TORREYA

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THE GENUS CETRARIA AS REPRESENTED IN THE UNITED STATES AND CANADA

By R. Heber Howe, Jr.

The species of this genus since 1753 have appeared under the following: *Lichen* L. 1753, *Lichenoides* Hoffm. 1790, *Lobaria* Hoffm. 1795, *Platisma* Hoffm. 1801, *Physcia* Michx. 1803, *Parmelia* Spreng. 1825, *Evernia* Nyl. 1857, *Platysma* Nyl. 1858, *Cornicularia* Trevis & Mudd 1861. Few of these names are, however, generic synonyms.

The genus *Cetraria* was proposed by Acharius in 1803, and has been variously limited by later authors. Though Acharius included under his *Cetraria* various species now removed to other genera, his species cannot be considered "altogether incoherent," and the genus must be credited to him, particularly as his type species has only been removed once (Mudd) from his genus.

Genus: CETRARIA* Ach., Meth. Lich. 293. 1803

(Subgenus: *Stigmatophora* Wain., Arkiv for Bot. 8: 20. 1909 in part.)

(Section: *Eucetraria* Korb., Parerga Lich. 17. 1865.)

(B. *Physcia* Fr., System. Orb. Veg. 239. 1825.)

(*Platyphyllum* Vent., Tableau reg. vegetal, 2: 34. 1799.)

(*Chionocroum* Ehrh., Beitr. naturk. 4: 148. 1789.)

Description: *Thallus* fruticose or subfoliose, laciniate, bifacial, brown or yellow; hyphal structure radial; *cortex* complex (decomposed), medulla arachnoid, axis stupeous; gonidia protococcoid, monostratified, heteromerous.

* *Cetra* or *Caetra* = a short Spanish shield.

[No. 9, Vol. 15 of Torreya, comprising pp. 187–212, was issued 28 September, 1915.]

Apothecia subterminal, adnate, scutelliform, convex or hooded, occasionally lacerate, emarginate (rarely spinulose), disk dark. Asci clavate, containing 6–8 spores; paraphyses gelatinous, simple or branched, septate. Spores ellipsoid or ovoid-ellipsoid, monoblast, hyaline. Spermogones immersed or papilliform. Sterigmata simple. Spermatia cylindrical.

OBSERVATIONS: The genus is represented in our area by six species. Though the hyphal structure is truly radial, the single stratified layer of gonidial cells links this genus with the dorsiventral genera. In the genus *Ramalina* for instance, the gonidial layer even in the most expanded types adheres to the radial structure, and therefore evidently does not take its position alone because of light exposure. In *Cetraria Richardsonii*, the most doubtful member of this genus as here limited, a common decorticate, concave surface rarely gives the plant a continuous, radial structure.

The species here included are, however, all separable from such species as *Platysma saepincolum* (Ehrh.) Nyl., which have a dorsiventral structure throughout, and have been to some degree taxonomically set apart from time to time by many authors. The variety *Cetraria islandica subtubulosa* Fr. (*tubulosa* Schaer.), suggests an interesting evolutionary speculation as to the development of the radial from the dorsiventral types.

KEY TO THE SPECIES

1 { Thallus more or less brown 2
  { Thallus stramineous to yellow 6

2 { Margins of branches spinulose 3
  { Margins of branches entire 5

3 { Laciniae expanded, soralio-maculate 4
  { Laciniae narrow, esoralio-maculate ..... var. *tenuifolia*

4 { Margins denticulate, pale ..... var. *platyna*
  { Margins spinulose, dark ..... *islandica*

5 { Laciniae cartilaginous, branches divaricate ..... *Richardsonii*
  { Laciniae coriaceous, branches thyrsoid-entangled ..... *hiascens*

6 { Laciniae narrow-canaliculate, glabrous ..... *cucullata*
  { Laciniae wide, distinctly lacunose ..... *nivalis*

CETRARIA ISLANDICA (L.) Ach.

The type species of the genus.

SYNONYMY: *Lichen islandicus* Linn., Spec. Plant. 2: 1145. 1753.

Cetraria islandica Ach., Meth. Lich., 293. 1803.

TYPE: In the Linnean herbarium, Burlington House, London, England.

TYPE LOCALITY: "Europae."

ORIGINAL DESCRIPTION: "foliaceous adscendens laciniatus; marginibus elevatis ciliatis." l. c.

DIAGNOSIS: *Thallus* fruticose, bifacial, brown, *bicolored*, *maculo*-soraliate margins *spinulose*. Apothecial margins *entire*.

DESCRIPTION: typical: *Thallus* fruticose or subfoliose (max. alt. 14 cm.), rigid, pale chestnut to dark brown, pale and often sanguineous below; *cortex* nitidous, sublacunose, maculo-soraliate; *branches* bifacial, laciniate (max. width 8 mm.), canaliculate, subconnivent, margins cilio-spinulose. *Apothecia* common, adnate, mostly subterminal, ample (max. diam. 1 cm.), convex, margins entire or crenulate, disk chestnut. *Spores* 6–11 × 3.5–5 μ.

CONTINGENT PHASES: (*a*) Maculate *throughout* with small decorticate areas. (? *C. islandica* var. *maculata* Wain., Arkiv för Bot. 8: 21. 1909.)*

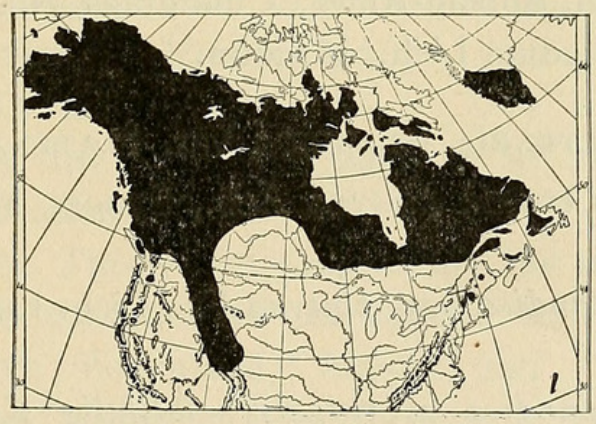

FIG. 1. *Range of Cetraria islandica* (L.) Ach.

(*b*) Laciniae slender above (*C. islandica* var. *gracilis* see Cummings, Lich. Alaska 144. 1900).

(*c*) Spines long (4 mm.), rarely furcate (= *C. islandica*

* Type loc., "prope Pitlekai." Orig. descpt. "Thallus laciniis angustis, marginibus conniventibus, apicibus concavis aut anguste planiusculis, margine spinulosus, maculis decorticatis albidis impressis in latere inferiore instructus. Medulla jodo caerulescens, $CaCl_2O_2$ non reagens. Haec variatio intermedia est inter var. *rigidam* et *crispam*, in ambas transiens." l. c.

var. *leucomeloides* Lindsay, Trans. Linn. Soc. **27**: 321. 1871).*

SUBSTRATA: On the earth.

DISTRIBUTION: Not uncommon in the Boreal zone or in high alpine situations (above 6,000 ft.). It occurs from Labrador to Vermont, westward to Washington (Mt. Rainier) and Alaska.

OBSERVATIONS: This easily recognized species is found represented by typical material only in the most boreal or alpine regions of our area. Owing to the fact that Tuckerman did not recognize the species *tenuifolia* (= var. *crispa* Ach.) almost all our herbaria material is determined as *C. islandica*. This misconception I first pointed out (Bryol. **16**: 34. 1913) when I published a figure of the Linnean type.

EXSICCATI: No. 3. Tuck., Lich. Amer. sept. Exs. 1 & 2. 1848. "Montium Alborum." = atypical.

No. 44. Decades No. Amer. Lich., Cummings, etc. Mt. Moosilauke, N. H. July 30, 1892. = in some numbers typical material, in some atypical, in some *C. tenuifolia*.

No. 6. Lich. Boreali-Amer., Cummings, etc., same as above.

No. 6. Canadian Lich., Macoun.

CETRARIA ISLANDICA var. PLATYNA (Ach.) Fr.

SYNONYMY: *Cetraria platyna* Ach., Synop. Meth. Lich. 229. 1814.

Cetraria islandica var. *platyna* Fr., Lich. Europ. reform. 37. 1831.

Cetraria islandica a. *vulgaris*† *latifolia* Kremplhb., Lich.

* "laciniae as long and flexuous as in *P. leucomela*." Type loc. "Greenland."

† Type loc., "St. Paul's Island, Behring Sea." Orig. Descript., "Thallus growing in tufts, erect or sub-decumbent, pallid-fuscescent brown or even nigricant at the tips but paler basally, rigid but brittle, the lobes variable in width, attaining to a maximum of 16 mm. and a height of 7 cent. the margins dividing into relatively short irregularly outlined lacinulae, both major and minor axils rounded. lobes commonly plane but variously contorted, only the tips canaliculate; the superior surface smooth, irregularly lacunose, the lacunae shallow, or here and there ribbed, scarcely differing below except in remaining pale with scattered white soredia, cortex continuous, sub-shining, the borders of the lobes laciniolate-spinulose. Apothecia not seen." l. c.

Flora Bayerns, Denkschr. k. bay. bot. Gesell. Regens. 4: 121. 1861.

Cetraria islandica var. *robusta* (Branth.) ? see Macoun, Canadian Lich. 54. 1902.

Cetraria hiascens var. *macrophylla* Merr., Bryol. 13: 26. 1910.

TYPE: In the Acharian herbarium, Universitetets Botaniska Institution, Helsingfors, Finland.

TYPE LOCALITY: "Helvetia."

FIGURE: Merr., Bryol. 13: *Pl. 2. f. 1.* 1910.

ORIGINAL DESCRIPTION: "thallo pallido-cinerascente laevigato, laciniis latiusculis planis diffusis irregulariter sublobatis flexuoso-complicatis, marginibus undulatis tenuiter innocueque denticulatis." l. c.

DIAGNOSIS: Similar to the preceding, laciniae *expanded, pale* cinereus to *pale* virescent.

DESCRIPTION: typical: *Thallus* subfoliose (max. alt. 10 cm.), subrigid, pale cinereus to virescent; sanguineous below; *cortex* nitidous, sublacunose, punctate-decorticate; *branches* bifacial, laciniate (max. width 1 cm.), subcanaliculate, margins subspinulose. *Apothecia* as in the species.

CONTINGENT PHASES: Unobserved.

SUBSTRATA: On the earth.

DISTRIBUTION: In the Boreal zone or in high (12,000 ft.) alpine situations.

OBSERVATIONS: This variety represents the most luxuriantly developed condition of the species, and has been seen only from Greenland, Alaska and Colorado. Miss Cummings writes in The Lichens of Alaska that the specimens representing this variety are "a much richer color than the type," but the specimens she refers to I have examined and find they have no characters to cause them to be determined as this variety. I have, however, typical material from St. Lawrence Island, one of the localities named.

CETRARIA ISLANDICA mod. ARBORIALIS Merr.

SYNONYMY: *Cetraria Islandica* = "*aboricola*" Tuck. herb.
Cetraria Islandica modification *arborialis* Merr., Bryol. 9: 4. 1906.

TYPE: No. 7. herb. J. Macoun.

TYPE LOCALITY: "British Columbia."

ORIGINAL DESCRIPTION: "Thallus cartilagineous, foliaceous, suberect or now appressed; laciniae plane, variously and irregularly divided, the apices commonly obtuse, from narrow to sometimes four mm. in breadth, very smooth and shining or sub-opaque; greenish-olivaceous or olivaceous-fucescent, the margins of the laciniae either spinulose or not, in the latter case sometimes white-sorediate. Apothecia not observed." l. c.

SUBSTRATA: On fallen twigs and bushes (huckleberry).

DISTRIBUTION: Alpine above 6,000 ft., from Mt. Tacoma and Olympic mountains, Washington to the Selkirk mountains and Glacier, British Columbia.

OBSERVATIONS: Th. Fries first recorded (1871) the growth of *C. islandica* on wood, and Tuckerman indicated speci-

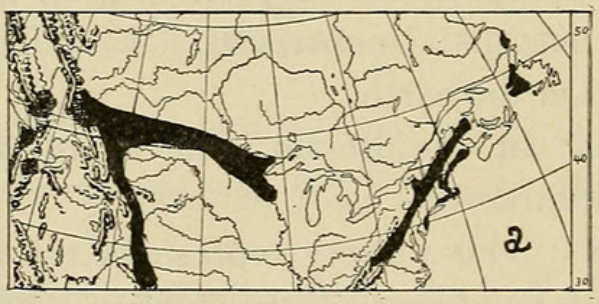

FIG. 2. Range of *Cetraria tenuifolia* (Retz.) R. H. Howe, Jr. (reduce to 2 in. wide). Range of *Cetraria islandica* mod. *arborialis* Merr. shown with hachures.

mens from the western United States in his herbarium which had been collected on wood, with the label "aboricola." It was not, however, until 1906 that Mr. G. K. Merrill gave a "conditional nomination" to such specimens. I have had the opportunity to study seven packets of this corticoline variety through the kindness of Prof. Fink, five of which were collected by himself. Mr. Merrill *in litt.* to Prof. Fink named a packet of this

material from Mt. Tacoma "*C. nitidiscola.*" This material bears espinulose apothecia which would seem to ally it with *C. islandica* rather than with *C. tenuifolia*, and as its range would also suggest, though the plants have narrow rather than expanded laciniae. It is evidently a modification as Mr. Merrill called it, caused by the corticoline substrata, a more or less accidental result of environment* as the following field note on one of Prof. Fink's labels goes to prove: "Collected specimens on branches two or three feet from the ground and about the trees at Glacier & Loggan and have a number of interesting transitional forms which convince me that this (*Cetraria "nidiuscula"* Merrill)" (note change of spelling) is not a good species." *All* these specimens show *spinulose* margins to some degree and *none* of them *sorediate* margins. The one plant from Central Point, Ore., collected by Mrs. Ashworth referred to by Mr. Merrill is *membranaceous* rather than "cartilagineous," is entirely *espinulose*, with *sorediate* margins, and represents typical *Platysma saepincola* (Ehrh.) Nyl., with a *dorsiventral* thallus and numerous *rhizinae*. Mr. Merrill's description is therefore composite and the words "or not, in the later case sometimes white sorediate" should be struck out.

Further material of this interesting modification may prove to argue its acceptance as a variety or even species.

CETRARIA TENUIFOLIA (Retz.) comb. nov.

SYNONYMY: *Lichen islandicus β tenuifolius* Retz., Fl. Scand. prod. 227. 1779.

Cetraria islandica γ crispa Ach., Lich. Univ. 513. 1810.

Cetraria islandica α vulgaris † *angustifolia* Kremplhbr., Lich. Fl. Bayerns, Denkschr. k. bay. bot. Gesell. Regens. 4: 121. 1861.

TYPE: In the Retzius herbarium, Botaniska Institutionen, Lund, Sweden.

* See such for *Umbilicaria pustulata* var. *papulosa* Tuck., Merr., Bryol. **9**: 3. 1906, and Howe, ibid. **16**: *pl. 3. f. 1.* 1913.

† littoral examples.

TYPE LOCALITY: "Scandinaviae."

ORIGINAL DESCRIPTION: None given, but the Dillenian description and plate analysis is cited.

"Est in Phytophylacio Sherardino ejus exemplar, dictae figurae respondens, foliis vel caulicaulis angusti-

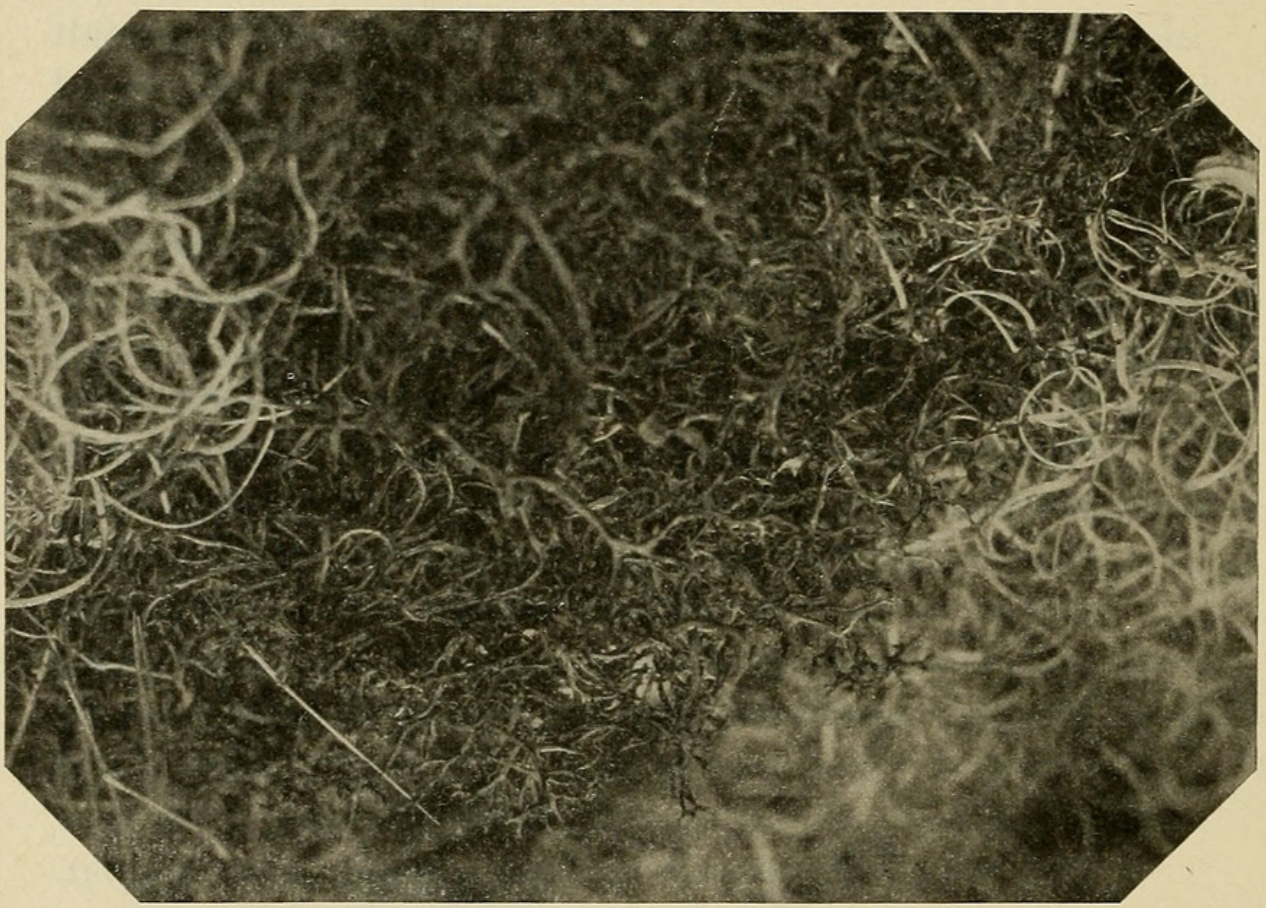

FIG. 3. *Cetraria tenuifolia* growing at Norwood, Mass.

oribus, magis glabris & splendentibus, colore obscuriore spadiceo, marginibus magis, ac in priore, approximantibus, ut convoluta & teretia folia appareant, ciliis introversis & vix apparentibus, extremitatibus magis divisis & corniculis brevibus, crebrioribus & angustioribus terminatis, in quibus nulla, ceu in illa specie, ne per vitrum quidem, cilia apparent; cilia porro per margines foliorum minus crebra sunt, ob quas differentias diversa videtur esse species." l. c.

FIGURE: Dill., Hist. Musc. *pl. 28. f. 112.* 1741.

Howe, Common & Conspicuous Lich. New Eng., 1. *pl. 2.* 1906.

DIAGNOSIS: Similar to the preceding, *unicolored*, laciniae *narrow*, often *connivo*-canaliculate, *never soralio-maculate*, apothecial margins *spinulose*.

DESCRIPTION: typical: *Thallus* fruticose (max. alt. 9 cm.), rigid, chestnut to olivaceous-brown throughout; *cortex* nitidous, *never* soralio-maculate; *branches* bifacial, canaliculate to connivo-canaliculate, margins spinulose. *Apothecia* rare, adnate, subterminal, small (max. diam. 5 mm.), convex, disk dark chestnut, spinulose. *Spores* as in preceding species.

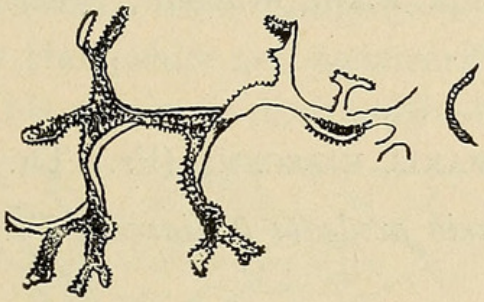

FIG. 4. Laciniae of *Cetraria tenuifolia*.

CONTINGENT PHASES: (*a*) much branched above, branches connivent, edges now adhered (= *C. islandica* var. *subtubulosa* Fr., Lich. Europ. reform. 37. 1831, *C. islandica* γ *tubulosa* Schaer. Enum. crit. Lich. Europ. 16. 1850).

(*b*) Dark brown to black (= *C. Islandica* γ *nigricans* Retz., ibid., *C. islandica* f. *nigrescens* Harm., Catal. Lich. Lorr. 171. 1894).

(*c*) Spines long (4 mm.) (= *C. islandica* ? *erinacea* Schaer., Enum. crit. Lich. Europ. 16. 1850.

SUBSTRATA: On the earth.

DISTRIBUTION: Common in the Boreal and Transitional zones. It occurs from Labrador south to North Carolina (alpine) and westward to Colorado, Montana and British Columbia (eastern slopes). Littoral stations on the Atlantic coast are common as far south as New Jersey.

OBSERVATIONS: This species, long recognized only as a variety of the preceding species, deserves specific rank as its apothecia are always spinulose and its thallus never soralio-maculate. It was raised to a species by Nylander

in 1888 (Enum. Lich. Fret. Behr. 7. 19. 53. 61) when he also described the variety *inermis* (ibid. 19) from Konyambay.

EXSICCATI: No. 66. Lich. Exs., Merrill, Camden, Me., Aug. 22, 1909 = called *C. islandica*.*

No. 15. Lich. Nova Angliae, Howe, Norwood, Mass., Dec. 4, 1905 = called *C. islandica*.†

No. 7. Canada Lich., Macoun, Spence's Bridge, B. C., May 24, 1875.

CETRARIA HIASCENS (Fr.) Th. Fr.

SYNONYMY: *Cetraria aculeata β hiascens* Fr., Lich. Europ. 36. 1831.

Cetraria hiascens Th. Fr., Lich. Scand. 98. 1871.

Cetraria islandica var. *Delisei* Bory Schaer., Enum. crit. Lich. Europ. 16. 1850.

Cetraria Delisei Bory Schaer, Fellm., Lich. arct. coll. aest. No. 60. 1863.

Cetraria Delisei Bory Schaer, Nyl., Enum. Lich. Fret. Behr. 19. 1888.

TYPE: Untraced.

TYPE LOCALITY: "alpibus Norvegicis."

ORIGINAL DESCRIPTION: "thallo in frondes ramosissimas dehiscente, apotheciis terminalibus liberis maximis." l. c.

DIAGNOSIS: *Thallus* fruticose, bifacial, slender, *bicolored*, *thyrsoid-entangled* above, margins *espinulose below*.

DESCRIPTION: typical: *Thallus* fruticose (max. alt. 5 cm.), rigid, cinereo-stramineous to brown above; *cortex* glabrous, sublacunose; *branches* bifacial, subcanaliculate (max. width 3 mm.), dichotomous, thyrsoid-entangled above, apices spinulose, margins below entire. *Apothecia* rare,

* Type loc., not given. Orig. descpt. "Inter reliquas formas praecipue insignis subtubulosa, divisione ceterum vulgaris, erecta, parce ramosa, sutura (thalli dehiscentis vestigio) ciliato-spinosa." l. c.

† Type loc., "alpib. helvet." Orig. descpt. "frondibus angustis, pollicaribus, in caespites densos congestis, densissime elongato-ciliato-spinulosis, canaliculatis, laciniis terminalibus obscure spadiceis, ramosisimis, subcurvatis, crispatis, lacero cristatis." l. c.

adnate, lateral, small, concave, margins often denticulate, disk chestnut. Spores as in last.

CONTINGENT PHASES: (*a*) Sorediate.

(*b*) Branches dilated below (= *C. hiascens* var. *dilatata* Wain., Arkiv. Bot. 8: 22. 1909).*

SUBSTRATA: On the earth.

DISTRIBUTION: Common in the Boreal zone or alpine above 4,000 ft. It occurs from Labrador and Newfoundland south to New Hampshire and westward to Alaska.

OBSERVATIONS: This species is distinguished from the smaller

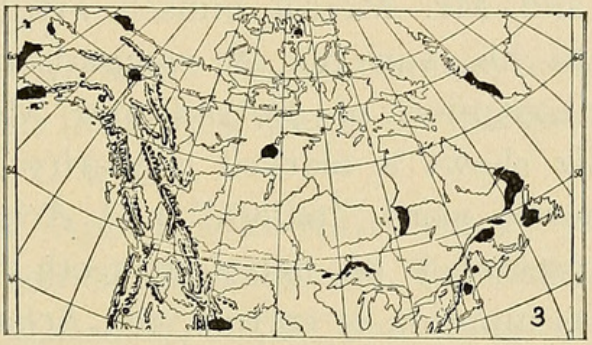

FIG. 5. Range of *Cetraria hiascens* (Fr.) Th. Fr.

forms of *C. islandica* (f. *minor* Harm.) by its espinulose, lateral margins. It is more easily confused with *Coelocaulon aculeatum* (Schreb.) Link though distinctly bifacial, rather than terete, never sulcate and fistulous, and generally glabrous rather than nitidous. In most of our North American herbaria the plant is labelled *C. islandica* var. *Delisei*. Wainio has recognized several varieties in material collected at Pitlekai, Siberia, a point only 150 miles from Cape Prince of Wales, Alaska,† and Nylander described a new variety also from "Behring-insula."‡ I cannot agree with Mr. Merrill that there is a "parallelism" between the explanate forms of *C. islandica* and certain plants which he has designated to belong under

* Type loc., "Pitlekai et Tjapka." Orig. descript. "Thallus laciniis dilatatis, circ. 17–2, 5 millim. latis, applanatis aut partim concavis, apicibus late rotundato-lobatis, rhizinis destitutus, papillis elevatis et spinulis brevibus passim parce marginibus laciniarum affixis, maculis decorticatis albidis cinereisve impressis in latere inferiore instructus." L. c.

† *fastigiata* (Del.), *rhizophora*, *Delisei* (Bory).

‡ *submedia*, *nigricescens*.

C. hiascens representing his variety *macrophylla*, unless we are to move the variety *platyna* of *islandica* into the synonymy of *macrophylla* and recognize it as the same plant. The best character we have to distinguish *hiascens* from the smaller states of *islandica* and *tenuifolia* is the espinulose lateral margins of the laciniae, and even the variability of this character for many years held *hiascens* as a variety of *islandica* itself. It is true that *platyna* has generally subspinulose lateral margins, but the spines are confined to the summits much less rarely than in *hiascens*, and Mr. Merrill himself attributes spinulose margins to his variety. A comparison of Acharius' original description of *platyna* and Mr. Merrill's of *macrophylla* shows a marked similarity. Both contain the diagnostic word "pallid," and Acharius calls the margins possessed of harmless teeth. Even if Mr. Merrill's assumption is correct, the Acharian name has priority for these broad leaved plants. And finally I cannot help believing that a far closer relationship exists between the plants of the *islandica* and *hiascens* stock than is expressed in even a parallelism.

EXSICCATI: No. 187. Decades No. Amer. Lich., Cummings, etc., Newfoundland, Lane au Mort, Sept. 28, 1895. Rev. A. C. Waghorne, called *C. islandica* var. *Delisaei* (Bor.) Schaer.

No. 118. Lich. Boreali-Amer., Cummings, etc., Newfoundland, Blanc Sablon, Sept. 14, 1894., Rev. A. C. Waghorne.

No. 7. Canadian Lich., Macoun., various stations, 1869–1883, called *C. islandica* var. *Delisaei* (Bor.) Schaer.

No. 230. Decades No. Amer. Lich., Cummings, etc., Mt. Lafayette, N. H., Aug. 6, 1896, C. E. Cummings, called *C. aculeata* (Schreb.) Ach.

CETRARIA RICHARDSONII Hook.

SYNONYMY: [*Lichenoides corniculatum rigidum spadiceum*, etc., Dill., Hist. Musc. 545. 1741.]

Cetraria Richardsonii Hook., Rich. App. Frankl. Narr. Jour. Polar Sea 761. 1823.

Evernia Richardsonii (Hook.) Nyl., Mem. Soc. Imp. Sic. Nat., Cherb. 5: 99. 1858.

Platysma Richardsonii (Hook.) Nyl., Synop. Lich. 306. 1858–60.

TYPE: In the Kew Herbarium, Royal Botanic Gardens, Kew, London. Cotype in the Herbarium Boston Society Natural History, Boston, Mass., from Ft. Enterprize, Canada, also in Herbarium of Wellesley College, Wellesley, Mass., Herbarium Harvard University, Cambridge, Mass.

TYPE LOCALITY: "Barren Grounds from Punt Lake to the Arctic Sea."

ORIGINAL DESCRIPTION: "thallo brunneo omino libero: laciniis dichotomis linearibus, apotheciis marginalibus flavescenti-brunneis." L. c.

FIGURE: Rich. App. Frankl. Narr., etc. *Pl. 31.* 1823.

Elenkin & Savicz, List Lich. coll. Yakutsk & Maritime Prov. by M. Tscheroleff, etc. *Pl. 10.* 1903.

DIAGNOSIS: *Thallus* everniiform, subcanaliculate, *brown*, *margins entire.*

DESCRIPTION: typical: *Thallus* fruticose, everniiform (max. alt. 16 cm.), rigid, brown; *cortex* glabrous, ecorticate here and there on the concave face; *branches* bifacial, divaricate, dichotomous above (max. width 9 mm.), margins entire. *Apothecia* rare, adnate, marginal, ample (max. diam. 9 mm.), convex, margins crenulate, disk yellowish-brown. *Spores* 6–6.5 × 4–6 μ.

CONTINGENT PHASES: Unobserved.

SUBSTRATA: On the earth and on the dung of *Rangifer arcticus.*

DISTRIBUTION: Common in the Boreal zone from Chesterfield Inlet, Hudson Bay to Dawson, Yukon. Dr. Eckfeldt recorded it from Newfoundland but his herbarium is without material from this island. No. 105 of Canadian Lichens distributed by J. Macoun from Mt. Aylmer, B. C. (8,000 ft.) and determined doubtfully as *Cetraria odentella* appears to be abortive or degenerate material of this species.

OBSERVATIONS: This little known arctic lichen is easily recog-

nized. It suggests *Everniopsis Trulla* (Ach.) Nyl., and its prostrate habit is more evernioid than cetrarian. Nylander even placed it in the genus *Evernia* in 1858, and in *Parmelia* in 1860, and its inclusion in this genus must be considered only tentative, as it may find a more logical resting place in the genus *Everniopsis*. It is quite clear that its radial structure is doubtful in view of its almost decorticate concave side and yet if sections for study are taken in corticate areas the plant is allied here rather than with the strictly dorsiventral Evernias.

FIG. 6. Range of *Cetraria Richardsonii* Hook.

It is interesting to note that this plant was first discovered by J. Ammann in Siberia and sent to Dillenius prior to 1741 as was pointed out by Tuckerman in 1860 and confirmed by Crombie in 1880. It was therefore figured and described by Dillenius eighty-two years before Hooker gave it his binomial name. Through the kindness of Dr. S. H. Vines of the Oxford Botanic Gardens I am reproducing on page 227 a photograph of the original Dillenian plant.

EXSICCATI: No. 8. Canadian Lich., Macoun. Dome, Yukon, Aug. 15, 1902.

CETRARIA CUCULLATA (Bell.) Ach.

SYNONYMY: *Lichen cucullatus* Bellardi, Osserwazione 54. 1788.
Lichen cucullata Bell., App. Floram Pedemontanam, Act. Acad. Turin 10: 209. 1790–91.
Lichen cucullatus Smith, Act. Soc. Linn. 5: 84. 1791.
Cetraria cucullata Ach., Meth. Lich. 293. 1803.

TYPE: In the Bellardi herbarium, R. Instituto Botanico, Turin, Italy.

TYPE LOCALITY: "montis Cenisii," Italy.

ORIGINAL DESCRIPTION: "foliaceus, erectus, laciniatus albus, scutellis poticis, cucullatis, fuscis." l. c. Smith in epist.

FIGURE: Smith, Act. Soc. Linn. **5**: *Pl. 4. f. 7.* 1791.
Howe, Bot. Gazette **56**: 498. *f. 1.* 1913, of type.

FIG. 7. The Dillenian type of *Cetraria Richardsonii* preserved at Oxford, England. An alga is mounted to the right on the same sheet.

DIAGNOSIS: *Thallus* fruticose, bifacial, canaliculate, *elacunose*, yellow.

DESCRIPTION: typical: *Thallus* fruticose (max. alt. 11 cm.), rigid, stramineous to yellow, often pale virescent; *cortex* glabrous, rarely sublacunose; *branches* bifacial connivo-canaliculate (max. width 5 mm.), margins undulate or lacerate, often spiculose. *Apothecia* not uncommon, terminal, cucullate, ample (max. diam. 1 cm.), concave, disk chestnut. *Spores* 7–10 × 3–4 μ.

CONTINGENT PHASES: (*a*) Purplish at the base.

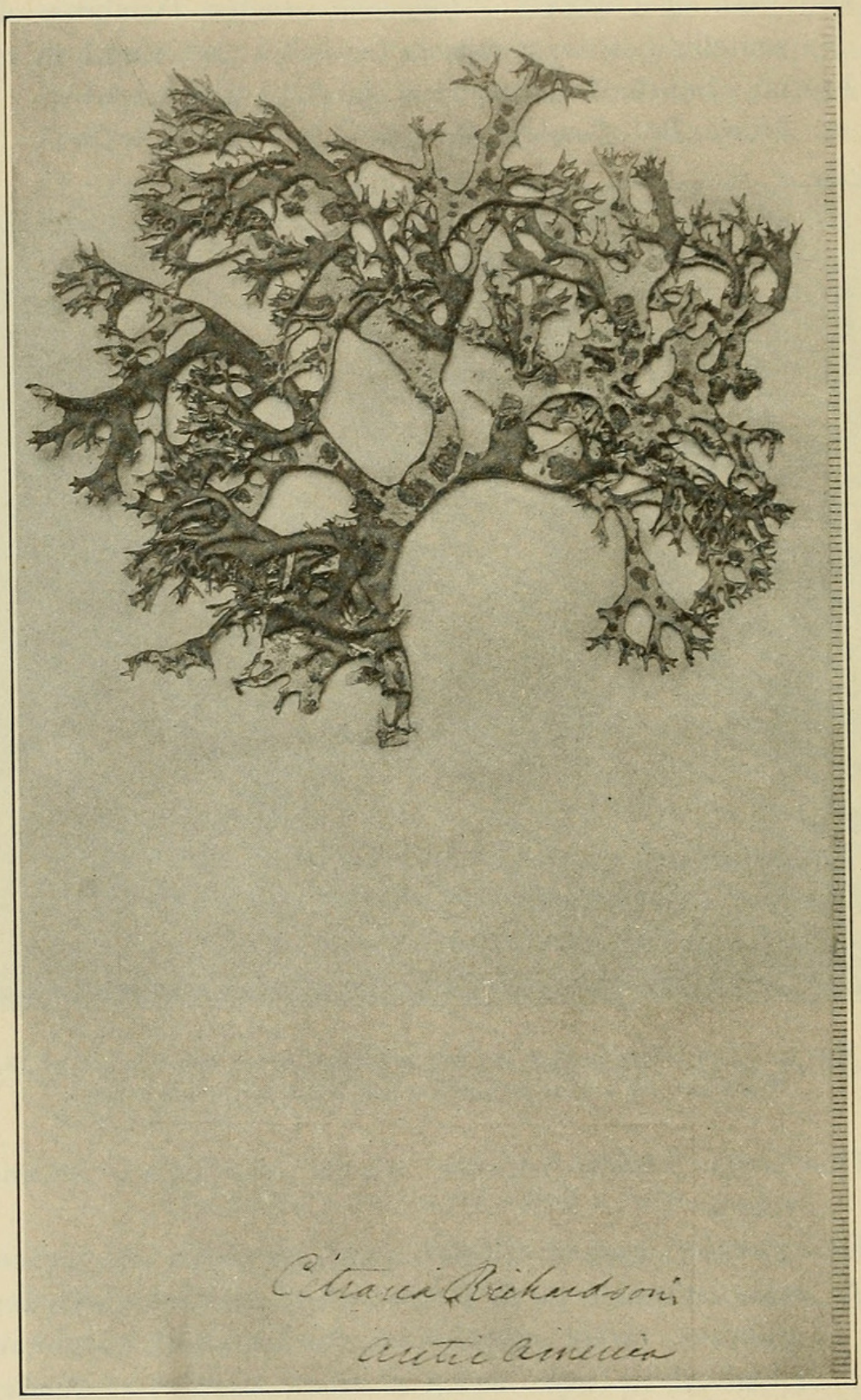

FIG. 8. The Hooker type of *Cetraria Richardsonii* preserved at Kew.

(*b*) Reduced, 4 cm. alt. (f. *minuscula* Elenkin & Savicz, ibid.).

SUBSTRATA: On the earth.

DISTRIBUTION: Common in the Boreal zone or in alpine regions above 5,000 ft. It occurs from Labrador to New York and westward to Colorado, British Columbia and Alaska.

OBSERVATIONS: This species is only to be confused with the following from which it may be distinguished by its taller, more slender, and less laciniate thallus, which is never more than slightly sublacunose. The complete early synonymy of the species is given as the name *cucullata* is occasionally attributed to Smith, who though evidently proposing it was antedated in print by Bellardi.

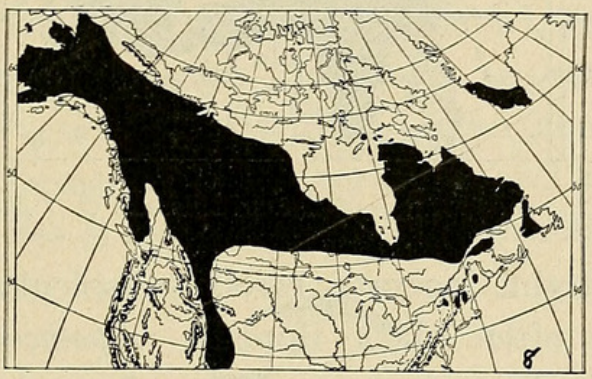

FIG. 9. Range of *Cetraria cucullata* (Bell.) Ach.

EXSICCATI: No. 4. Lich. Amer. sept. Exs., Tuck. I & II. 1848. "Montium Alborum."

No. 101, ibid., V. & VI. 1855. "Montium Alborum," called form *latior*.

No. 45. Decades N. Amer. Lich., Cummings, etc. Mt. Moosilauke, Aug. 10–17, 1898, 4,800 ft.

No. 230. Lich. Boreali-Amer., Cummings, etc., ibid.

No. 8. Canadian Lich., Macoun. Various stations, 1882–1891.

CETRARIA NIVALIS (L.) Ach.

SYNONYMY: *Lichen nivalis* Linn., Spec. Plant. 2: 1145. 1753. *Cetraria nivalis* Ach., Meth. Lich. 292. 1803.

TYPE: In the Linnean herbarium, Burlington House, London.

TYPE LOCALITY: "Lapponiae, Upsaliae, Gronlandiae."

ORIGINAL DESCRIPTION: "foliaceus ascendens laciniatus crispus glaber lacunosus albus margine elevato." l. c.

FIGURE: Dill., Hist. Musc. *Pl. 21. f. 56A.* 1741.

Howe, Bot. Gazette, **56**: 499. *f. 2.* 1913, of type.

DIAGNOSIS: *Thallus* subfoliaceous, bifacial, subcanaliculate, *reticulate-lacunose*, stramineous.

DESCRIPTION: typical: *Thallus* fruticose to subfoliose (max. alt. 7.5 cm.), rigid, stramineous to pale virescent, often stained below; *cortex* reticulate-lacunose; *branches* bifacial, subcanaliculate, pinnate-lacerate (max. width 1 cm.), margins lacerate, rarely subspiculose at the apices (spicules often black tipped). *Apothecia* rare, adnate, subterminal, ample (max, diam. 8 mm.), convex, margins crenulate, disk pale chestnut. *Spores* 7–8 × 3–4 μ.

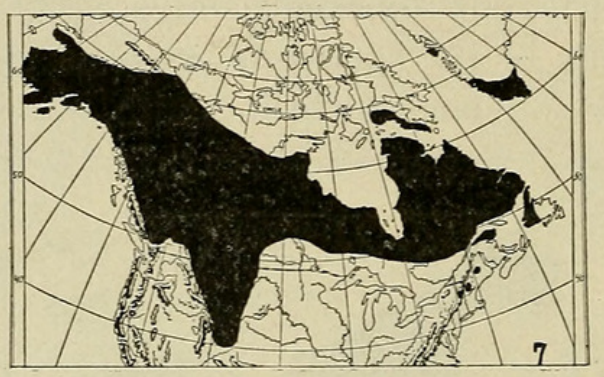

FIG. 10. Range of *Cetraria nivalis* (L.) Ach.

CONTINGENT PHASES: (*a*) Degenerate, pulvinate.

SUBSTRATA: On the earth.

DISTRIBUTION: Common in the Boreal zone or in alpine regions above 4,000 ft. It occurs from Labrador to Vermont and westward to Colorado, British Columbia and Alaska.

OBSERVATIONS: This species is sometimes difficult to distinguish from the preceding, and represents the most foliaceous species of the genus. Its thallus is nevertheless distinctly radial in structure.

EXSICCATI: No. 59. Lich. Amer. sept. Exs., Tuck., II & III. 1854. "Montium Alborum."

No. 14. Lich. Exc., Merr., St. Paul Island, June 19, 1897. J. M. Macoun.

No. 9. Canadian Lich., Macoun. Rocky Mts., etc. 1885–1891.

No. 10. Canadian Lich., Macoun. Banff, 1891.