Notes on some North American species of Parmelia.

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The large lichen genus Parmelia presents many difficulties from the variability of its forms, and with regard to the chemical reactions of the thallus with liquid potassa (K) and hypochlorite of lime (CaCl) either separately or combined. As Tuckerman has remarked, it tends to develop into evernioid forms, of which the extreme is manifested in P. Kamtschadalis and P. cervicornis, and this tendency is manifested in species of the stock of P. perforata. Some writers have placed Evernia furfuracea in Parmelia. As to the chemical relations I am unable to attach absolute specific value to them. There are exceptions to their constancy, some of which were pointed out by Tuckerman in a paper in the *American Naturalist* for 1868, which remain to be accounted for. I have recently collected two specimens of Parmelia on the same trunk, one of which gave a positive (red) reaction with K, and the other a negative one, while otherwise there was not the slightest difference between them. So I have collected at the same time on red maple, two specimens of Buellia parasema in one of which the thallus gave a yellow reaction with K, while in the other the yellow immediately turned to red. But all the difference between them was that the former seemed to be the younger of the two. Specimens gathered at other times yielded no reaction. The cladonias also present similar difficulties. It is possible that a lichen may possess different chemical constituents at different stages of growth, or under different conditions of soil, climate, etc. Experiment on the same plant at different periods of its development is necessary to confirm the deductions from simple examination. Still, the reactions appear to be constant in most of the species of Parmelia and may serve as an aid in their determination, while the exceptions remain to be accounted for. Where there appears to be an exception we may best say that "perhaps" the specimen belongs to a distinct species.

Tuckerman, whose views in regard to species were very conservative, described in his *Synopsis* nineteen species of Parmelia. Some of his varieties are regarded by other authors, either on chemical or other grounds, as distinct species. Ny-

lander[1] described ten North American species, and has discovered some new ones among specimens sent him from New Bedford; and some additional species have turned up since Tuckerman wrote. So that at present there appear to be known about forty species. The reactions of most of the species are given in Hue's *Lichenes Exotici.*

1. P. PERLATA (L.) Ach.—Th. K yellow Me. K—. But in the var. *olivetorum* Ach. (the proper designation of which seems to be *olivaria* Ach.) Me. K dull red. The lichen is a widely extended one. Very near to it is *P. cetrarioides* (Del.) Nyl., which occurs on rocks in New Bedford, agreeing with a specimen from Switzerland (Lojka.). Another New Bedford specimen, with the habit and reaction of perlata, has the lobes ciliate, and may be the var. *ciliata* DC. But Nylander[2] considered it hardly to differ from *P. crinita.* A sorediate form (var. *sorediata* Schær.) also occurs in New Bedford.

2. P. CRINITA Ach.—The New Bedford plant referred here in Willey's *Lichens of New Bedford* is referred by Nylander to *P. perforata.* But I have since found an isidiose specimen, otherwise resembling *P. perlata*, which may be the plant of Acharius and of Tuckerman's *Synopsis* which is so described. The reactions of P. crinita are variously described by authors as Me., "saftgrün" (Krempelhuber), "atro-virens fere atra" (ibid.). The *P. crinita* Nyl. Syn. seems to be a different plant, and is referred by Wainio (Brazil) partly to *P. proboscidea* Tayl. and partly to *P. melanothrix* (Mont.). P. crinita is mentioned in several lists of North American lichens, but on what authority I know not.

3. P. CETRATA Ach.—This, like the preceding, is a difficult lichen. Tuckerman seems to have regarded all forms of the stock of perforata with narrowed or finally evernioid lobes as belonging here. But I think this can hardly be the case. *P. perforata* var. *cetrata* from Australia (Müller) gives Me. K—. A remarkable variety is var. *hypotropoides* Nyl. in litt., growing on branches of red cedar at New Bedford, with the thallus underneath white, as in *P. hypotropa*, and becoming yellow with K. Wainio (Brazil) gives the reaction of cetrata Th. K yellow, Me. K yellow, then red, with which the New Bedford plant agrees. A large New Bedford plant called *P. cetrata* by Tuckerman, is referred by Nylander to *P. tiliacea*, of which

[1] Flora —: 605 *et seq.* 1885.
[2] Flora —: 603. 1885.

it has the lobation, but much larger spores, while it agrees with tiliacea in its closely appressed habit. The plants called cetrata in lists of North American lichens must be considered as doubtful.

4. P. TINCTORUM Despr., Nyl. Pyr. Or. 16.—This plant, according to Wainio, Brazil, has received various names and is *P. perlata* var. *coralloidea* Mey. & Flot., *P. praetervisa* Müller and *P. perlata* var. *platyloba* ibid: to which he unnecessarily adds another, *P. coralloidea.* A specimen from Jamaica (Rev. F. Wolle) determined by Nylander has the thallus prolonged into convolute lobes; and a specimen from the west coast, H. A. Green, resembles var. *platyloba.* All the specimens give the same reaction Me. CaCl red.

5. P. SACCATILOBA Tayl. Nyl. Flora —: 608. 1885. Pyr. Or. 40. (*P. latissima* Kph.; *P. Zollingeri* Hepp.)—Me. K yellow, CaCl light red. Spores large, nearly as in *P. latissima* Fée.—Mexico. *P. glaberrima* Kph. is *P. latissima* Fée.

6. P. COMPARATA Nyl. Flora—:290. 1869 where it is said to be perhaps a var. of perlata analogous to cetrata, with the aspect of laevigata, is said in Hue Exot. to be widely distributed in North America. Me. K yellow.

7. P. SUBMARGINALIS Mich. Nyl. Flora —: 607. 1885.—(*P. perlata* Mont. Cub. 230; *P. perforata* var. *cetrata* Müller Beitr. *n. 69; P. perlata* var. *ciliata* ibid. *n. 1639*). "Similar to *P. perlata*, but the margin of the thallus ciliate and often partly laciniate, or laciniose-fimbriate. Apothecia larger, often perforate. Spores .014–018 × .008–.012^{mm}." Nyl. l. c. Me. K—. In a New Bedford specimen the thallus is divided into long, narrow, convex laciniæ, which are black and naked beneath. Another old and rigid specimen was called *P. subrugata* in Willey: Lichens of New Bedford, but the prolonged lobes are broader.—In *P. perlata* the spermatia are bifusiform, .005^{mm} long; in *P. submarginalis*, acicular .008–.010^{mm} long, and in *P. perforata* acicular-cylindrical, .010–.016^{mm} long.

8. P. HYPOTROPA Nyl.—This species is distinguished by the white borders of the under side of the thallus, which are colored yellow then red by K. Reaction as in *P. perforata*, Me. K yellow, then red.

9. P. HYPOTROPOIDES Nyl. in litt.—Thallus expanded, membranaceous, glaucescent, the rounded lobes depressed, more or less crenate, and finally elongated into narrow flat

laciniæ, beneath black and naked, but yellowish-white at the margin. Me. K red, but not showing any reaction beneath. Apothecia large, perforate. Spores .009–.16 × .006–.009^{mm}.—On trees, New Bedford, and District of Columbia (Lehnert).

10. P. PRÆSIGNIS Nyl. Pyr. Or. 17; Flora —: 610. 1895. On trees, Arizona, Pringle, 1881. Me. CaCl red. Spores .014—.016 × .007—.009^{mm}; spermatia bifusiform, .006—.007^{mm} long. Also in Mexico.

11. P. TILIACEA Ach.—The reaction given is Me. CaCl red, as in Lojka Exsic. Univ. *n. 62.* But only one of numerous specimens gives any reaction, which would be *P. sublævigata* Nyl. Me. K yellow, then red.—*P. livida* Tayl. from New Orleans is considered by Nylander as a variety of this; but Müller in Beitr. *n. 1344* looks upon it as distinct. *P. galbina* Ach. Syn. 195, from North America is a small form on dead wood. *P. relicina* Fr., which is made a variety of this by Tuckerman, is considered by most authors to be distinct.

11. P. BORRERI, var. RUDECTA Tuck. is separated by Nylander on account of the spermatia which in Borreri are sublageniform and in rudecta acicular-cylindrical and twice as long.

12. P. KAMTSCHADALIS (Ach.) Eschw. Me. K red.—"*Borrera glabrata* Schwein." then "*Evernia polita* Tuck." in herb. Schwein. (comm. Eckfeldt without station) seems to be a broad-lobed form of this.

13. P. CONSPERSA (Ehrh.) Ach.—Me. K yellow then red. But isidiose specimens on rocks, New Bedford, give Me. K—. as is also the case with a similar specimen in Stenh's Exs. Suec. *n. 122*, while the others give K red.

14. P. MOLLIUSCULA Ach.—Me. K yellow, then red. Mr. T. A Williams has described and figured in Report of Missouri Bot. Garden, May 1892, a fertile specimen collected in the Black Hills by Dr. Engelmann in 1856. A fertile plant, collected by T. S. Brandegee in Colorado, closely resembles Mr. Williams's figure and description. Apothecia numerous, the margin incurved, crenate, the disk blackening. Spores .011–.013 × .005–.006^{mm}. Spermatia cylindrical, .007–.009^{mm} long. Me. K red.

15. P. CONGRUENS Ach.—This species, which is figured in Swartz, Lichenes Americani, *pl. 4*, was not recognized by Tuckerman as North American. But according to Nylander it occurs in Mexico, and Müller, who had seen Muhlenberg's

original specimen in herb. Swartz says in Lich. Argent. 64 that he cannot distinguish it from his *P. versicolor* Beitr. *n. 315*, from New Holland, and refers Krempelhuber's plant to a distinct species, *P. subcongruens*.

16. P. ISIDIOCERA Nyl. Syn. **1:** 382.—This occurs in arctic America. "Affinis *P. aurulenta*."

17. P. SPHÆROSPORELLA Müller Beitr. *n. 1650*.—Thallus appressed ochroleucous, rugose beneath, pale yellowish, and with pale fibrils. Apothecia at length plane, the disk from flesh-colored becoming livid-fuscous. Spores globose, diam. .005–.007^{mm}.—On trees, Oregon, Dr. Lyall, in herb. Kew.

18. P. ACETABULUM, Me. K yellow then red, occurs in arctic America. Most of the Parmelias of the brown series give no reaction.

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