

CONTRIBUTION TO THE LICHEN FLORA OF NORTH AMERICA¹

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The lichens here described have been collected in the northern section of North America. Of these specimens, 18 are Alaskan, 60 from eastern Canada (New Brunswick, except one from Quebec), approximately 150 from western Canada (British Columbia and Alberta), and a few from the state of Wyoming.

The Alaskan lichens, 15 species in all, are largely the usual arctic ground lichens. The New Brunswick lichens, which comprise 46 species, come from around Dalhousie and were collected in the year 1930 by the agronomist Tapio Reijonen. *Usnea longissima* was collected near Franklin, Quebec, by Dr. Viljo Kujala in 1931 during his scientific journey. On this same journey, he collected in western Canada (120 species, varieties, and forms) and in Wyoming (6 species). The latter specimens come from the sandstone in a cactus desert.

The lichens from western Canada were collected by Dr. Viljo Kujala in various types of forest in British Columbia in the following localities: Jackman, Longworth, Aleza Lake, Prince George, Six Mile Lake (Trout Lake), Hazelton, Dorreen, Cowichan Lake (Vancouver Island), Kamloops, Fish Lake (near Kamloops), Blue River, Valemout, Golden, Field, and in Alberta in the vicinity of Lake Louise. The desert lichens come principally from the vicinity of Kamloops in British Columbia and from Wainwright in Alberta.

Although the same species have been encountered in several different localities, the total number of species, varieties, and forms is 171 with 5 entirely new species, as follows: *Usnea Kujalae*, *Placodium xanthostigmoideum*, *Nephromium canadense*, *Diploschistes canadensis*, and *Sphaerophorus Tuckermanii*.

The list further includes eleven new varieties and forms, as follows: *Usnea comosa* var. *stuppea*, *Alectoria sarmentosa* var. *gigantea*, *A. Fremontii* f. *perfertilis*, *Cetraria nigricans* var. *pallida*,

¹ Duplicates of most of the specimens have been deposited in the herbarium of the Missouri Botanical Garden.

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C. tenuifolia var. *reticulata*, *C. tenuifolia* var. *pseudoislandica* f. *septrionalis*, *C. juniperina* var. *canadensis*, *C. juniperina* var. *crispata*, *Parmelia elegantula* var. *americana*, *Cyanisticta Hookeri* var. *septrionalis*, *Mycoblastus sanguinarius* var. *Dodgeanus*.

Species new to North America or otherwise noteworthy include the following: *Usnea lapponica*, *U. dasypoga*, *U. caucasica*, *U. prostrata*, *U. rugulosa*, *U. similis*, *Alectoria Fremontii* subsp. *olivacea*, *A. jubata* var. *Vrangiana*, *Ramalina Roesleri*, *Ochrolechia upsaliensis*, *Pertusaria xanthostoma*, *Physcia pyrithrocardia*, *P. muscigena* f. *squarrosa*, *P. endophoenicea*, *Peltigera Maurizii*, *P. canina* var. *suomensis*, *P. lepidophora*, *P. Nylanderi*, *Cetraria Merrillii*, *Parmelia Delavayi*, *Squamaria alphoplaca*, *Nephromium subparile*, *Lobaria oregana*, *Diploschistes bryophiloides*.

The lichens collected by Dr. Kujala are principally epiphytic and soil-lichens from a variety of forest types, although a few of the soil lichens come from fields or desert. It might be interesting to note here that in regions as widely separated and isolated as the North American prairies and the south Russian and Asiatic steppes and deserts there appear many identical, or, at least similar, lichen forms living on the ground. Such steppe lichens are: *Parmelia vagans* (appearing also in south Russia and Asia), *Physcia muscigena* (many forms, a few also growing in the mountains), *Acarospora Schleicheri* (appears in the Asiatic, North-African, and Russian steppes, in addition to the European Alps and Pyrenees),¹ *Psora decipiens* (also in deserts and mountains), *Diploschistes canadensis* (the similar Russian *D. scruposus* var. *terrestris*), *Ochrolechia upsaliensis* (sporadically found outside of the steppes), *Cladonia cariosa* var. *cribrosa* (particularly on other mineral substrates, slightly calciphile).

As the lichens in this collection were not collected by a lichenologist, the lichen flora of the various localities is very poorly represented and poor in species. They are, however, of particular interest to the European investigator on account of the many similar forms. The typical European *Cetraria juniperina* and *C. islandica* do not appear at all amongst the American lichen specimens (the latter also being absent from the "*Cetraria islandica*" specimens collected in Tierra del Fuego by Professor Auer's expedition in 1929).

¹ Magnusson, Monogr. *Acarospora*. p. 395, 1929.

As the lichens from the various localities have not been sufficiently collected, conclusions as to the relationship between the American and European species are still hypothetical, particularly as the present systematic revision of lichens necessitates many corrections of the earlier determinations. We can, however, state that as far as our present knowledge extends a great number of identical lichen forms appear both in North America and Eurasia, although the quantitative relationships between the different species differ considerably on the two sides of the Atlantic.

I wish to acknowledge with thanks Dr. C. W. Dodge, Mycologist to the Missouri Botanical Garden, who has kindly translated my manuscript from German to English, and T. Hidén, of Helsinki, Finland, who has gone over the latin text of this work.

USNEA DASYPOGA (Ach.) Röhl. New Brunswick: Dalhousie; British Columbia: Prince George and Six Mile Lake, on *Picea*. Sterile.

USNEA DASYPOGA var. *SUBSCABRATA* Vain. British Columbia: Hazleton, on *Betula* and *Pinus*. Sterile.

USNEA CAUCASICA Vain. Thallus prostratus, glauco-viridis, medulla sublaxa, K—.—British Columbia: Six Mile Lake, on *Picea*. Fertile.

USNEA PROSTRATA (Vain.) Räs. British Columbia: Aleza Lake, on *Picea*. Sterile.

USNEA RUGULOSA Vain. British Columbia: Hazleton, on trunks of *Pinus Murrayana*. Sterile.

USNEA LONGISSIMA Ach. Quebec: north shore of the St. Lawrence Bay, Franklin, especially on branches of *Picea* in a mixed forest; British Columbia: Vancouver, Catillano Canyon, on *Thuja* in a forest with abundant ferns. Sterile.

USNEA COMOSA (Ach.) Vain. Thallus erectus, parce sorediosus, soredia isidiosa; medulla crebra, K—.—New Brunswick: Dalhousie, on *Picea*; British Columbia: Hazleton, rarely on branches of *Pinus Murrayana*. Sterile.

USNEA COMOSA var. *stuppea* Räs., var. nov. Thallus erectus aut suberectus, brevior fruticulosus, 5–7 cm. longus, laevigatus vel leviter verrucosus, sorediosus, pallido-stramineus; soredia maculiformia, demum parce isidiosa. Medulla laxa, *stuppea*, K—.—British Columbia: Hazleton, very frequent on small, half-dried *Pinus*, *Picea*, and *Betula*, on a sandy heath. Sterile.

USNEA SIMILIS Motyka

U. subcomosa Vain. in Kgl. Danske Vidensk. Selsk. Skrifter, Nat. og Math. Afd. VIII. 6: 392 (110). 1924.

With the above species, occasional in Hazleton. Sterile.

USNEA LAPPONICA Vain. With the above species, Hazleton, on *Pinus*. Sterile.

USNEA HIRTA (L.) Motyka. British Columbia: Aleza Lake, occasional on *Picea canadensis* and *P. Engelmannii*. Sterile.

*USNEA Kujalae*¹ Räs., sp. nov. Thallus curtus, erectus, fruticulosus, 3–5 cm. longus, bene ramosus, lacteo-stramineus vel albo-viridis, sorediosus. Rami laevigati, sine verruculis nervisque. Medulla laxissima, K—. Apothecia rara, terminalia, 2–3 mm. lata, albido-straminea, fibrillosa, plana. Sporae 9–10 × 5.3–7 μ , ovoideo-

¹ In honor of Dr. Viljo Kujala.

ellipsoideae, 8 : nae, monostichae. Asci cylindrici. Hymenium $80\ \mu$ crassum, I+, caerulescens. Subsimilis *Usneae sorediiferae* Motyka, sed thallus albidus et parce sorediosus.—British Columbia: Hazleton, abundant on branches of *Pinus Murrayana*. Rarely fertile.

ALECTORIA SARMENTOSA Ach. Thallus elongatus, pendulus vel prostratus, K = K(Cl) $\mp$ leviter roseus, demum ferrugineus, I $\mp$ leviter caerulescens. Sporae normaliter binae vel 4:nae, fuscae.—British Columbia: Aleza Lake, frequent on branches of *Abies lasiocarpa*, *Picea canadensis*, and *P. Engelmannii*; Longworth, frequent on branches of *Thuja*; Hazleton, rarely on *Pinus*. Fertile.

ALECTORIA SARMENTOSA var. **gigantea** Räs., var. nov. Thallus elongatus, pendulus vel prostratus, 50–80 cm. longus, albido-stramineus, parce pseudocyphellatus, esorediatus, K =, K(Cl) =, Cl =, I = leviter caerulescens. Apothecia vulgaria, plana vel concava, atro-fusca vel livido-fusca, nuda vel leviter pruinosa. Sporae normaliter 3:nae, $25\text{--}31 \times 14.5\text{--}20\ \mu$, ellipsoideae, fusco-nigrae. Hymenium $130\ \mu$ crassum, I+ caerulescens.—British Columbia: Longworth, frequent on *Thuja*; Dorreen, on *Pseudotsuga*.

ALECTORIA LAETA (Tayl.) Linds.

A. japonica Tuck., *A. osteina* Nyl., *A. lata* DR. (Arkiv f. Bot. 20¹¹: 24. 1926).

Thallus suberectus vel prostratus, osteo-ochroleucus, apicem versus concolor, K $\pm$ passim obsolete intensive fulvescens, K(Cl) $\mp$ roseus.—British Columbia: Hazleton, occasional on the ground; Alaska, occasional on the ground. Sterile.

ALECTORIA OCHROLEUCA (Ehrh.) Nyl. Thallus pro parte ochroleucus, majore parte viridi-niger, K = vel basim versus obsolete $\pm$ dilute fulvescens, K(Cl) =.—Alaska, on the ground. Sterile.

ALECTORIA IMPLEXA (Hoffm.) Nyl. f. FUSCIDULA Arn. Thallus pallido-fuscescens, K $\pm$ lutescens, sorediosus. Soredia albida.—British Columbia: Hazleton, on branches of *Pinus*, Aleza Lake, on branches of *Abies* and *Picea*. Sterile.

ALECTORIA JUBATA (L.) Nyl. var. PROLIXA Ach. Thallus fuscescens vel nigro-fuscescens, K =, sorediosus. Soredia copiosa, albida.—New Brunswick: Dalhousie, on trunks of *Abies*; British Columbia: Kamloops, Fish Lake, Golden, and Aleza Lake, very frequent on branches and trunks of *Pseudotsuga* and *Pinus Murrayana*. Also on conifers near Hazleton. Sterile.

ALECTORIA JUBATA var. VRANGIANA (Gyeln.) Räs.

A. Vrangiana Gyeln. (Magyar Bot. Lap. 31: 46. 1932).

Thallus parce sorediosus, vel fere esorediatus, olivaceo-viridis vel fusco-viridis, K =, K(Cl) =.—British Columbia: Hazleton, on conifers, occasional. Sterile.

ALECTORIA FREMONTII Tuck. f. **perfertilis** Räs., forma nov. Thallus prostratus, obscuro-castaneo-fuscus, laevis, subnitidus, esorediatus, K =, Cl =, K(Cl) =. Apothecia vulgaria numerosissima, lateralia, convexa, flavida. Sporae $5\text{--}8 \times 5\ \mu$, ovoideae, 8 : nae, hyalinae. Hymenium I+ caerulescens.—British Columbia: Golden, on the trunks and branches of *Pinus Murrayana*.

ALECTORIA FREMONTII subsp. OLIVACEA Räs. Thallus olivaceo-castaneus, prostratus, laevis, nitidus, esorediatus, K =, Cl =, K(Cl) =. Apothecia rarissima, minora, flavida.—British Columbia: Golden, on *Pinus Murrayana* and *Pseudotsuga*, Kamloops, Fish Lake, on *Pinus Murrayana*. Sterile.

The sorediose form, named by Du Rietz (Arkiv f. Bot. 20¹¹: 8. 1926) subsp. *Eriks-sonii*, was not seen among the North American specimens. It would appear more correct, as Du Rietz (*l. c.*) thinks, not to regard the sorediose form as the main species. My subspecies *olivacea* (Räsänen, Medd. Soc. Fauna Flora Fennica 43: 4.

1916) is much shinier than the North American type and has very rare apothecia, so that we have here three different *Alectoria* types.

RAMALINA THRAUSTA (Ach.) Nyl. British Columbia: Hazleton, on branches of conifers, Prince George and Six Mile Lake, on *Picea*. Sterile.

RAMALINA GENICULATA Nyl. British Columbia: Hazleton, on branches of *Pinus Murrayana*, rare. Sterile.

RAMALINA ROESLERI (Hochst.) Nyl. New Brunswick: Dalhousie, on branches of *Picea*, *Sorbus*, and on a wooden wall. Sterile.

RAMALINA CALICARIS (L.) Fr. New Brunswick: Dalhousie, on trunks of *Populus*. Fertile.

LETHARIA VULPINA (L.) Vain. Thallus sorediosus. Medulla I+ caerulescens.—British Columbia: Kamloops, Fish Lake, and Field (subalpine), on branches and trunks of *Pseudotsuga*. Sterile.

LETHARIA VULPINA f. *INCOMPTA* Ach. Thallus sorediosus et bene isidiosus, medulla I+ caerulescens.—Found with the species near Fish Lake, Golden, and Jackman, B. C., on *Pinus Murrayana*. Sterile.

CORNICULARIA DIVERGENS Ach. Alaska (alpine), on the ground. Sterile.

CETRARIA MERRILLII DR.

C. californica var. *Tuckermanii* Howe

Thallus 0.5–2 cm. longus, rigidus, erectus, divaricato-ramosus, opacus, olivaceo-niger. Rami angulato-nervosi, foveolati. Apothecia vulgaria, 0.5–3 mm. lata, plana vel convexa, terminalia, atra vel fusco-nigra, nuda, subnitida, subciliata. Sporae 8:nae, 6–8 × 4–5.5 μ , ovoideae, incoloratae.—British Columbia: Golden, Kamloops, Fish Lake, and Hazleton, on branches of *Pinus Murrayana* and other conifers. Fertile.

CETRARIA NIGRICANS Nyl. var. *pallida* Räs., var. nov. Thallus superne pallidus vel olivaceo-pallidus, subtus albidus, basim versus sanguineo-lentus; medulla I+ caerulescens. Lacinae 1–2 mm. latae, subcanaliculatae, denticulato-ciliatae, dichotome ramosae.—Alaska, on the ground with *Alectoria ochroleuca* and *Cornicularia divergens*. Sterile.

CETRARIA TENUIFOLIA (L.) Vain. Thallus canaliculatus, laevigatus, medulla K—.—Alaska, rarely with the previous species. Sterile.

CETRARIA TENUIFOLIA var. *reticulata* Räs., var. nov. Thallus subtus foveato-reticulatus, castaneo-fuscus, in marginibus dense isidioso-dentatus. Lacinae angustae, canaliculato-tubulosae, crispatae, marginem versus pseudocypbellatae. Medulla K—.—British Columbia: Kamloops, on stones, Valemount and Aleza Lake, on the ground. Sterile.

CETRARIA TENUIFOLIA var. *PSEUDOISLANDICA* Räs. (Ann. Bot. Soc. Zool.-bot. Fenn. Vanamo 2: 15. 1932) f. *septentrionalis* Räs., forma nov. Medulla I—. Thallus similis *C. islandicae*, sed I—, et margo laciniarum fere sine spinis vel ciliis. Color pallido-castaneus.—British Columbia: Golden, on trunks and branches of dwarf shrubs near the ground. Sterile.

The true *Cetraria islandica* (L.) Ach., which gives the reaction "Medulla I lutescens, demum ferrugineo-rubescens," has not been seen by me from either North or South America.

CETRARIA NIVALIS (L.) Ach. British Columbia: Kamloops, on the ground and rocks in semi-desert; Alaska, on the ground. Sterile.

CETRARIA CUCULLATA (Bell.) Ach. British Columbia: Valemount, on the ground with *Arctostaphylos Uva-ursi*; Alaska (alpine), on the ground. Sterile.

CETRARIA CAPERATA (L.) Vain.

C. pinastri (Scop.) Röhl.

British Columbia: Hazleton, a small specimen with other *Cetraria* species on branches of *Pinus Murrayana*, Aleza Lake, a chiefly geoplese lichen (Räsänen, Über Flechtenstand u. Fl. Veget. im Westl. Nordfinnl., p. 84. 1927), with *Parmelia ambigua* and *P. pallescens* on the base of *Abies lasiocarpa*. Sterile.

CETRARIA JUNIPERINA (L.) Fr. var. VIRIDIS (Schweinitz) Räs.

C. viridis Schweinitz apud Halsey, Ann. Lyceum Nat. Hist. New York 1: 16. 1824; *C. juniperina* var. *virescens* Tuck.

Thallus curtus, rigidus; laciniae obtusae, obscuro-virides; K=, Cl=, I=. Apothecia terminalia, majora, 3-8 mm. lata, fusco-nigra, subnitida, margo subcrenata, tenuis. Sporae 8: nae, ovoideae, 6-8 $\times$ 3.5-6.5 μ , incoloratae.—British Columbia: Golden, common on branches of *Pinus Murrayana*. Fertile.

CETRARIA JUNIPERINA var. *canadensis* Räs., var. nov. Thallus erectus vel suberectus, subrigidus; laciniae obtusae, aureo-flavae vel interdum viridi-flavae, super reticulato-nervosae, intus flavae. Apothecia terminalia, minora, 1-3 mm. lata, castaneo-fusca, nitida; margo lacerato-crenata. Sporae 6.5-8 $\times$ 4-5.2 μ , ovoideae, 8: nae, hyalinae.—British Columbia: Kamloops, Fish Lake, Aleza Lake, and Hazleton, very frequent on twigs of conifers.

C. juniperina (the main species) has apothecia chiefly in the middle of the thallus and the lobes are very divided. Also, the color of this species is not so bright a golden yellow as in the variety *canadensis*, and the surface is furthermore much smoother in the species.

CETRARIA JUNIPERINA var. *crispata* Räs., var. nov. Sicut var. *canadensis*, sed thallus dense lacerato-crispatus vel subpapillatus. Apothecia rara. Est analogica cum *C. juniperina* var. *terrestris* Schaer. (= *C. Tilesii* Ach. in Zahlbr. Cat. Lich. Univ. 6: 341. 1930).—British Columbia: Golden, rarely on branches of *Pinus Murrayana* with var. *viridis*. Fertile.

CETRARIA ALEURITES (Ach.) Th. Fr. New Brunswick: Dalhousie, on trunks of *Abies* and on wood. Sterile.

CETRARIA CHRYSANTHA Tuck.

Platysma septentrionale Nyl.

Thallus stramineus, lacunoso-nervosus, esorediatus, subtus fusco-niger, K $\pm$ lutescens, Cl=, K(Cl) $\mp$ roseus, I=.—Alaska (alpine), on the ground. Sterile.

CETRARIA LACUNOSA Ach. var. *MACOUNII* DR. Thallus subtus fusco-niger, non isidiosus, I=.—British Columbia: Kamloops, on stones in semi desert. Sterile.

CETRARIA NORVEGICA (Lynge) DR. Thallus isidiosus, I=.—With the above species in Kamloops, on stones. Sterile.

CETRARIA GLAUCA (L.) Ach. Thallus I $\mp$ caerulescens.—With the above species in Kamloops, on stones; Prince George, Six Mile Lake, abundant on *Picea*; Aleza Lake and Vancouver, on branches of *Picea*. Sterile.

CETRARIA GLAUCA var. *STENOPHYLLA* Tuck. (Syn. North Amer. Lich. 1: 36. 1882). Thallus I $\mp$ caerulescens, anguste laciniatus, glaucus, subtus niger.—British Columbia: Vancouver Is., Lake Cowichan, occasional on the lower branches of *Picea* in the forest. Sterile.

CETRARIA SCUTATA (Wulf.) Poetsch

C. chlorophylla (Willd.) Dalla Torre et Sarnth

British Columbia: Kamloops, Fish Lake, Golden, Hazleton, Aleza Lake, on the branches of *Pinus Murrayana* and *Abies*; Vancouver Is., Lake Cowichan, occasional on *Thuja gigantea*. Sterile.

NEPHROMOPSIS PLATYPHYLLA (Tuck.) Herre

Cetraria platyphylla Tuck.

Thallus 1–3 cm. latus, irregulariter laciniatus, super opacus, obscure fuscus, tuberculosus, subtus pallide fuscus, reticulato-nervosus. Apothecia marginalia, minora, 1–2 mm. lata, plana, fusca, tenuiter marginata; margo crenata. Sporae sphaeroideae vel subellipsoideae, 8:nae, incoloratae, 4–6.5 μ . Hymenium ca. 50 μ crassum, I+ caerulescens.—British Columbia: Golden, on twigs of *Pinus Murrayana*.

NEPHROMOPSIS CILIARIS (Ach.) Hue. British Columbia: Aleza Lake, a small specimen on *Pinus Murrayana*. Sterile.

PARMELIA PALLESCENS (Neck.) Räs.

P. hyperopta Ach.

New Brunswick: Dalhousie, on trunk of *Abies*; British Columbia: Aleza Lake, on base of *Abies lasiocarpa* as a geopse lichen. Sterile.

PARMELIA AMBIGUA (Wulf.) Ach. New Brunswick: Dalhousie, on wood; British Columbia: Aleza Lake, on base of *Abies lasiocarpa* and *Pinus Murrayana*. Sterile.

PARMELIA PHYSODES (L.) Ach. f. LABROSA Ach. New Brunswick: Dalhousie, on trunk of *Abies*; British Columbia: Aleza Lake, on trunks of *Picea*, Kamloops, on *Pinus Murrayana*. Sterile.

PARMELIA PHYSODES f. VITTATA Mereshk. British Columbia: Aleza Lake and Hazleton, on branches of *Pinus Murrayana*. Sterile.

PARMELIA LOPHYREA Ach. Thallus cinereus, esorediatus, K± lutescens, K(Cl) ≠ roseus. Apothecia vulgaris, subtus ampullacea, demum ca. 5 mm. lata. Sporae sphaeroideae, 2.5–5 μ , 8:nae, incoloratae. Hymenium 50 μ crassum, I+ caerulescens.—British Columbia: Golden, on branches of *Pinus Murrayana*; Aleza Lake, on branches of *Picea*.

PARMELIA DELAVAYI (Hue) Nyl. Thallus parvus, esorediatus, obscure cinereus. Apothecia vulgaris, demum 5 mm. lata, subtus non ampullacea, discus fuscus, urceolatus vel deplanatus. Sporae 5–7 × 4–5 μ , 8:nae, ovoideae. Hymenium ca. 55 μ crassum, I+ caerulescens.—British Columbia: Golden, on *Pinus Murrayana*.

PARMELIA ENTEROMORPHA Ach. Thallus esorediatus, ventricosus-inflatus, cavus, K± lutescens, K(Cl)=.—British Columbia: Vancouver Is., Lake Cowichan, on trunk of *Thuja gigantea*. Sterile.

PARMELIA VITTATA (Ach.) Röhl. British Columbia: Prince George, Six Mile Lake, on trunk of *Betula*?. Sterile.

PARMELIA SULCATA Tayl. New Brunswick: Dalhousie, on trunks of *Betula*, *Sorbus*, *Picea*, *Abies*, and on wood; British Columbia: Prince George, Six Mile Lake, on *Betula*; Hazleton, on *Betula*; Golden, on *Pinus Murrayana* and *Pseudotsuga*; Kamloops on arid ground. Sterile.

PARMELIA VAGANS Nyl.

P. molliuscula Tuck. (Syn. North Amer. Lich. 1: 64. 1882).

Thallus dichotome laciniatus, sine sorediis et isidiis, stramineo-virens, K ≠ fulvescens.—British Columbia: Kamloops, on the ground between grasses and shrubs. Sterile. The lichen is a typical desert lichen and appears also in such environment in Russia and Asia.

PARMELIA SUBAURIFERA Nyl. New Brunswick: Dalhousie, on the trunk of *Sorbus*; British Columbia: Hazleton, on the trunk of a *Populus*. Sterile.

PARMELIA PAPULOSA (Schaer.) Vain.

P. exasperatula Nyl.

New Brunswick: Dalhousie, on the trunk of *Sorbus*. Sterile.

PARMELIA ELEGANTULA (Zahlbr.) Räs. var. *americana* Räs., var. nov. Thallus opacus, obscure olivaceo-fuscescens, isidiosus, K=, Cl=, K(Cl)=. Isidia subcylindrica, curta, concoloria. Apothecia desunt.—British Columbia: Kamloops, on a *Pseudotsuga* in semi-desert.

PARMELIA PUBESCENS (L.) Vain. var. *RETICULATA* Cromb. British Columbia: Kamloops, on a stone in semi-desert. Sterile.

THAMNOLIA VERMICULARIS (Sw.) Schaer. Alaska (regio alpina), on the ground between tufts of *Cornicularia divergens* and *Cladonia rangiferina*. Sterile.

SIPHULA CERATITES (Wahlbg.) Fr. British Columbia: Dorreen, on stones in moist mountain forest. Sterile.

STEREOCAULON TOMENTOSUM Fr. British Columbia: Dorreen, on branches of *Tsuga*; Alberta: Lake Louise, on mossy earth; Alaska (regio alpina), between *Cornicularia divergens* and *Cetraria chrysantha*. Rarely fertile.

LECANIA DIMERA (Nyl.) Th. Fr. British Columbia: Aleza Lake, very common on the trunks of *Populus*. Fertile.

SQUAMARIA ALPHOPLACA (Wahlbg.) Dub. Thallus orbicularis, radiatus, griseus, K+ partim rubescens. Medulla I—. Apothecia ca. 1 mm. lata, nigra, nuda vel tenuiter pruinosa. Sporae 9, 6.5 μ , 8 : nae.—U. S. A.: Cody, Wyoming, on sandstone in a cactus desert.

ASPICILIA CALCAREA (L.) Mudd. With the previous on sandstone in cactus desert, in Cody. Fertile.

LECANORA COILOCARPA (Ach.) Nyl. New Brunswick: Dalhousie, on a rail fence. Fertile.

LECANORA UMBRINA (Ehrh.) Röhl. New Brunswick: Dalhousie, on a stone in a field. Fertile.

LECANORA SYMMICTA Ach. Thallus areolato-verruculosus, mox totus solediosus, virescens, K—, Cl+ aurantiaco-rubescens. Apothecia livida, mox convexa, fere immarginata.—New Brunswick: Dalhousie, on a wood rail fence.

I have found the same lichen—not in any way to be confused with *Biatora symmicta* (Nyl.) Räs.—in the summer of 1931, on a wooden fence in Petsamo, Finland. Except for this I have not seen this central European and North American species.

LECANORA SUBINTRICATA Nyl. British Columbia: Kamloops, Fish Lake, on trunks and branches of *Pinus Murrayana*. Fertile.

OCHROLECHIA UPSALIENSIS (L.) Mass. Thallus K—, Cl—, K(Cl)—. Epitecium K(Cl)—. Apothecia 1–2 mm. lata, planiuscula vel urceolata, pruinosa. Margo crassa, subrugosa.—British Columbia: on rotting vegetable remains in somewhat shaded positions in the semi-desert.

PHLYCTIS ARGENA (Ach.) Flot. New Brunswick: Dalhousie, on trunk of *Abies* sp. Sterile.

PERTUSARIA PERTUSA (L.) Tuck. New Brunswick: Dalhousie, together with previous species on *Abies*. Fertile.

PERTUSARIA XANTHOSTOMA (Smrft.) Fr. Thallus verruculosus-inaequalis, K—, K(Cl)—. Apothecia 0.5 mm. lata, punctiformia, pallido-lutescentia. Excipulum K+, sanguineo-rubescens. Sporae 4: nae, ellipsoideae, incoloratae, 58–66 $\times$ 26–40 μ . Hymenium I+ caerulescens.—New Brunswick: Dalhousie, on a *Thuja* trunk.

PERTUSARIA MULTIPUNCTA (Turn.) Nyl. British Columbia: Aleza Lake, on the trunk of an *Abies*. Fertile.

PERTUSARIA FAGINEA (L.) Vain.

P. amara (Ach.) Nyl.

Thallus albidus, partim albo-sorediosus, K+ demum rubescens, K(Cl)+ mox violascens.—With the previous species on an *Abies* at Aleza Lake. Sterile.

XANTHORIA POLYCARPA (Hoffm.) Flag. New Brunswick: Dalhousie, on a *Sorbus* and a rail fence. Fertile.

PLACODIUM ELEGANS (Link) DC. New Brunswick: Dalhousie, on a field stone. Fertile.

PLACODIUM FERRUGINEUM (Huds.) Rabenh. New Brunswick: Dalhousie, on the fibrous trunks of a *Thuja*. Fertile.

PLACODIUM *xanthostigmoideum* Räs., n. sp. Thallus totus leproso-granulosus, citrinus vel aurantiaco-citrinus, K+ violascens. Similis *Candelariellae xanthostigmae* (Pers.) Lettau, sed thallus K+.—New Brunswick: Dalhousie, on the trunks of *Betula*, *Abies*, and *Thuja*. Sterile.

Placodium chrysodetum Vain. also has leprous thallus and positive K (violascens) reaction, but this lichen is exclusively confined to stones and may grow over dead mosses on stones. *Placodium citrinum* (Hoffm.) Hepp., a typical calcareous lichen, may also grow on trees and wooden houses which are impregnated with chalk dust, but is not entirely leprous and its color is "flavo-citrina vel cerina" and it frequently has apothecia.

PHYSCIA CLEMENTIANA (Ach.) Kickx.

Ph. astroidea Nyl.

Thallus albidus vel canus in centro granuloso-sorediosus, K $\frac{+}{-}$ lutescens.—New Brunswick: Dalhousie, on the bark and on the peeled trunks of *Picea*. Sterile.

PHYSCIA STELLARIS (L.) Nyl. New Brunswick: Dalhousie, with the previous species on *Picea*. Sterile.

PHYSCIA STELLARIS var. ROSULATA (Ach.) Nyl. New Brunswick: Dalhousie, on a trunk of *Betula*. Fertile.

PHYSCIA CAESIA (Hoffm.) Nyl. New Brunswick: Dalhousie, with *Placodium elegans* on a field stone. Sterile.

PHYSCIA MUSCIGENA (Ach.) Nyl. British Columbia: Kamloops, on the ground between mosses and grasses in a semi-desert. Sterile.

PHYSCIA MUSCIGENA f. LENTA (Ach.) Vain. British Columbia: Kamloops, with the previous species on the ground in semi-desert. Sterile.

PHYSCIA MUSCIGENA f. SQUARROSA (Ach.) Lyng. Thallus 6–8 cm. latus, imbricatus, albo-pruinosis; laciniae curvae, obtusae, adscendentes. Apothecia 1–3 mm. lata, plana, albo-pruinosa, marginata. Sporae 15–26 $\times$ 8–15 μ , fuscae.—British Columbia: Kamloops, with the previous species on the ground in semi-desert.

PHYSCIA GRISEA (Lamy) Zahlbr. var. SEMIFARREA (Vain.) Lyng. British Columbia: Kamloops, on the ground between grasses and *Selaginella*. Sterile.

PHYSCIA PYRITHROCARDIA (Müll.-Arg.) Räs.

Ph. adglutinata var. *pyrithrocardia* Müll.-Arg.

Thallus centrum versus tote isidioso-sorediosus, viridi-griseus, intus erythrinus, K=.—New Brunswick: Dalhousie, on the trunk of *Picea*. Sterile.

PHYSCIA ENDOPHOENICEA (Harm.) Räs. Sicut *Ph. obscura* (Ehrh.) Nyl. f. *ciliata* (Hoffm.) Lyng. sed thallus fusco-niger et intus pulchre rubescens. Thallus K $\neq$ violascens.—New Brunswick: Dalhousie, on trunk of *Betula*, with *Placodium xanthostigmoideum*. Sterile.

RINODINA DEMISSA (Flk.) Mass. New Brunswick: Dalhousie, on a field stone. Fertile.

BUELLIA DISCIFORMIS (Fr.) Mudd var. MINOR (Fr.) Räs. New Brunswick: Dalhousie, on a *Populus* trunk. Fertile.

BUELLIA DISCIFORMIS var. *INSIGNIS* (Naeg.) Nyl. f. *MUSCORUM* (Schaer.) Räs. British Columbia: Kamloops, on mosses growing on stones in a semi-desert. Fertile.

BUELLIA MAJOR (DN.) Mass. New Brunswick: Dalhousie, on trunks of *Sorbus*, *Picea*, and *Abies*. Fertile.

BUELLIA PUNCTIFORMIS (Hoffm.) Mass. f. *CHLOROPOLIA* (Fr.) Vain. British Columbia: Kamloops, on the trunk (bark) of a very well-lighted *Pseudotsuga*. Fertile.

PELTIGERA VARIOLOSA (Mass.) Körb. Subsimplis *Peltigerae aphthosae* sed thallus subtus distincte nervosus et superne marginem versus subpruinosis.—British Columbia: Field, on the ground between mosses and grasses. Sterile.

PELTIGERA VENOSA (L.) Körb. British Columbia: Dorreen, on mineral soil in shaded forest. Fertile. In the dozen individuals from Dorreen the apothecia are much smaller (about 1 mm.) than in the Finnish specimens, so that one might regard the American species as a new variety (var. *microcarpa* Räs.).

PELTIGERA HORIZONTALIS (L.) Hoffm. British Columbia: Prince George, Six Mile Lake, on mossy stone walls. Fertile.

PELTIGERA MAURIZII Gyeln. (Hedwigia 68: 1. 1928). Thallus circiter 6 cm. latus, superne laevis, nitidus, epruinosis et etomentosus, cinereus vel cinereo-fuscescens, subtus malaceaeforme nervosus, obscuro-fuscus, marginem versus pallidior; rhizinae nigro-fuscae, fasciculatae, obsoletae. Apothecia horizontalia, plana vel concava, badio-fusca, 3–5 mm. lata; margo subintegra. Sporae 26–43 $\times$ 3.5–6 μ , fusiformes, 3-septatae, hyalinae. Hymenium 80–83 μ crassum, sordide-hyalinum, I+ caerulescens.—British Columbia: Field, on ground between mosses and other ground lichens. This easily recognizable lichen is a form intermediate between *Peltigera malacea* and *P. horizontalis*.

PELTIGERA MALACEA (Ach.) Fr. British Columbia: Valemount, on an *Arctostaphylos* and lichen heath. On the ground. Sterile.

PELTIGERA CANINA (L.) Willd. British Columbia: Kamloops, on mossy stones in semi-desert. Fertile.

PELTIGERA CANINA var. *MEMBRANACEA* Ach. British Columbia: Field, with *Peltigera Maurizii* and *P. variolosa*, on the ground in a forest of *Picea*. Fertile.

PELTIGERA CANINA var. *SUOMENSIS* (Gyeln.) Räs.

P. suomensis Gyeln. (Magyar Bot. Lap. 29: 34. 1930).

British Columbia: Blue River, on the ground in a burnt-over *Myrtillus* forest. Fertile.

PELTIGERA RUFESCENS (Weis) Humb. British Columbia: Kamloops, on the ground in semi-desert. Fertile.

PELTIGERA MICROPHYLLA (Anders.) Gyeln.

P. perfida Gyeln.

Thallus superne cinereo-fuscescens, laevigatus, nitidus, subtus polydactylaeforme venosus, marginem versus squamuloso-isidiosus. Apothecia junior involuta.—New Brunswick: Dalhousie, on ground in coniferous forest.

PELTIGERA LEPIDOPHORA (Nyl.) Bitt. Alberta: Wainwright, on calcareous earth, together with *Cladonia cariosa*, in a desert. Rare and sterile.

PELTIGERA NYLANDERI Gyeln. (Bot. Közlem. 24: 137. 1927). Thallus pusillus, 1–2 cm. latus, firmus, monophyllus, laciniatus, ad marginem bene limbiformiter sorediosus, subtus caninaeforme venosus.—British Columbia: Kamloops, between mosses on stones in semi-desert. Sterile.

NEPHROMIUM SUBPARILE Gyeln. (Magyar Bot. Lap. 29: 24. 1930). Thallus

superne et ad marginem bene granuloso-sorediosus, etomentosus (glaber), subtus glaber, K=.—British Columbia: Kamloops, on stones in semi-desert. Sterile.

NEPHROMIUM LAEVIGATUM Ach. var. *PAPYRACEUM* (Hoffm.) Nyl. Thallus pusillus, tenuis, superne glaucus, K=, subtus albido-pallens, glaber. Apothecia majora, 3–8 mm. lata, horizontalia, fusca; margo subintegra. Sporae pallidae, $16-21 \times 4-5 \mu$, 1- vel 3-septatae, oblongo-fusiformes.—British Columbia: Aleza Lake, on branches of *Picea* in the forest.

NEPHROMIUM canadense Räs., n. sp. Thallus 5 cm. latus, subrigidus, coriaceus, bene laciniatus, ad marginem dentatus vel lacunate dentatus, superne sublaevigatus, apicem versus scabroso-areolatus, passim leviter hirsutus vel totus nudus, griseo-pallidus vel glauco-fuscescens, subtus tomentellus, pallido-fuscescens. Apothecia vulgaris, 3–6 mm. lata, convoluta, fusca; margo dentata. Sporae 3-septatae, pallidae, oblongae vel oblonge fusiformes, $14.5-21 \times 7-8 \mu$. Hymenium 70μ crassum. I+ caerulescens. Gonidia nostocoidae.—British Columbia: Aleza Lake, together with *Nephromium laevigatum* var. *papyraceum* and *Cyanisticta Hookeri* var. *septentrionalis*, on branches of *Picea* in forest.

SOLORINA SACCATA (L.) Ach. British Columbia: Field, on a tree base. Fertile.

LOBARINA VERRUCOSA (Huds.) Gyeln.

Sticta scrobiculata (Scop.) Ach.

New Brunswick: Dalhousie, on a tree trunk, rare. Sterile.

LOBARIA PULMONARIA (L.) Hoffm. Thallus ad marginem sorediosus, non isidiosus; medulla et soredia K+ flavescens.—New Brunswick: Dalhousie, on *Abies* and *Betula* trunks. Sterile; British Columbia: Aleza Lake, on branches and trunks of *Picea*. Fertile.

LOBARIA LINITA (Ach.) Rabenh. Thallus esorediatus, K=.—Alaska (regio alpina), on the ground between *Cladonia* species and mosses. Sterile and rare.

LOBARIA OREGANA (Tuck.) Müll.-Arg. Thallus majus, 30 cm. longus et 3–10 cm. latus, dichotome laciniatus, lacunoso-reticulatus, viridi-glaucus, esorediatus, basim versus demum squamulosus; laciniae in apicibus rotundata. Apothecia vulgaris, in centro aut submarginalia, plana aut demum convexa, castaneo- vel rufo-fusca; margo tenuis. Sporae $40-61 \times 6-8 \mu$, hyalinae, fusiformes, 1-septatae. Hymenium $100-120 \mu$ crassum, incoloratum, I+, caerulescens. Hypothecium 60μ crassum, K+ lutescens. Thallus K± lutescens, Cl=, K(Cl)=, I=.—British Columbia: Hazelton, on *Pinus Murrayana*, Dorreen, on *Pseudotsuga*, and Vancouver Is., Lake Cowichan, on trunks of *Thuja* and *Tsuga*.

STICTINA FULIGINOSA (Dicks.) Nyl. British Columbia: Aleza Lake, common on branches of *Picea* in forest. Sterile.

CYANISTICTA HOOKERI (Bab.) Räs. var. *septentrionalis* Räs., var. nov. Thallus superne glauco-cinereus, subnitidus, scrobiculatus, isidiosus, subtus obscure rhizinosus. Pseudocyphellia minora, papilliformia, albida. Gonidia nostocoidae.—British Columbia: Aleza Lake, on branches of *Picea*. Sterile.

COLLEMA NIGRESCENS (Huds.) Ach. New Brunswick: Dalhousie, on *Populus* trunks. Sterile.

LEPTOGIUM TREMELLOIDES (L.) Fr. New Brunswick: Dalhousie, on *Abies* trunks. Sterile.

LEPTOGIUM SATURNINUM (Dicks.) Mass. British Columbia: Kamloops, on side of a stone in semi-desert. Sterile.

PILOPHORON ACICULARE (Tuck.) Nyl. Thallus 2.5–3.5 cm. longus, simplex vel parce ramosus, corticatus, viridis, K+ lutescens. Apothecia sphaeroidea vel sub-

conica, vulgaris, nigra vel caeruleo-nigra. Sporae hyalinae, oblongo-fusiformes, simplices, $18-21 \times 5-6 \mu$. Epithecium caeruleum, K+ smaragdulum. Hypothecium fuliginum. Hymenium $60-130 \mu$, crassum, incoloratum, I+ caerulescens.—British Columbia: Dorreen, frequent on stones between plant remains (fallen needles, etc.) in mountain forest.

CLADONIA RANGIFERINA (L.) Rabenh. Alaska (regio alpina), on ground. Sterile.

CLADONIA RANGIFERINA f. NIVEA Räs. Thallus niveus, K+ lutescens.—British Columbia: Dorreen, on an arid heath in *Pinus Murrayana* forest. Sterile.

CLADONIA SILVATICA (L.) Rabenh. Alaska (regio alpina), on ground; British Columbia: Dorreen, on an arid heath among *Pinus Murrayana*. Fertile.

CLADONIA SILVATICA var. MITIS (Sandst.) Räs. British Columbia: Valemount, on an arid heath with *Arctostaphylos Uva-ursi*. Sterile.

CLADONIA ALPESTRIS (L.) Rabenh. Alberta: Lake Louise, on an *Empetrum* heath. Common. Sterile.

CLADONIA BACILLARIS Nyl. New Brunswick: Dalhousie, on a very rotten rail fence. Fertile.

CLADONIA CRISTATELLA Tuck. New Brunswick: Dalhousie, in same situation as previous species. Fertile.

CLADONIA DEFORMIS Hoffm. Alberta: Lake Louise, on an arid heath between other *Cladonia* species and mosses. Sterile.

CLADONIA UNCIALIS (L.) Fr. Alaska (regio alpina), on ground; British Columbia: Valemount, on an *Arctostaphylos-Cladina* heath. Fertile.

CLADONIA CRISPATA (Ach.) Flot. var. INFUNDIBULIFERA (Schaer.) Vain. British Columbia: Valemount, with previous species on an *Arctostaphylos-Cladina* heath. Fertile.

CLADONIA CRISPATA var. ELEGANS (Del.) Vain. British Columbia: Blue River, on a burnt-over *Vaccinium Myrtillus* heath. Fertile.

CLADONIA CENOTEA (Ach.) Schaer. var. CROSSOTA (Ach.) Nyl. British Columbia: Valemount, on an *Arctostaphylos-Cladina* heath. Sterile.

CLADONIA CARIOSA (Ach.) Spreng. f. CRIBROSA (Wallr.) Vain. Alberta: Wainwright, on ground in desert with *Peltigera lepidophora*. Fertile. As both species grow on calcareous soil, one may conclude that the soil in these deserts is calcareous.

CLADONIA GRACILIS (L.) Willd. var. DILATATA (Hoffm.) Vain. New Brunswick: Dalhousie, on a very rotten rail fence; British Columbia: Golden, on a sand heath; Valemount, on an *Arctostaphylos-Cladina* heath; Alberta, Lake Louise, on an arid heath. Fertile.

CLADONIA GRACILIS f. ANTHOCEPHALA Flk. British Columbia: Field (regio subalpina), on a *Vaccinium Myrtillus* heath; Blue River, on a *V. Myrtillus* heath, which had been burnt over. Fertile.

CLADONIA ELONGATA (Jacq.) Hoffm. Alaska (regio alpina), on mossy ground. Sterile.

CLADONIA ELONGATA var. ECMOCYNA (Ach.) Räs. Podetia cornuta vel subcornuta, saepe dilatata, scyphifera, glauco-cinerea, K— pulchre lutescentia.—Alberta: Lake Louise, on a dry heath; British Columbia: Field (regio alpina), on heath under *Phyllocladus*, etc. Fertile.

CLADONIA CORNUTA (L.) Schaer. New Brunswick: Dalhousie, on rotten stump of an *Abies*. Sterile.

CLADONIA VERTICILLATA Hoffm. New Brunswick: Dalhousie, on ground. Sterile.

CLADONIA DEGENERANS (Flk.) Spreng. British Columbia: Valemount, on an *Arctostaphylos* heath. Fertile.

CLADONIA SUBCERVICORNIS (Vain.) DR. f. *TURDESCENS* Magn. (Lich. Sel. Scand. Exs. II, No. 34. 1929). British Columbia: Kamloops, on a desert. Fertile.

CLADONIA PYXIDATA (L.) Fr. var. *NEGLECTA* (Flk.) Mass. British Columbia: Kamloops, on edge of desert. Sterile.

CLADONIA CHLOROPHAEA (Flk.) Spreng. British Columbia: Kamloops, on ground in desert; Alberta: Wainwright, in desert. Sterile.

CLADONIA FIMBRIATA (L.) Fr. var. *SIMPLEX* (Weis) Vain. f. *MINOR* (Hag.) Vain. New Brunswick: Dalhousie, at base of *Picea*; British Columbia: Kamloops, in desert. Sterile.

CLADONIA FIMBRIATA var. *SIMPLEX* f. *MAJOR* (Hag.) Vain. British Columbia: Aleza Lake, on *Picea* base. Sterile.

CLADONIA FIMBRIATA var. *APOLEPTA* (Ach.) Vain. New Brunswick: Dalhousie, on a very rotten rail fence. Fertile.

BACIDIA MINUSCULA Anzi var. *BECKHAUSII* (Körb.) Vain. Thallus obsoletus. Apothecia minutissima, 0.2–0.3 mm. lata, globosa, tuberculata, nigra, tenuiter pruinosa. Sporae juvenes, $12-18 \times 2 \mu$, 1- to 3-septatae, bacillariae, incoloratae. Hymenium obscure olivaceum, I+ caerulescens, deinde sordide rubescens, 40μ crassum. Epithecium K+ violascens. Hypothecium pallidum.—British Columbia: Aleza Lake, on bark of *Abies* with *Biatora helvola* and *Opegrapha* sp.

BACIDIA FUSCORUBELLA (Hoffm.) Arn. British Columbia: Aleza Lake, on trunk of a *Picea*. Fertile.

PSORA DECIPIENS (Ehrh.) Körb. British Columbia: Field (regio subalpina), on sandy ground. Fertile.

CATILLARIA TRICOLOR (With.) Th. Fr. British Columbia: Aleza Lake, occasional on twigs of *Pinus Murrayana*. Fertile.

BIATORA SYMMICTERA (Nyl.) Räs. New Brunswick: Dalhousie, on trunks and branches of *Thuja*, *Abies*, and *Sorbus*. Fertile.

BIATORA HELVOLA (Körb.) Th. Fr. British Columbia: Aleza Lake, on bark of *Abies*. Fertile.

LECIDEA GONIOPHILA Flk. U. S. A.: Cody, Wyoming, on sandstone in light in a cactus desert. Fertile.

LECIDEA LAPICIDA (Ach.) Vain. var. *SERIATA* Th. Fr. U. S. A.: Cody, Wyoming, in same situation as previous species. Fertile.

MYCOBLASTUS MELINUS (Krmplhbr.) Hellb. Thallus albedo-cinereus, verruculosus, esorediatus, K+ lutescens. Apothecia nigra, opaca, 0.5–1.5 mm. lata, convexa, immarginata. Sporae binae, hyalinae, ellipsoideae, $46-55 \times 25-32 \mu$. Hypothecium pallidum.—British Columbia: Aleza Lake, on barkless, dry, decorticated twigs of *Picea*.

MYCOBLASTUS SANGUINARIUS (L.) Norm. Thallus viridi-albidus, K—, intus sanguineus. Apothecia nigra, nitida. Sporae $46-61 \times 25-31 \mu$, solitariae. Hypothecium crasse sanguineum.—British Columbia: Aleza Lake, on *Betula* and *Abies* trunks. Fertile.

MYCOBLASTUS SANGUINARIUS var. *Dodgeanus*¹ Räs., var. nov. Thallus albidus, verruculoso-inaequalis, esorediatus, tenuis vel mediocris, K+ auratus, Cl—, I—, intus albidus. Apothecia 1 mm. lata, atra, convexa, opaca, immarginata. Hypothecium tenuiter sanguineum vel pallido-flavescens. Sporae solitariae, magnae, oblongo-ellipsoideae, $85-92 \times 26-36 \mu$.—British Columbia: Aleza Lake, common on bark of *Abies lasiocarpa*; Prince George and Six Mile Lake, on *Betula*.

¹ In honor of Dr. C. W. Dodge.

ACAROSPORA SCHLEICHERI (Ach.) Mass. British Columbia: Kamloops, on sandy ground in a desert. Fertile.

ACAROSPORA MOLYBDINA (Wnbg.) Trevis. U. S. A.: Cody, Wyoming, on sandstone in cactus desert. Fertile.

ACAROSPORA PELTASTICTA Zahlbr. U. S. A.: Cody, Wyoming, with previous species on exposed sandstone in cactus desert. Fertile.

DIPLOSCHISTES BRYOPHILOIDES (Nyl.) Zahlbr. Alberta: Wainwright, on ground over mosses and plant remains. Fertile.

DIPLOSCHISTES canadensis Räs., n. sp. Thallus griseo-cinereus, areolata-verruculosus, mediocris, $K\frac{+}{-}$ violaceo-rubescens vel atropurpureus, $Cl=$, $K(Cl)$ haud roseus, $I=$. Apothecia 0.5–1 mm. lata, urceolata, atra, haud pruinosa, marginata; margo crenata. Sporae 4 : nae, fuscae vel demum nigrae, muriformes, $19.5-27.5 \times 11-13 \mu$. Hymenium $I+$ fulvescens. Sicut *D. scruposus* var. *terrestris* sed thallus cum KOH rubescens.—British Columbia: Kamloops, on sandy ground in desert.

GRAPHIS SCRIPTA (L.) Ach. New Brunswick: Dalhousie, on *Abies* trunks; British Columbia: Aleza Lake, on *Abies lasiocarpa*. Fertile.

SPHAEROPHORUS GLOBOSUS (Huds.) Vain. var. *LACUNOSUS* Tuck. Thallus 7 cm. altus, bene ramosus, pallido-vel olivaceo-fuscus, $K=$, $Cl=$, $K(Cl)=$, $I\mp$ distincte caerulescens. Rami lacunoso-foveolati. Apothecia globosa, subterminalia.—British Columbia: Hazleton, on ground. Fertile.

SPHAEROPHORUS Tuckermanii Räs., n. sp. Thallus 5–8 cm. altus, parce ramosus, albidus vel olivaceo-albidus, passim albido-roseus, $K-$, $Cl-$, $K(Cl)-$, $I\mp$ dilute caerulescens, cum ramis primariis, cylindricis, 0.5–1 mm. latis, laevibus et cum ramulis adventiciis, 1–5 mm. longis, sat tenuibus et parcis. Apothecia vulgaria, terminalia, globosa, 1–2 mm. lata. Massa sporalia, nigra. Sporae 8 : nae, sphaeroideae, 5–8 μ , viridi-atrae vel fusco-nigrae. Asci anguste cylindrici.—British Columbia: Hazleton, with previous species on ground between mosses and plant remains.

STAUROTHELE CIRCINATA Tuck. Thallus fusco-niger, areolato-diffractus, ad marginem subradiatus. Apothecia concoloria. Sporae fuscae, binae, murales, oblongo-ellipsoideae, $39-52 \times 21-25 \mu$. Gonidia hymenialia, oblongia, viridia, $8-9.2 \times 4 \mu$.—U. S. A.: Cody, Wyoming, on sandstone with *Acarospora molybdina* and *Squamaria alphoplaca* in a cactus desert.

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