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Tuckerman, Edward

Lichens of California, Oregon,
and the Rocky mountains

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T. F. Allen

Lichens of California,

Oregon and the Rocky Mountains;

so far as yet known.



With an Appendix.

By Edward Tuckerman, M. A.,

Professor of Botany in Amherst College.

Amherst, Mass.:

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1866.

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Origin and the Rocky Mountains

no far as yet known



With an Appendix

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Menzies, who visited the North West Coast of America in 1787-8, and somewhat later, with Vancouver's expedition, was the first to observe, principally, if not entirely at Monterey, the remarkable Coast-lichens of California. Some of his specimens reached Acharius; but others, and among them *Ramalina Menziesii*, Tayl., remained undescribed for more than half a century. Having the good fortune to meet this venerable botanist in 1842, I was favoured by him with a considerable set of his duplicates. For other results of British explorations, illustrating especially the Lichens of the coast north of California, and of the Rocky Mountains, a grateful acknowledgement is here due to the liberality of the late much-lamented Sir J. W. Hooker; to whose ever open hand I also owe an important collection made in connection with the Oregon Boundary Commission by Dr. Lyall, and a smaller one, from Palliser's British North American Expedition, by Bourgeau.

Of our own naturalists, Mr. Charles Wright, who has herborized, with an eye open for Lichens, in perhaps more countries of the globe than any other botanical traveller, was the earliest to attempt any special collection in California, and though much limited (as botanist of the U. S. North Pacific Expedition,) in time, succeeded in making several important additions to what was known. Mr. A. Fendler had before communicated to me an instructive series of Lichens collected by him at Santa Fe, in New Mexico; and this was followed by

the valuable contributions to our knowledge of the Lichen-Flora, as well of the coast as of the interior mountains, made, during the Mexican Boundary Survey, by Mr. Wright and Dr. C. C. Parry; for which, as for many other, long continued favours, I am indebted to Professor Torrey. *Alectoria Fremontii* is a memorial of the celebrated expedition of Capt. J. C. Fremont. Other naturalists who have contributed to the extension of our list are, Dr. F. V. Hayden (Miss. & Yellowstone Expedition) who collected in some of the eastern Valleys of the Rocky Mountains; and Mr. E. Hall. To the careful observations of the latter, and to those, a season more recent, of Dr. Parry, almost the whole of our scanty knowledge of the important alpine Flora is confined.

The Coast-Flora, especially of California, is however still more interesting than the alpine; and if we except some small collections by Professor Newberry, and, at San Diego, by Dr. J. G. Cooper, it remained still almost unexplored, when Mr. H. N. Bolander, who had already devoted himself to the Mosses of the region, collecting, says Mr. Lesquereux (Calif. Mosses, in Trans. Amer. Phil. Soc.) 'in less than one year . . . as many species as all the other collectors together,' turned, happily, his attention to the plants before us.

The intention of this publication is to shew, at the beginning of careful exploration, exactly what is known of the Lichen-Flora of the west coast, south of Vancouver's Island; and of the great, western system of mountains, within the same range of latitude. Of the very extensive alpine districts embraced, nothing is indeed ascertained, illustrating their lichenose vegetation, except in the interior ranges; but it is likely that these represent, in this regard, those nearer the coast. Though the deficiencies of the list are almost surprising as the

new forms which it indicates, the time has clearly not yet come to touch any discussion of apparent anomalies of distribution. With the aid of Mr. Bolander, it is my expectation to distribute to lichenists some of the more remarkable forms here reckoned. And this gentleman intends also, I am happy to say, to give to the press, his interesting ~~observations~~^{observations} on the geological conditions and the climatal limitations of the Coast-Flora.

It appears proper, in view of some modifications, apparent in these pages, of the writer's previously expressed conceptions of the System, to state briefly his present apprehension of it. Of late long-occupied with a tropical Lichen-Flora, I have found great advantage in consulting, and to some extent, have followed the method of, the learned memoirs of Dr. Nylander, who has added more to the sum of knowledge of tropical Lichens than any other writer, and whose opinions derive indisputable weight from the universality of his stand-point. It is however one thing to follow, in a new field, the track of a method already indicated, and another to accept the System which lies behind; nor is anything more certain than that the long-continued, sufficient investigation of particulars, of species, implies, and ought to imply restatements of our *general* notions. From the first and always a disciple of the illustrious Fries, it is then my full persuasion that his systematic interpretation of the affinities of Lichens, taken generally, or in all its larger features, is still adequate to the phenomena; and that succeeding expositions, far from supplanting, have derived already not a little of their vitality, or will require to seek it, from the profound views of the botanist of Upsal.

But science does not stand still. The observations of Meyer and Eschweiler, and in particular of Fee and Montagne, opened up the fresh field of spore-investiga-

tion, which De Notaris, Leighton, Massalongo, and Koerber have so sincerely cultivated; and a new content was added to the conception of species. These groups of individuals derive all their value from their ideal centres, from the idea, which they more or less imperfectly exhibit; and every advancing approximation to completeness in our apprehension of this idea is most obviously important, and may be expected to be felt throughout the System. How far, and in what manner, the present writer's studies incline him to appreciate the sporal phenomena of Lichens, will be seen from what follows. (*)

I conceive then, that while less weight than has been often assumed should be given to spore-differences of a merely *gradal* character, or such others as depend only upon mensuration, more than has sometimes been allowed should be yielded to those that seem to be typical.‡ Analysis appears to me to indicate two well-defined kinds of lichen-spores, complemented in the highest tribe only by a well-defined intermediate one. In one of these (typically colourless) the originally simple spore, passing through a series of modifications, always

(*) All consideration of the notion of 'species' is embarrassed by the different and uncertain values which the word is used to express. We must distinguish in order to combine. And so short is life, that a generation may be employed in separating, what it shall fall to another to bring together again; and yet the whole honest concern of both have been the determination of 'species.' Large views are only possible as the results of much precedent work, either of successive enquirers, or in nature. Nor is it always possible to avoid the construction of 'species' from material which we must be well aware is inadequate; such species being in fact parts of quantities, the real extent of which is unknown to us.

(‡) The question here touched upon will be considered more at large in a work upon the Genera of North American Lichens, now in preparation.

in one direction, and tending constantly to elongation, affords at length, *the acicular type*. To this is opposed (most frequently but not exclusively in the lower tribes, and even possibly anticipated by *the polar-bilocular sub-type* in *Parmeliacei*) a second, (typically coloured) in which the simple spore, completing another series of changes, tending rather to distention, and to division in more than one direction, exhibits finally *the muriform type*. Differences such as these may certainly appear to be significant, and to suggest a possible correlation with others, which shall leave no doubt that these types require marked expression in the System. Nor is such expression questioned in the case of the best-developed, foliaceous groups. Nobody now hesitates to distinguish *Physcia* and *Pyxine* from *Parmelia*, or *Solorina* from *Peltigera*; and the argument from such foliaceous to the analogous crustaceous genera is impeded perhaps by nothing beside the thalline inferiority of the latter. But, *prima facie*, the case is seen to be not the same with the successive steps in the process of differentiation of these types; and the value of such *gradal* (bilocular, quadribocular, plurilocular) distinctions should be certainly inferior. Species which exhibit the ultimate condition of their spore-type, as here taken, exhibit also, ideally at least, the whole of the preceding process of evolution. This is still better seen in larger natural groups, as (*exc. excip.*) *Biatora vernalis*, Fr. *L. E.*, expressing, with general congruity of structure, the whole history of the colourless spore. And the step is not a long one from such groups to natural genera; to the assumption that *gradal* differences of the same spore-type, displayed by species, or clusters of species, within the circuit of what is otherwise a natural genus, shall be an insufficient ground for the sundering of such

genus.* The consideration of the numerous, sometimes sufficiently significant instances, in which nature appears to point in the direction we have taken, must be left for another place. Let me however be permitted at least to say, that if no lichenist would venture to separate generically the two forms of *Arthonia cyrtodes*, of the present writer, (Wright *Lich. Cub.* n. 245, 246) the way then is plainly open for the whole of the argument. The spore-character of *Biatora*, Naeg. & Hepp (Hepp *Abbild. Sp.* t. 1) is in entire accordance with the view here taken of the spore-characters as well of *Biatora* and *Lecidea* as of *Lecanora*; but I am unacquainted with any writer who has touched the instances alluded to in a really appreciative way beside Dr. Th. Fries (*Lich. Arct.* p. 137, 185, 226,) though except in a very few, isolated examples, as *Gyalecta* and *Rhizocarpon* (*Gen.* p. 91) the reasoning suggested by his observations has not as yet appeared to modify his constructions.

According to these views *Parmelia* proper, Ach., will fall into *Theloschistes*,** *Parmelia*, and *Physcia*; and *Lecanora* into *Placodium* (DC.) Naeg. & Hepp, *Lecanora*, and *Rinodina*. Excluding the biatorine forms of *Placodium* from the *Lecideei*, the latter will have no examples of the polar-bilocular sub-type; but *Heterothecium*, corresponding to *Physcia* and *Rinodina*, will

(*) "Respondent plene" (*Patellaria*, Fr.) "Lecideis Lichenum, in quibus, ut Calicis et omnibus naturalissimis generibus, sporidia simplicia et eximie septata variant." Fr. *Summ. Veg. Scand.* p. 366, not.

(**) Equivalent here to *Xanthoria* (Th. Fr.) Stizenb., and only preferred to the latter on account of its priority: the section of *Parmelia* called, at one time, *Xanthoria* by Fries (*S. O. V.* p. 246) having never been taken by him in any higher sense.

be distinguishable from *Biatora* : and *Buellia*,* similarly, from *Lecidea*. And the whole Class may be conceived, as in like manner passing into 1, a *Colourless Series*, especially characteristic of the higher tribes; and 2, a *Coloured Series*, having its chief development in the lower; series which, tabularized, so as to exhibit the sporal analogies, will be found perhaps significant as well of the relations of the genera, as of the systematic value of the spores.

As seen from my own, necessarily much-limited point of view, the difficulties of this sketch of a method appear to be overbalanced by its advantages. *Gyaloceta*, as reconstructed, in at least the spirit of these observations, by the younger Fries, offers one of these difficulties: but no other instance has occurred to me, in true Lichens, of muriform spores in a genus belonging apparently to the Colourless Series. The group is a small one, and its relations to *Thelotrema* may be nearer than has been suspected. In the last-named large, mainly tropical, and protean natural genus, and in *Graphis* (less distinguishable from *Opoglyphis* than *Gyaloceta* from *Thelotrema*) there is certainly, at first sight, as great apparent confusion in the spore-features, as in the external conditions of the apothecia; but the species are here happily so numerous, that uncertainties of the latter sort are, in the widest view, perhaps readily explainable.—and so, if I mistake not, with those of the former: both groups being typically referable, and as entireties, to the Coloured Series. There is moreover, to be admitted generally, a possible distinction between colour-

*Earlier than *Rhizocarpon*, Massal., which name can scarcely derive precedence from its use in a wholly distinct manner (as including namely types of those genera as understood by the Italian Lichenographer) by De Candolle.

less types and decolorate conditions; and *vice versa*. The anomalies of Collemaceous Lichens must be considered by themselves, and in another place. And to this, which is now offered, for what it shall prove to be worth, I venture only to add the expression of my earnest conviction, that with all the new light which the researches of the last thirty years have thrown upon Lichenology, this study has not yet advanced so far as safely to neglect the wide views, divinations as we now know they often were, of the elder lichenographers:— or, in other words, that no structural detail, of whatever apparent value, can safely assert itself in defiance of the argument from general structure; or otherwise than as elucidated by the subtle mediation of HABIT.

Tribe I. PARMELIACEI, Fr.

Fam. 1. *Usneei*, Fr.

ROCCELLA *leucophæa*, Tuckerm. San Diego, on *Obione*;
Dr. C. C. Parry.

RAMALINA *Menziesii*, Tayl. Coast. Monterey; Menzies.
Sta. Barbara; Dr. Parry. Vancouver's Island; Dr.
Lyll.

R. leptocarpha, Tuck. Coast. Monterey; Menzies.
Alcatraz; Mr. Wright. San Diego; Dr. J. G. Cooper.

R. lavigata, Fr. (*Parm. Eckloni*, Spreng.) New Mexi-
co; Mr. Wright.

R. tenuis, Fr. & Tuck. New Mexico; Mr. Wright.

R. calicaris, Fr., v. *fraxinea*, Fr. New Mexico; Mr.
Fendler. Var. *farinacea*, Schær. Coast; Mr. Wright.
Rocky Mountains; Dr. Hayden.

R. pollinaria, Ach. New Mexico; Mr. Fendler.

R. homalea, Ach. Coast rocks, Calif.; Menzies. San
Diego; Dr. Cooper.

R. ceruchis (Ach.) De Not. Coast, on trees. Alcatraz;
Mr. Wright. San Angelo; Russell herb. San Diego;
Dr. Cooper.

DACTYLINA *ramulosa* (Hook.) Tuck. Rocky Mountains,
Hook. Herb.

D. madreporiformis (Wulf.) Tuck. Rocky Mountains;
Dr. Parry.

CETRARIA *Californica*, Tuck. Monterey (on trees)
Menzies.

C. Islandica (L.) Ach. Rocky Mountains; Dr. Hay-
den, Mr. E. Hall.

C. cucullata (Bellard.) Ach. Rocky Mountains; Mr.
Hall.

C. nivalis (L.) Ach. Rocky Mountains; Dr. Parry.
Mr. Hall.

C. glauca (L.) Ach. Coast of Calif.; Mr. H. N. Bolan-
der. Vancouver's Island; Dr. Lyall.

C. lacunosa, Ach. Coast. Port Wentworth; Menzies.
Calif.; Mr. Bolander.

C. ciliaris, Ach. Coast of Calif.; Mr. Bolander.

C. scæpincola (Ehrh.) Ach. Pend Oreille r., Oregon;
Dr. Lyall.

C. juniperina (L.) Ach., *a.* Monterey; Menzies. Van-
couver's Island; Dr. Lyall. Var. *terrestris*, Schær.
Rocky Mountains, alp., Dr. Parry. Var. *pinastri*,
Ach. Rocky Mountains; Mr. Hall.

EVERNIA *ulpina* (Wulf.) Ach. Coast of Calif.; Men-
zies. N. W. Coast; Douglas. Rocky Mountains;
Dr. Hayden.

E. prunastri (L.) Ach. N. W. Coast; Menzies. Rocky
Mountains; Dr. Hayden.

E. divaricata (L.) Ach. Rocky Mountains; Mr. Hall.

E. furfuracea (L.) Mann. New Mexico; Mr. Fendler.

USNEA *barbata* (L.) Fr. *florida*, Fr. Lower Calif.; Mr.
Xantus. New Mexico, Mr. Fendler. Var. *hirta*, Fr.
Rocky Mountains; Dr. Hayden. Coast (f. *rubiginea*)
Mr. Bolander. Var. *ceratina*, Schær. Coast of Calif.;

Torr. herb. Var. *dasy-poga*, Fr. Coast; Mr. Bolander. Vancouver's Island; Dr. Lyall.

U. longissima, Ach. Washington Terr.; Torr. herb.

ALECTORIA ochroleuca (Ehrh.) Nyl., *a.* Oregon; Hook. herb. Var. *sermuntosa*, Nyl. Oregon; Dr. Newberry. Washington Terr., Torr. herb.

A. Fremonti, Tuck. Sierra Nevada; Capt. J. C. Fremont. Northern Oregon; Dr. Lyall. Rocky Mountains; Dr. Hayden.

A. jubata (L.) Fr., var. *implexa*, Fr. Washington Terr.; Torr. herb.

Fam. 2. *Parmelici*.*

THELOSCHISTES chrysophthalmus (L.) Norm., *a.* Coast of Calif., Mr. Bolander. Rocky Mountains; Mr. Hall. Var. *pubea*, Wallr. Monterey; Torr. Herb. New Mexico; Mr. Wright.

T. parvulus (L.) Norm., var. *polycarpus*, Fr. Coast of Calif., Mr. Wright. N. Mexico; Mr. Fendler. Var. *lychnus*, Schaer. N. Mexico; Mr. Fendler. Var. *ramulosus*, Tuck. Mare Island, Calif., Mr. Wright. Var. *Finnmarkus*, Ach. Rocks on the coast; Mr. Bolander.

PARMELIA perlata (L.) Ach., var. *flavicans*. Coast; Mr. Bolander.

(*A *Bryopogon*, as understood by several recent writers, but left here under its published name, because the spores of *Alectoria Thulensis*, Th. Fr. (*A. nigricans*, Nyl. *Lich. Scand.* p. 71; *Syn.* t. 8, f. 17) as described by Nylander, appear, notwithstanding their want of colour, fully to confirm the near affinity of this lichen to *A. ochroleuca*; and to suggest, in connection with *A. salata*, Nyl., that decolorate spores are insufficient to justify the separation from *Alectoria* of species otherwise agreeing with it.

- P. perforata* (Jacq.) Ach. Coast; Mr. Bolander;
P. tiliacea (Ehrh.) Floerk. Rocky Mountains (trees)
 Dr. Parry.
P. saxatilis (L.) Fr., *a.* Oregon; Dr. Lyall. Rocky
 Mountains; Dr. Hayden.
P. physodes (L.) Ach., *a.* Coast; Mr. Bolander. Var.
enteromorpha, Tuck. Monterey; Menzies. North
 West Coast; Douglas.
P. olivacea (L.) Ach. Coast; Mr. Bolander.
Parmelia Fendleri, Tuck. in litt., & in Nyl. Enum.
 Gen. p. 105, thallo pusillo orbiculari microphyllino ex
 olivaceo fuscescente subtus pallidiori glabro fibrilloso,
 laciniis substellatis linearibus planis multifidis denta-
 tis, subinde congestis complicatis; apotheciis confertis
 castaneis margine crenulato. Sporæ octonæ, ellipsoideæ,
 simplices, diam. dein duplo longiores, incolores. *Platy-*
sma, Nyl. Syn. Lich. p. 309. Trunks, Santa Fe,
 New Mexico; Mr. Fendler. Has occurred to me (on
 old rails) in Maryland and Massachusetts; in Penn-
 sylvania (Dr. Michener) and in South Carolina, on
 trunks of Pine and dead wood (Mr. Ravenel.) Spermogones
 now submarginal, but never in the strict
 sense in which this position is characteristic in *Ce-*
traria ciliaris; nor do they appear to me to offer any
 important differences from those of *Parmelia stygia*.
P. stygia (L.) Ach. Rocky Mountains; Dr. Parry.
P. caperata (L.) Ach. Coast; Mr. Bolander. N. Mexi-
 co; Mr. Fendler.
P. conspersa (Ehrh.) Ach. Coast; Douglas. Mr.
 Schott. N. Mexico; Mr. Fendler.
P. molliuscula, Ach., e Nyl. (*P. chlorochroa*, Tuck.)
 Rocky Mountains; Dr. Hayden.
 PHYSCIA *erinacea* (Ach.) Tuck. Coast. Monterey;
 Menzies. San Diego; Dr. Parry.

- P. pulverulenta* (Schreb.) Nyl. N. Mexico; Mr. Fendler. Rocky Mountains, (*musci*.) Dr. Hayden.
- P. speciosa* (Wulf., Fr.) var. *hypoleuca*, Ach. Valley of Rio Grande; Mr. Wright. Var. *galactophylla*, Tuck. With the last. Var. *leucomela*, Eschw. Coast of Calif.; Menzies. New Mexico; Dr. Parry.
- P. stellaris* (L.) a. Coast; Mr. Bolander. Rocky Mountains; Dr. Parry. N. Mexico; Mr. Fendler. Var. (*tribacia*) Fr. Coast; Mr. Bolander. Var. *hispidata*, Fr. With the last.

PYXINE *Cboes* (Sw.) Nyl., var *sorediata*, Tuck. Rocky Mountains; Hook. herb.

Fam. 3. *Umbilicariæ*, Fee.

- UMBILICARIA *flocculosa*, Hoffm. Rocky Mountains; Hook. herb.
- U. hyperborea* (Ach.) Hoffm. Rocky Mountains; Hook. Herb.
- U. cylindrica* (L.) Delis. Rocky Mountains; Dr. Hayden. Dr. Parry.
- U. proboscidea* (L.) DC. Rocky Mountains; Dr. Parry.
- U. phæa* (sp. nova) *thallo cartilagineo monophyllo lævi fuscescente, subtus papilloso nudo nigro; apotheciis appressis dein prominulis gyroso-proliferis, margine tenui subevanescente. Sporæ minutæ, e globulari ovoideo-ellipsoideæ, simplices, subincolores, diam. fere duplo longiores.* Rocks on the coast; Mr. Bolander. Comparable as respects size with *U. erosa*.
- U. murina*, (Ach.) DC.? Rocky Mountains. Mr. Hall.
- U. hirsuta* (Ach.) DC. N. W. Coast; Douglas. Rocky Mountains; Mr. Hall.

- U. angulata*, Tuck. Syn. N. Eng. (*Gyroph. pellita*, Hook. hb.) Monterey; Menzies. N. W. Coast; Hook. herb. To be further compared with the last.
- U. pustulata* (L.) Hoffm., a. New Mexico; Mr. Fendler. Mr. Wright.

Fam. 4. *Peltigerei*.*

- STICTA fuliginosa* (Dicks.) Ach. Coast of Calif.; Mr. Bolander. Vancouver's Island; Dr. Lyall.
- S. anthraspis*, Ach. N. W. Coast; Menzies. Coast of Calif.; Mr. Bolander.
- S. pulmonaria* (L.) Ach. N. W. Coast; Douglas. California; Mr. Fitch.
- S. scrobiculata* (Scop.) Ach. Coast; Dr. Lyall. Mr. Bolander.
- PELTIGERA aphthosa* (L.) Hoffm. N. W. Coast; Scouler. *F. marginalis*. Rocky Mountains, alp.; Mr. Hall.
- P. canina* (L.) Hoffm. Vancouver's Island; Dr. Lyall. N. Mexico; Mr. Fendler. Var. *membranacea*, Nyl. Coast; Douglas. Mr. Bolander. Var. *sorediata*. Coast; Mr. Bolander.
- P. rufescens* (Neck.) Hoffm. Coast; Dr. Lyall. Mr. Bolander.
- P. polydactyla* (Neck.) Hoffm., a. Coast; Douglas. Var. *scutata*, Fr. Coast; Dr. Lyall. Mr. Bolander.
- P. venosa* (L.) Hoffm. N. W. Coast; Menzies. Sierra Nevada; Mr. Bolander. Rocky Mountains; Mr. Hall. N. Mexico; Mr. Fendler.
- SOLORINA crocea* (L.) Ach. Oregon; Dr. Lyall. Rocky Mountains, alp.; Mr. Hall.

Fam. 5. *Pannariæ*.*

PANNARIA hypnorum (Vahl.) Delis. Rocky Mountains, alp., Mr. Hall.

P. microphylla (Sw.) Massal. Coast; Mr. Bolander. N. Mexico; Mr. Fendler.

P. lepidiota, Th. Fr. Coast; Mr. Bolander.

PANNARIA cyanolepta (sp. nova) thalloe granulis conglomeratis cyanis hypothallo obsolente; apotheciis minutis batorinis rufo-nigricantibus, disco convexo marginem excludente. Sporæ octonæ, ellipsoideæ, obtusæ, similes dein nebulosæ, diam. 2-2½ plo longiores, incolores. On the earth; 'clayey soil near the North American river, Auburn;' Mr. Bolander. Comparable with *P. nebulosa* (Hoffm.) Nyl. (*Lich. Par.* n. 114) which appears quite the same with *Lecidea coronata* Borr! (Hook. Br. Fl.) but the minute, steel-blue granules of the present scarcely coalesce into scales; and the apothecia differ. The simplification of internal thalline structure corresponds here with the reduction of the thallus, as in other species.

Fam. 6. *Lecanorci**.

DIRINA Californica (sp. nova) thallo subtartarico rugoso-reticulato cinerascete; apothecis medioeribus confertis sessilibus, disco convexo margineque prominulo flexuoso-subcrenato cinereo-pruinosis. Sporæ in thecis elongato-clavatis suboctonæ, dactyloideæ, tetrablastæ, diam. 3-5 plo longiores, incolores. Spermata acicularia, arcuata, sterigmatibus simplicibus. Trunks of Oak (*Quercus agrifolia*) in the Oakland Slough; Mr. Bolander. In general aspect not a little like conditions of *Lecanora glaucoma*, and comparable also with *L. (Lecania) fecunda*, described below; but not

well with such European specimens as I possess of *Dirina Ceratonix*; which differs also in its much larger, broad-fusiform spores.

PLACODIUM coralloides, Tuck. (*) Coast; Mr. Bolander.

P. cladodes, Tuck. Rocky Mountains; Mr. Hall.

P. elegans (Link) DC. Rocky Mountains; Mr. Hall.
Dr. Parry.

P. callopismum (Ach.) Merat? Coast; Mr. Bolander.

P. fulgens (Sw.) DC. Rocky Mountains; Dr. Hayden.

PLACODIUM bolacinum (sp. nova) thallo squamuloso fulvo, squamis glebulosis rotundatis lævigatis subinde crenatis; apotheciis mediocribus zeorinis subplanis disco aurantiaco. Sporæ octonæ, polari-dyblastæ, diam. subduplo longiores, incolores. Sandstone bowlders, on the coast, Mr. Bolander; who finds a similar lichen on mud walls.

P. cinnabarrinum (Ach.) Anz. Coast; Mr. Bolander.

PLACODIUM luteo-minium (sp. nova) thallo crustaceo glebuloso lutescente; apotheciis mediocribus biatorinis ex aurantiaco miniatis, disco plano, margine ruguloso. Sporæ 8-16næ, oblongæ dein fabæformes, dyblastæ sporobl. approximatis isthmo deficiente, diam. $2\frac{1}{2}$ plo $3\frac{1}{2}$ plo longiores, incolores. On the earth, San Diego; Dr. J. G. Cooper. Spores larger and more regular than those of the next, from which the colours sufficiently distinguish the present.

(*) Adopting here, as already in *Obs. Lich.* (l. c. 6, p. 266, 287) the general views of Dr. Stizenberger (*Beitr. l. c. p. 135*) as to the systematic value of the effigurate type of thallus, I cannot hesitate to arrange with this last its fruticulose exaltation, so remarkably exhibited on the west Coast. The only known example of this type was *Lecanora fruticulosa* Eversm. (*Sphærothallia*, Fr. Nees, *pro p.*) but this is distinguishable, as a member of the section *Aspicilia*, from *L. Bolanderi*, &c.; and the latter cluster may take the sub-sectional designation of *Cladodium*: as *Placodium coralloides* and *cladodes* of *Thamnoma*.

- P. citellinum* (Ehrh.) Naeg. & Hepp. Coast, Mr. Bolander. Rocky Mountains; Dr. Parry. N. Mexico, Mr. Fendler.
- P. aurantiacum* (Lightf.) Naeg. & Hepp., *a.* Coast; Mr. Bolander.
- P. cerinum* (Hedw.) Naeg. & Hepp, *a.* Coast; Mr. Wright. Rocky Mountains; Dr. Parry.
- P. ferrugineum* (Huds.) Hepp. New Mexico; Mr. Wright.
- P. singaspermum* (DC.) Hepp. Rocky Mountains; Mr. Hall.
- P. variabile* (Pers.) Nyl., f. ? Rocky Mountains (a fragment) Dr. Hayden.

LECANORA *Bolanderi*, Tuck. Coast: Mr. Bolander.

LECANORA *phryganidis* (sp. nova) *thallo* fruticulosochroleuco, ramis teretibus ramosis mox rimuloso-rugulosis, centro caespitose-stipatis, ambitu decumbentibus; apotheciis majusculis lat. calibus sessilibus, margine subintegro discum carneo-luteolum primitus pruinoseum vix superante, demum thallose-labatis. Sporae octonar. oblongae, simplices, sporobl. variabili, diam. 3-4 plo longiores, incolores. On sandstone rocks, coast; Mr. Bolander. The roundish patches often two inches in diameter, and the branches occur an inch long. The diameter of these is from half to three quarters of a line, and of the larger apothecia from one to two lines. I have indicated some apparent differences in the apothecia from those of the next following species, and *L. pinguis*, but the fruit of all three of these lichen is externally similar, and comparable at once with that of species of the *vari*-group, as also with that of *L. rubina*.

LECANORA thamnitis (*sp. nova*) thallo papillato-fruticulosulo, truncis pluribus teretiusculis fastigiato-ramosis in crustam verrucosam viridi-stramineam cæspitose-stipatis; apotheciis majusculis terminalibus subpodicellatis, disco pallido-luteolo, margine demum crenato. Sporæ ex ovoideo ellipsoideæ, simplices limbatae l. (sporobl. dein disrupto) sub-dyblastæ, diam. 2-2½ plo longiores. Sandstone rocks, with the last; Mr. Bolander. Evolution of the thallus, which rather exceeds a quarter of an inch in height, comparable with that of *Cladonia papillaria*. Apothecia not unlike those of *L. pinguis*, and in some respects similar also to those of *L. rubina*; the largest having a diameter of two lines. The papillose crust of *L. aipospidu* (Wahl.) Ach., and that of *L. poliophœa* (Wahl.) Ach., pass into a flat, more or less radious, common margin, of which there is no trace here.

L. rubina (Vill.) Schær., a. (*L. chrysoleuca*, Ach.) Rocky Mountains; Dr. Hayden. New Mexico; Mr. Fendler. Var. *opaca*, Ach. Rocky Mtns; Dr. Hayden.

L. muralis (Schreb.) Schær. (*L. saxicola*, Ach.) Coast; Mr. Bolander.

L. pinguis, Tuck. Coast; Mr. Bolander.

L. varia (Ehrh.) Ach. Coast; Mr. Bolander.

L. pallescens (L.) Schær. Coast; Mr. Wright. Dr. Lyall. Rocky Mountains; alp.; Mr. Hall.

L. pallida (Schreb.) Schær. (*L. albella*, Ach.) Coast; Mr. Wright.

L. glaucoma (Hoffm.) Ach. Coast; Mr. Bolander.

L. Cenisia, Ach. Coast; Mr. Bolander.

L. subfusca (L.) Ach., ff. Coast; Mr. Wright.

L. atra (Huds.) Ach. Coast; Mr. Wright.

LECANORA fecunda (*sp. nova*) thallo contiguo diffracturimoso albo (*detrito chrysogonimico-aurantiaco*;) apoth-

*ascis congestis innatis difformibus plano-convexis, disco fusco albo-pruinoso, margine thallino tenui integro demisso l. subevanido. Sporæ in thecis confertis ventricosis octonæ, subclavuloidæ, 5-6 blastæ, diam. 2-3½ plo longiores, incolores. Spermata acicularia, arcuata, sterigmatibus simplicibus infixa. On Quercus agrifolia, the 'patches giving it a whitish appearance,' Monterey; Mr. Bolander. With the aspect of a common state of *L. glaucoma*, and really closely resembling it. Spores always straight. Paraphyses scarcely distinguishable. Spermata agreeing with those of the group represented by *L. subfusca*.*

L. athrocarpa, Dub., Nyl. San Diego; Dr. Cooper. Rocky Mountains; Dr. Hayden.

L. punicea, Ach. Valley of Rio Grande; Mr. Wright.

L. cinerea, (L.) Sommerf. Coast; Mr. Bolander. Rocky Mountains; Dr. Parry.

L. peliscypha (Wahl.) Coast; Mr. Bolander.

L. chthrophana (Wahl.) Ach. Southern ranges of Rocky Mountains; Mr. Wright.

L. Schleicheri (Ach.) Nyl. Rocky Mountains; Mr. Hall.

L. xanthophana, Nyl. (*L. chrysops*, Tuck.) Coast; Mr. Bolander.

RINODINA *oreina* (Ach.) Massal. Rocky Mountains; Dr. Hayden.

R. sophodes (Ach.) a, & ff. Coast; Mr. Bolander.

RINODINA *sabulosa* (sp. nova) thallo tenui dein contiguo inæquabili viridi-glaucescente; apotheciis minutis sessilibus, disco plano convexo fusco-nigro marginato, margine thallino persistente subintegro. Sporæ octonæ, meliocræ, ellipsoideæ, tetrablastæ demum submuriformi-pleioblastæ, diam. 2-3½ plo longiores, fuscæ. On

gravelly earth, near the ocean; Mr. Bolander. The two central sporoblasts of the at first regularly quadrilocular spore passing into four, and all the sporoblasts broken at length into smaller ones. This interesting modification of the spore-type of *Rinodina* looks evidently beyond the quadrilocular condition. The genus is represented very commonly on the rocks and trees of California, mostly in states not widely divergent from the type of *R. sophodes*; but no trace has appeared of *R. Ascociscana* (*Lecanora*, Tuck. Suppl. 2, p. 204.)

PERTUSARIA pertusa (L.) Ach. sub *Porina*, var. *areolata*, Clement. Coast; Mr. Bolander.

P. Wulfenii, DC., Nyl. Coast; Mr. Bolander.

URCEOLARIA scruposa (L.) Ach., *terricola*. Coast; Mr. Wright. Rocky Mtns; Mr. Hall. Var. *parasitica*, Sommerf. Coast (on thallus of *Cladonia*) Mr. Bolander.

THELOTREMA lepadinum, Ach. Oregon; Scouler.

Tribe II. LECIDEACEI, Fr.

Fam. 1. *Cladoniæ*, Th, Fr.

STEREOCAULON tomentosum, Fr. Rocky Mountains; Mr. Bourgeau. Mr. Hall.

S. paschale (L.) Fr., f. Coast; Mr. Bolander.

PILOPHORUS acicularis (Ach.) Th. Fr. N. W. Coast; Menzies. Rocky Mountains; Hook. Herb.

- CLADONIA turgida* (Ehrl.) Hoffm. N. W. Coast; Hook. herb.
- C. Santensis*, Tuck. Coast; Mr. Bolander.
- C. pyxidata*, (L.) Fr. Coast; Mr. Bolander. Rocky Mtns; Dr. Hayden. N. Mexico; Mr. Fendler.
- C. gracilis* (L.) Fr., *a.* Coast; Mr. Bolander. Rocky Mountains; Dr. Parry. Var. *hybrida*, Schaer. N. W. Coast; Hook. herb. Rocky Mtns; Mr. Hall. Var. *elongata*, Fr. Coast; Menzies. Rocky Mtns; Mr. Hall.
- C. fimbriata* (L.) Fr., *a.* Coast; Mr. Bolander. Vancouver's Island; Dr. Lyall. N. Mexico; Mr. Fendler.
- C. cenotea*, Ach. Vancouver's Island; Dr. Lyall.
- C. furcata* (Schreb.) Fr., *a.* N. W. Coast, and Rocky Mountains; Hook. herb. Varr. *racemosa*, Fl., & *subulata*, Fr. N. W. Coast; Douglas. Rocky Mtns; Mr. Bourgeau.
- C. uncialis* (L.) Fr., *v. albaea*, Ach. Vancouver's Island; Dr. Lyall.
- C. cornucopioides* (L.) Fr. Vancouver's Island; Dr. Lyall.
- C. bellidiflora* (Ach.) Schaer. Coast; Douglas. Mr. Bolander.
- C. deformis* (L.) Hoffm. Rocky Mountains; Mr. Hall.

Fam. 2. *Lecidei*.*

- BEMYCES aruginosus* (Scop.) DC. (*Biat. icmadoiphila*, Fr.) Oregon; Dr. Lyall.
- BIATORA Russellii*, Tuck. (*Lecidea*, *Obs. Lich.*) Rocky Mountains; Dr. Hayden.
- B. globifera* (Ach.) Fr. Auburn; Mr. Bolander.
- B. luridella*, Tuck. (*Lecidea*, *Obs. Lich.*) N. Mexico; Mr. Fendler. Rocky Mountains; Dr. Hayden.

- B. crenata* (*Endocarpon crenatum*, & *E. speireum*, Tayl., e Nyl. *Lecan. chonion*, Tuck. Suppl. 1.] Valley of Rio Grande; Dr. Bigelow.
- B. decipiens* (Ehrh.) Fr. Coast; Mr. Bolander. Rocky Mountains; Dr. Hayden.
- BIATORA scotopholis* (*sp. nova*) *thallo areolato-squamoso nigro-castaneo; squamulis aggregatis tenuibus rotundatis mox crenato-lobatis, hypothallo nigro; apotheciis adnatis planis margine tenui obtuso, dein convexis, fusco-atris, intus albis. Sporæ parvæ, ellipsoideæ, simplices, diam. subduplo longiores, incolores.* Sandstone of the coast; Bolander. The irregular thallus appearing black to the naked eye; by which the minute scales are scarcely appreciable.
- B. icterica*, Mont. (*Lecid. endochlora*, Tayl., e Nyl. *Lecan. Wrightii*, Tuck. Suppl. 1.)
- B. coarctata* (Ach.) Th. Fr. *terrestris*. Coast; Mr. Bolander.
- B. glebulosa*, Fr. Coast; Mr. Bolander.
- B. castanea*, Hepp. Rocky Mountains, alp.; Mr. Hall.
- B. sanguineo-atra* (Fr.) Rocky Mountains, alp.; Mr. Hall.
- B. cinnabarrina* (Sommerf.) Fr. Pend Oreille r., N. Oregon; Dr. Lyall.
- B. russula* (Ach.) Mont. Rocky Mountains; Dr. Parry.
- B. erysibe*, Fr. Rocky Mountains; Dr. Hayden.

LECIDEA enteroleuca, Ach. Coast; Mr. Bolander. N Mexico; Mr. Fendler. Var. *theioplaca*. Coast; Mr. Bolander.

- L. vitellinaria*, Nyl. Rocky Mountains; Dr. Hayden.
- L. insularis*, Nyl. Coast; Mr. Bolander.
- L. fusco-atra*, Ach., Fr. Rocky Mountains; Dr. Parry.
- L. atrobrunnea* (Ram.) Schær. Rocky Mtns.; Dr. Parry.

- LECIDEA ruginosa** (sp. nova) thallo e glebulis rugosoplicatis congestis virescenti-fuscis; apotheciis mediocribus sessilibus planis, intus albis, disco e rufo nigricante, margine obtuso. Spore 6-8 μ e, aciculares, pleioblastæ, diam. 12-16 μ longiores, incolores. Serpentine rocks on the coast; Mr. Bolander. With a thallus not incomparable with that of *L. conglomerata*, Ach., this species offers acicular spores (*Toninia*, Auct.) Paraphyses lax, brown-headed.
- LECIDEA massata** (sp. nova) thallo globuloso-verrucoso viridi-glaucoscente; apotheciis mediocribus, centro afflicis plus atris, margine tenui. Spore parva, cymbiformes, dyblastæ (rarisime 3-4 blastæ) diam. 2-4 $\frac{1}{2}$ μ longiores, incolores. Loose gravelly soil on hillsides, near the sea; Mr. Bolander. Spores best comparable with those of *L. granosa*, (*Obs. Lich.*) but scarcely other than bilocular. Those of my English specimens of *L. aromatica* (Borr. Herb.) as well figured by Mühl. (*Man. Brit. Lich.* t. 3. f. 64) are obtuse and rather finger-shaped, quadrilocular, and of twice the dimensions.
- L. morio* (DC.) Schær. Rocky Mountains; Dr. Parry.
- BUELLIA** (*) *epigæa* (Pers.) Rocky Mountains; Dr. Hayden.
- BUELLIA radiata** (sp. nova) thallo rimoso arcoluto glaucoscente, ambitu callosoplicato; apotheciis innatis,

(*) The genus is disposed here in accordance with the views expressed in the preliminary observations, and explains the warty differentiation of the coloured spore — *B. Africana* (*Lecid. Turk. Obs. Lich.*) with 1-2-plate spores, is an interesting addition to the figurate section (*Catolichia* Flad. A. Z.) and; *B. Japonica* (*Lecid. Obs. Lich.*) *B. Egea* (*Lecid. Turk. Suppl.*) and *B. verrucosa* (*Lecid. Turk. Suppl.*) in which last the spores are quadrilocular, are other lichens referable to *Buellia*, as here taken.

disco plano-convexo nigro albo-pruinoso, margine tenui thallo primitus coronato. Sporæ octonæ, parvæ, e sub-rotundo brevi-ellipsoidæ obtusæ, dyblastæ, fuscæ. Rocks on the coast; Mr. Bolander. Thallus of young plants contiguous, the circumference obscurely effigurate. In older ones the lobation of the margin is not very unlike that of states of *Lecanora circinata*. Apothecia generally comparable with those of *L. albo-atra*; but the spores differ.

B. lactea (Massal.) Koerb. Coast; Mr. Bolander.

B. stellulata (Tayl.) Coast; Mr. Bolander.

BUELLIA *pullata* (sp. nova) thallo areolato obscure fusco, areolis confertis minutis concavis angulatis crenatisque; apotheciis sessilibus, disco nigro opaco marginem obtusum demum excludente. Sporæ octonæ, obtuse ellipsoideæ, dyblastæ, diam. 2-3½ plo longiores, fuscæ. Rocks on the coast; Mr. Bolander. Scale-like areoles comparable with those of conditions of *Lecidea fusco-atra*, but minute. Spores with approximated sporoblasts; the isthmus obsolete.

B. halonia (Ach.) Coast; Mr. Bolander.

B. parasema (Ach.) Koerb. Coast; Mr. Bolander. Rocky Mountains; Dr. Parry.

B. papillata (Sommerf., Nyl. *B. insignis*, Th. Fr.) Rocky Mountains; Dr. Parry.

B. albo-atra (Hoffm.) Th. Fr. Coast; Mr. Wright.

B. parasitica (Floerk.) Th. Fr. Coast; Mr. Bolander.

B. oidalea, Tuck. (*Lecid*, *Obs. Lich.*) Alcatraz; Mr. Wright. Mendocino city; Mr. Bolander. San Diego; Dr. Cooper. Oregon; Dr. Newberry.

B. Montagnei (Flot., Koerb.) Rocky Mountains; Dr. Hayden.

B. geographica (L.) Rocky Mountains; Dr. Parry. Coast; Mr. Bolander.

Tribe III. GRAPHIDACEI, Eschw., Fr., Nyl.

- OTEGRAPHA varia* (Pers.) Fr., v. *pulicaris*, Fr. Coast; Mr. Bolander. Var. *diaphora*, Fr. Sand-stone, San Bruno mtns; The same. Var. *rimalis*, Fr. Coast; Mr. Wright.
- O. vulgata*, Ach., Nyl. Coast of Calif., Mr. Bolander.

Tribe IV. CALICIACEI. (*)

- SPHEROPHORUS globiferus* (L.) DC. Coast, on trees; Mr. Bolander. Vancouver's Island; Dr. Lyall.
- ACOLIUM Californicum*, Tuck. (*Trachylia*, Obs. Lich.) Coast-rocks; Mr. Bolander.
- ACOLIUM Bolanderi* (sp. nova) thallo areolato-verrucoso fulvo-cinereo hypothallo nigricante subfimbriato; apotheciis in verrucis mastoideis innatis, disco subplano nigro, margine obsolete. Sporæ in thecis cylindræcis octonæ, sphericæ, simplices, fusæ. Sandstone rocks on the Coast; Mr. Bolander. Very rarely (in a large collection of specimens) the wart-like areoles are flattened and obscurely crenulate at the circumference; but there is no approach to the plaited and lobulate thallus of the preceding species. The apothecial warts of *A. Californicum* reach at length a line in height, exceeding that in the diameter. Those of the present are rather smaller, the largest scarcely attaining to a line of height or diameter. Internally,

(*) Of the two genera which now constitute the Tribe *Sphaerophoracei* of authors, *Acrosyphus* Lev. Mont. is, from the present writer's point of view, indubitably Caliciaceous; and might be called a fruitless *Acolium*. *Sphaerophorus* is by no means so clear; but I shall attempt to show, in another place, that however remarkable the thallus of this type its fruit is at least conceivable as an extreme deformation of that of *Acolium*. This latter name proposed by De Notaris in 1817, is adopted here in place of *Trachylia*, as the designation of the earliest definite statement of the genus, as now understood.

the structure of the apothecia is generally similar in both; but *A. Bolanderi* offers the first known instance, in *Accolium*, of spherical spores. Spermata oblong, not unlike those of *A. tympanellum* (Nyl. Syn. t. 5, f. 32) the length from thrice to thrice and a half exceeding the diameter.

ACOLIUM chloroconium (sp. nova) thallo tenui plicato-verruculoso glaucescente; apotheciis innato-prominulis nigris disco flavoviridi-pulverulento marginem flavicantem dein nigrum superante. Sporæ in thecis cylindraceis octonæ, parvæ, obtusissime ellipsoideæ medio contractæ, diam. vix duplo longiores, fuscæ. On Oak-bark (*Quercus agrifolia*) in company with *Buellia oidalca*, California; Mr. Bolander. Thallus comparable, except in its minuteness, with that of *A. tympanellum*. Apothecia agreeing better with those of *A. stigonellum*; from which the present differs in possessing a proper thallus, in its greenish-yellow bloom, and smaller spores. (*)

CALICIUM subtile, Fr. Dead-wood, San Diego; Dr. J. G. Cooper.

Tribe V. VERRUCARIACEI (Fr., 1821, Fee) Stizenb.

DERMATOCARPON miniatum (L.) Eschw. Coast; Mr. Bolander.

D. Guepini (Moug.) Coast (infert.) Mr. Bolander.

D. rufescens (Ach.) Th. Fr. N. Mexico; Mr. Fendler.

(*) Of other species, *A. Javanicum* (Mont. & V. d. Bosch) Stizenb (*Trachylia*, Nyl., Tuck Obs. Lich, *Pyrgillus*, Nyl Syn.) found by the late Dr. Hale in Louisiana, is perhaps hardly to be expected. *Acrosyphus* however, (*A. sphaerophoroides*, Lev.) collected by Humboldt and Bonpland near Perote in Mexico, may not impossibly occur farther north.

D. hepaticum (Ach.) Th. Fr. Rocky Mountains; Dr. Hayden. N. Mexico; Mr. Fendler.

ENDOCARPON *pusillum*, Hedw., Th. Fr. (*E. pallidum*, Ach., Nyl.) N. Mexico; Mr. Wright.

Collemaeous Lichens are but ill represented in the collections. The following are all that have been determined.

COLLEMA *coccophorum*, Tuck. N. Mexico; Mr. Wright.

C. cristatellum (sp. nova) thallo subeffuso olivacco-nigro e lobulis minutis confertis crassis erectiusculis complicatis margine granulatis; apotheciis mediocribus pluno-concavis, disco castaneo margine tenui granulato-crenato. Sporæ oblongo-ovoidæ, e tetrablasto irregulariter pleioblastæ, diam. 3-4 plo longiores, incolores. On the earth, in gravelly soils, Santa Fe, New Mexico; Mr. Fendler. Comparable with, but I think a distinct plant from the European *C. cristatum*, Schær.

C. Texanum, Tuck. Valley of Rio Grande; Mr. Wright.

C. flaccidum, Ach. New Mexico; Mr. Fendler.

C. nigrescens (L.) Ach. Coast; Mr. Bolander.

LEPTOGIUM *tremelloides* (Ach.) Fr. N. Mexico; Mr. Fendler.

L. pulmatum (Huds.) Mont. Coast; Menzies. Mr. Bolander.

L. saturninum (Ach.) Nyl. Rocky Mountains; Hook. hb. N. Mexico; Mr. Fendler.

L. muscicola (Sw.) Fr. Coast; Mr. Bolander.

APPENDIX.

The Lichens, of which characters are here subjoined have not yet occurred in the regions embraced in the above list.

GYALECTA radiatilis (sp. nova) thallo tenui contiguo inæquabili glaucescente, hypothallo albo; apotheciis minutissimis emergentibus thallo adscendente marginatis, excipulo connivente urceolato radio-striato nigro. Sporæ in thecis subcylindraccis octonæ, ex ellipsoideo oblongo-ellipsoideæ, simplices, diam. $2\frac{1}{2}$ — $3\frac{1}{2}$ plo longiores, incolores. On bark, South Kingstown, Rhode Island; Mr. J. L. Bennett. The very minute apothecia are distinguishable, by the contrast of colours, by the naked eye, but require a powerful lens for their (external) examination. They are much more evidently gyalectine than *G. epulotica*, Ach., a lichen which I am now inclined to consider as best placed by Koerber, together with *G. odora*, Schær., under *Lecanora* sect. *Aspicilia*, and are comparable rather with the Cuban lichen (Wright *Lich.* l. c. 5, p. 414.) described by me as *Gyaleta asteria* (*Obs. Lich.* l. c., 5, p. 414.) From this the present differs in its black exciple with a constantly pore-like aperture, and especially in the interesting point that the spores are always simple; thus completing the sporal history of the genus. It now appears impossible to doubt that *G. asteria* is identical with *Parmelia* (*Urceolaria*) *Valenzueliana*, Mont. *Pl. Cell. Cub.* p. 205; and the Cuban species must therefore take the name of *G. Valenzueliana*. *Ramonia*, Stizenb., founded upon this lichen (*Beitr. z. Flechtensyst.* p. 168) was probably a systematic consequence, due to Montagne's reference of his plant to *Urceolaria*. But it is even more difficult to follow Nylander (*Obs. in Bot. Zeit.*) in subsuming such structure as this under *Lecanora*.—One word here of respectful homage to the memory of that genial cryptogamist who first illustrated the plant we have been considering. If a reverent handling of nature, and

an ever friendly sympathy with all who sought like him to learn her secrets, add anything to the worth of what a man has accomplished, they may well embalm the name of MONTAGNE.

BIATORA tephroea (sp. nova) thallo tenuissimo contiguo æquabili dein diffracto-rimuloso cinereo fusciscente, hypothallo nigricante sublimitato; apotheciis mediocribus sessilibus, disco plano rufo hypothecio pallido imposito, margine crasso integro demum nigro. Sporæ in thecis clavatis octonæ, parvulæ, ellipsoideæ, simplices, diam. $1\frac{1}{2}$ — $2\frac{1}{2}$ plo longiores, incolores. On trees, Hong Kong, China (U. S. N. Pacif. Expl. Exp.) Mr. Wright. Apothecia comparable with those of forms of the group represented by *B. aurigera* (Fee) from which the present is separated by its pale hypothecium. Considered by themselves, the biatorine types of *Lecidea*, Ach., may well appear too intimately akin to the lecideine to admit of generical separation. In a larger view however it is sufficiently evident that two parallel series are exhibited in the family before us; and such separation may be accepted as most convenient, if not, with Fries '*Lichenologiam idealiter intuenti*,' (*L. E.* p. 247) as clearly necessary. In accordance with observations already made, I regard the natural groups *Biatora* and *Lecidea* as exhibiting the development of the colourless spore-type, and *Heterothecium* Flot., emend., and *Buellia*, of the coloured. (*)

(*) According to this, *Biatt. encodes, orphnax, fursurosa* (Cuba, C. Wright), *palmettoæ, chlorophniæ, lateo-rufula, microps, melampylo, pallida, setula, palmicola, thysanota, major, leucoleuca, monophana, medius, chlorosticta*, Wright; *Lecidea, Fuslerii* (Obs. Lich. II. cc.) will be properly separated from *Heterothecium Simonsii, leptochilum, pachychilum, auriculum, vulpæum*, and *turbinatum* (*Lecid. Obs. Lich. II. cc.*)

BUELLIA inquilina (*sp. nova*) *apotheciis in thallo apotheciisque Pertusariarum corticolarum parasitantibus, minutis sessilibus atris intus cinerascentibus, margine tenui prominulo discum plano-convexum opacum cincente. Sporæ octonæ, ellipsoideæ, dyblastæ, diam. 2—2½ plo rarius 3 plo longiores, fuscescentes.* On corticoline *Pertusariæ*, North Carolina; Rev. Dr. Curtis. South Carolina; Mr. Ravenel. Texas (spores not seen) Mr. Wright. Appearing to represent here, in some sort, the pertusariicoline *Acolium stigonellum* of Europe; and the lichen is, with little doubt, the *Calicium stigonellum* of Muhlenberg's catalogue.

OPEGRAPHA oulocheila (*sp. nova*) *thallo tenui contiguo glaucescente; apotheciis minutis superficialibus rotundato-diformibus oblongisque nigris, disco dilatato plano, margine persistente ruguloso. Sporæ brevi-ellipsoideæ, dyblastæ, fuscescentes.* Salem, North Carolina, on granitic rocks; Schweinitz. Apothecia and spores, in the single specimen, from Schweinitz's herbarium (Herb. Acad. Sci. Philad.) before me, but half the size of those of *O. cerebrina*; from which species the present also differs in its crisped margin, and habitat.

OPEGRAPHA prosodea, Ach., *thallo dein compacto lavigato e viridulo fuscescente nigro-limitato; apotheciis superficialibus crassis ellipticis l. oblongis stellatisque obtusis disco aperto l. elongatis subramosis disco angustatodemum rimæformi. Sporæ in thecis clavato-oblongis octonæ, fusiformi-oblongæ, 6—14 blastæ, diam. 5—9 plo longiores, incolores.*

a, notha; apotheciis rotundatis ovalibus oblongisque planis, disco dilatato fusco marginem obtusum subæquante.

b, diaphora; apotheciis elongatis cylindraceis subclausis. Occurring commonly on various barks, in East-

ern Cuba; Mr. Wright. In defining the spores of *O. prosodca*, Ach., Nylander (*Lich. Exot.* p. 220, note) compares the lichen generally (as represented in the herbarium of Acharius) to the *O. rubella* of Mongeot & Nestler's *Exsiccati*, which he has since indicated is the *O. viridis* of Persoon; as it is also, in part, of Flerke's herbarium. I am inclined to consider this a happy comparison, in view of the extension of the Acharian species above-proposed; and to regard our remarkable *a* as related to *b* much in the same way that *O. involuta*, Wallr. is to the more narrowed forms (as Zw. *exs.* n. 8; Stenh. *Lich. Succ.* n. 119, *pro min. p.*) of *O. viridis*. The spores of the two northern lichens last referred to are as similar as those of the tropical ones described above, and Schærer well united the northern forms in his n. 96; the left-hand specimen, in my copy, offering the short, often concave, thick-margined fruit of *O. involuta*, and the right, the more elongated, slenderer apothecia of *O. rubella*, Nyl. *Prodr.* The now rounded apothecia of our above-described *v. notha* accompany sometimes, and significantly resemble *Lecanactis premnea*.

OPEGRAPHIA *astræa* (*sp. nova*) thallo compacto cinerascente albidove l. obsolescente, nigro-limitato; apotheciis superficialibus deplanatis abbreviatis l. elongatis simplicibus l. demum stellato-ramosis, disco puncti- l. rimæformi margineque demisso albo-velatis. Sporæ in thecis confertis clavatis octenæ, dactyloideæ, 4—8-blastæ sporobl. quadratis, d. a. n. 5—7 plo longiores, plerumque incoloræ.

a, apotheciis rotundis ellipticisve dein elongatis simplicibus margine nigro subsistente.

b, apotheciis mox stellatis superne albo-vestitis. Gra-

phis astræa, Tuck. in litt., & in *Nyl. Enum. Gen., Suppl.* Upon Holly, Elm, Maple, and Bald Cypress, in the low country of South Carolina; Mr. Ravenel. On various barks, in Cuba; Mr. Wright. In one of the Cuba forms the apothecia are curiously rounded, suggesting a comparison with *Acolium leucampyx* (*Trachylia*, Tuck. *Obs. Lich.*, & in Wright *Lich. Cub.* n. 21.) This state passes into an elongated one which is sometimes, as it were, torulose, the apothecium appearing to break up into smaller ones, as in many tropical *Bialora* (*apoth. proliferis.*) Thecæ abundant in all the forms, but the spores very rarely perfected in the extraordinary Carolina one distinguished as *b*, and I consider this a less typical state. It has much of the aspect of *Graphis Afzelii*.

GRAPHIS culectra (*sp. nova*) *thallo hypophlæode; apotheciis sparsis oblongis linearibusque flexuosis subsimplicibus, disco rimæformi dehiscente, margine excipuli nigri inflexo albo-pulverulento, strato thalldæ concolori marginante immersis. Sporæ in thecis ventricosis 6-8næ, cruceæformes, 12-15-blustæ, diam. 6-8 plò longiores, incolores l. dilute fuscidulæ.*—Trunks, in the White Mountains. Illinois, Mr. Hall. Spores taking a claret colour, at length violet, with iodine. The diversity in the spores from *G. scripta*, is corroborated by the remarkably dilated, stroma-like, accessory exciple, which is comparable with the accessory margin of *Opegrapha herpetica* v. *subocellata*, but more pronounced; and sufficiently indicates the lichen to the naked eye.

COLLEMA nigrescens (L.) Ach., *ryssoleum* (*sub-sp. nova*) *thallo suborbiculari macrophyllino membranaceo lævi lacero-laciniato olivaceo-viridi, lobis irregularibus mar-*

gine elevatis undulatis complicatis supra rugoso-papulis subtus pallidioribus lacunosis costatis, periphericis rotundatis; apotheciis submediocribus confertis sessilibus, disco plano-convexo e fusco-rufo nigricante, margine tenui integerrimo. Sporæ octonæ, lato-fusiformes, 4-6-llustæ, diam. 3-6 pl. longiores, incolores. Granite rocks, common in New England, and in the Blue Ridge of Virginia; and perhaps throughout the Appalachian chain. New Jersey; Mr. C. A. Austin. Mountains of North Carolina; Rev. Dr. Curtis. *C. nigrescens* is rather monophyllous, and confined to trees; but its lobation may conceivably assume the form of that of the present, which especially differs in its fusiform-ellipsoid, or broad-fusiform spores.

COLLEMA microptychium (sp. nova) thallo minuto pulvinato submembranaceo atrovirente, lobis rotundatis crenatis erectiusculis gyroso-complicatis; apotheciis sessilibus planis, disco rufo, margine integro. Sporæ octonæ, vermiformi-bacillares, pleioblastæ, diam. 6-10 pl. longiores, incolores.—Elm trunks at Amherst; common. Readily recognizable, especially when infertile, by the erect, rounded, plaited lobules which constitute the minute, pulvinate fronds. These scarcely exceed a quarter of an inch in diameter. The spores are smaller than those of *C. leptalcum* (*Obs. Lich. l. c. 6, p. 233*) but evidently associate the lichen with it. The latter is however sufficiently diverse in its best, and appears to be always distinguishable in its minutest conditions:

give the most abundant results in the
 last case, well known in a few localities
 and in the mountains of the Alps. The
 last case is very rare, and is found in
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