certainly not remote from ours, is quite appropriate to a species the spores of which occur in twos, threes, and fours, in the sporesacks.

LECIDEA (*Heterothecium*) TURBINATA, sp. nov.: thallo e granulis applanatis in crustam verrucoso-rugulosam dein conglobatis pallido-luteo-fuscescente; apotheciis minutis turbinatis excipulo pallide fusculo basi stipitiformi-constricto margine integro discum e concavo planum rufo-fuscum hypothecio obscuriore impositum demum æquante. Sp. in thecis oblongis singulæ, magnæ, pallide fuscescentes, oblongæ, muriformi-polyblastæ (ser. transv. 30–50, long. 8–10) diam. 5–6° longiores. Paraphyses distinctæ. Encrusting *Coccocarpia parmelioides*, and mosses, in the island of Cuba, *Mr. Wright*. At once distinguishable from other species of *Heterothecium* by its substipitate apothecia, resembling those of *L. pezizoidea*, Ach., upon which Dr. Koerber founds his *Lopadium*. Hypothallus, so far as observed, very thin, and pale. Disk colorless within; resting upon a blackish-brown hypothecium. Paraphyses conglutinate at first, as observed in the related European species by Koerber (Par. p. 175), but soon separating into a loose mass of long, now branched filaments, which are perhaps capitulate, but by no means so distinctly as in the cited Northern lichen (Th. Fr. Lich. arct. p. 201, and herb.). The apothecia of the latter are also less turbinate, this feature being remarkably conspicuous in the tropical species.

LECIDEA (*Buellia*) PARASEMA (Ach.), Fée. *Buellia*, Koerb. Syst. Lich. Germ. p. 228. Notwithstanding some obscurity in the general remarks of Fée, Suppl. p. 101, the descriptions and figures of the spores both of this and of his *L. glaucotheca* (*L. disciformis*, v. *cæsio-pruinosa*, Nyl.) appear to me to leave no question that the lichen (with “bilocular

sporidia") which he had in view, as occurring commonly on tropical barks, was the well-known flat state of *L. parasema*, Ach. (*L. disciformis*, Nyl.), which really is common on such barks, and not what is now called *L. enteroleuca*. And this amounts to a determination of *L. parasema* as that part only of the original species which is characterized by bilocular, finally brown spores: a limitation dating at least from 1837, if not from 1824. "*L. disciformis*, Fr.," cited as a synonyme in Moug. & Nestl. Crypt. Vog. n. 745, has no other authority for its definition, that I am aware of, than the specimens published by the French botanists in connection with it, and in my copy at least this definition is uncertain, as one of the three specimens (with a similar hypothallus to that of the other two, only here more evidently conditioning the thin thallus, and smaller, flat, dark-reddish apothecia) has the ovoid, simple spores characterizing *L. enteroleuca*. *L. parasema* being as common as it is in the warmer regions of the earth, and doubtless passing there into states (the varieties *casio-pruinosa*, and *æruginascens*, Nyl., and *endococcina* (th. intus miniato), mihi, are some of these) unknown elsewhere, and *L. myriocarpa* (DC.), Nyl., also occurring in those regions, I do not venture at present to distinguish further, by a diagnosis, the *L. catasema* of Lich. Cub. n. 242; but the apparently granulose thallus of this lichen seems to differ from the granulate conditions of *L. parasema*, while the minute, soon proliferous apothecia (the thalamium in which, brownish in a thin section, is made up of conglutinate paraphyses, — contrasting both with *L. parasema* and *L. myriocarpa* the almost colorless thalamium of which consists of loosely coherent, filiform paraphyses), and especially the small spores, which are less than those of the last-named species (Fr. Lich. Suec. n. 353; Nyl. in Lindig. Lich. N. Gran. n. 742) and rather resemble the spores of some *Trachylia*, may well make proper a separate notice of it. There are, in Mr. Wright's collection, some small forms on living bark, approaching the other.

LECANACTIS, Eschw. Syst. p. 14 (founded on *Lichen lynceus*, E. Bot., which Acharius referred first to *Lecidea* and then to *Arthonia*) was accepted by Fries (Lichenogr. p. 374) in a different sense from what it afterwards assumed in the mind of its author, and has been since illustrated and extended by Koerber (Syst. p. 275). The group touches at once on Lecideaceous and Graphidaceous types, and its importance in the system appears tolerably evident if the close natural affinity of *L. lyncea* (an *Opegrapha*, according to Borrer, Schærer, and

Nylander) to *L. illecebrosa* (which Acharius, Schærer, and Nylander have referred to *Lecidea*) is fully considered; these two species, notwithstanding the divergence in shape of their apothecia, being nearer to each other than to anything else. To these, *L. biformis* (Floerk.), Koerb., for a fine specimen of which I am indebted to Mr. v. Krenpelhuber, approaches near, and *L. abietina* (Ach.), Koerb. chiefly differs in its better-defined, larger apothecia, and rather larger spores. It is with this last that *L. premnea* (*Lecidea premnea*, Ach. Lich. p. 173, 670. Nyl. Prodr. Lich. Gall. p. 138, and Lich. Par. n. 67. Nyl. Lich. Scand. p. 241. *L. abietina* (Sm.), Hook., non Ach. *Opegrapha plocina*, Koerb. Syst. Germ. p. 280. *Pragmopora*? *premnea*, Koerb. Parerg. p. 280), or the little group of which it is the type, is most naturally associable. Long-forgotten and misunderstood, the well-marked European member of this group was published at length, in both the bark and the rock-forms, by Mr. Leighton and Dr. Nylander, and its characters fully indicated in print. But it remained to observe the varying expressions of the type in other, and especially the warmer regions of the earth; and *Lecidea coniochlora*, Mont. & Van den Bosch (*Lichenes Javanici*, p. 37), scarcely differing from the European lichen (to which it was referred in Nyl. Prodr. Lich. Gall.) except in its longer spores, which are 8–12-locular, while the spores of the European vary mostly from 4 to 6, was the first step, as it is still the most important one, in that direction. *Lecidea insignior*, Nyl. in Prodr. Fl. N. Granat. l. c. (Herb. Lindig. n. 2688) appears to be only a more marked expression of this elongation of the spores, which was also indicated in the earlier *Lecidea premnea*, v. *phurilocularis*, Nyl. Lich. N. Caled. (Ann. Sci. 4. 15, p. 49); a phrase best agreeing, in its present limitation, with the described Java specimens, but not improbably to be extended hereafter to cover the whole extent of the divergence. For there is little else to distinguish these tropical forms. All agree, generally, in their imperfect, or obsolescent thallus, and flattish, black, greenish-pruinose apothecia, the prominent margin of which is peculiarly “wrinkled” (Ach.) or “sub-erose” (Koerb.), with the Northern type, and the blunt-fusiform or “oblong-fusiform” (Nyl.) outline of the spores of the latter is traceable throughout. *Lecidea proximata*, Nyl. in Prodr. Fl. N. Gran. l. c. (the *Lecanactis premnea* of the present writer in Lich. Cub. n. 243, where n. 244 is a form with more elongated spores) is particularly observable for its better-developed thallus and apothecia, the spores being rather intermediate (as is the case also in a

Hong Kong specimen formerly collected by Mr. Wright) between the shorter and longer forms. The large and handsome apothecia of this last condition (*Lecid. proximata*, Nyl.) place it at the head of our specimens, as suggesting even the still more conspicuous and very distinct *Lecanactis Leprieurii* (*Lecidea*, Mont. Guyan. p. 38), which, as is remarked by Dr. Nylander (l. c.), is clearly a member of the present group of species, and perhaps the culmination of it.

We have only left to notice a North American expression of the type of *L. premnea*, diverging from the European in a direction opposite to that which has been considered, and offering, possibly, rather more evidence of distinction. *Lecanactis chloroconia*, Tuckerm. herb., is a rather rare New England lichen, found by me in the White Mountains, growing on rock-maple, and in Hampshire, Massachusetts, on chestnut, and sent to me by my friend Mr. Russell (with dissections indicating its relations to *Lecanactis*), from Vermont (Mr. Frost), which, with a very thin, glaucous-cinerascent, or often almost obsolete thallus, not at all unlike that of conditions of *L. premnea*, and similar but thinner-margined apothecia, combines small, more often exactly dactyloid, quadrilocular spores, not exceeding one third of the size of those of the form *proximata*. As compared with the last, this may well be taken for distinct, but the range of its variations is as yet, perhaps, too imperfectly known.

OPEGRAPHA MICROCYCLIA. *O. myriocarpa*, Tuckerm. Suppl. I. (Amer. Journ. Sci. 25) p. 429, non Mont. The name originally given to this lichen, occurring in several parts of New England, had been previously applied to a South American species by Montagne. The present has also the advantage of indicating the curious peculiarity of the plant, which is its minute, *rounded* apothecia.

ARTHONIA (Arthothelium) CYRTODES, sp. nov.: thallo tenui subcartilagineo contiguo inæquabili rimuloso glauco-cinerascente hypothallo nigro sublimitato; apotheciis submediocribus adnatis rotundatis convexis fusco-nigricantibus intus concoloribus. Sp. 8næ in thecis ventricosis, majusculæ, incolores (rarius dein fusciculæ) oblongo-ellipsoideæ, 10-12-blastæ (sporobl. nunc hic illic muriformi-divisis), sæpe curvulæ, diam. 3-5° longiores. Paraphyses obsolete. *Lecidea cyrtodes*, Tuckerm. in litt. *Arthonia cyrtodes* & *A. distendens*, Nyl. in Prodr. Fl. N. Gran. l. c.

α. Thallus viridi-glauescens hypothallo minus distincto, sporis ob-

longo-ellipsoideis, (sporobl. integris,) diam. $3-5^{\circ}$ longiores. *Arthonia cyrtodes*, Nyl. l. c. On trunks in the island of Cuba, Mr. Wright (Lich. Cub. n. 245).

β . Thallus dein cinerascens hypothallo nigro, sporis magis oblongis, (sporobl. nunc muriformi-divisis,) diam. $3-4^{\circ}$ longiores. *Arthonia distendens*, Nyl. l. c. With the other, in the island of Cuba, Mr. Wright (Lich. Cub. n. 246).

I had referred this to *Lecidea* (in herb., as an aberrant type of the group *Heterothecium*), but the exciple is absolutely deficient, and the lichen belongs, as determined by Dr. Nylander (to whom specimens were sent, in advance of publication, and published by him), to *Arthonia*. I am still, however, unable to discern in the specimens more than the development of a single species. As respects the thallus, the apothecia, and the spore-sacks, both forms entirely agree. The hypothallus becomes possibly more distinct in β , and there conditions more or less the color of the thallus, which varies at length in this form, to brownish. The spores, quite similar in their younger states (varying from 2-5-locular) in both forms, become a little dilated in β , and the sporoblasts (entire in α) are then here and there divided, and thus first indicate the true type of the lichen: exactly as occurs in other spores of the muriform sort, where the same process of differentiation (from narrower and more ellipsoid forms, with entire sporoblasts, to more dilated ones, with subdivided sporoblasts) is observable abundantly in the contents of the same thalamium.

VERRUCARIA DRUMMONDII, sp. nov.: thallo determinato subcartilagineo rugoso-verrucoso ambitu radioso-subplicato nigricanti-fusco hypothallo indistincto; apotheciis minutis verrucis thallinis immersis ostiolo prominulo nigro. Sp. in thecis saccatis ($1-2næ?$) majusculæ, e cocciformi oblongæ, muriformi-polyblastæ, nigro-fusæ, diam. $1\frac{1}{2}-3\frac{1}{2}^{\circ}$ longiores. On lime-rock, near Kingston, Canada. The small, rounded, thinnish, and very dark fronds are quite conspicuous on the light-gray rock, and are from a quarter to half an inch in diameter. Thallus warted at the centre, but passing into wrinkles towards the circumference, which is more or less distinctly plaited, and radiant in a manner sometimes approaching that of *Lecidea* (*Sporostatia*) *Morio*, or, still more, some hypothalline fringes of crustaceous rock-lichens. Apothecia contained in larger, pretty regular warts, the white perithecium finally blackening, especially above. Paraphyses scarcely observable, but the "hymenial gonidia" especially abundant. The



Tuckerman, Edward. 1864. "Observations on North American and other lichens." *Proceedings of the American Academy of Arts and Sciences* 6, 263–287.

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