

**August 16 — Baillie Island to Tuktuoyaktuk.** Two flocks of Lesser Snow Geese (*Chen hyperborea hyperborea*) were seen flying overhead in a southwesterly direction. Other birds observed on this last leg of the journey were 20 Arctic Terns and 3 Sabine's Gulls (*Xema sabini*).

**Addendum:** Observations of T. H. Manning in the Amundsen Gulf area 1951, 1952 and 1953. Mr. T. H. Manning has placed at my disposal notes based on observations made by him and A. H. McPherson in 1951 and 1952 and by himself in 1953. Those of his observations made on coastal areas or at sea within the limits of Amundsen Gulf are summarized. The presentation is according to locality, localities being arranged in the general order followed by my journey described above.

**Cape Berkeley, Western Victoria Island:** Sept. 5-7 inclusive, 1953. Six hours spent ashore here. Observations: Pacific Eider — 15 males, 6 females seen Sept. 8 on leaving the cape by boat. King Eiders — 7 all females (some collected). Duck Hawk — 1; Golden Plover — 1; Ruddy Turnstone — 1; White-rumped Sandpiper — 10; Horned Larks — 6; Ravens — 2; Lapland Longspurs — 10; Snow Buntings — 25.

**North Shore of Minto Inlet:** Sept. 8, 1953. Observed while travelling by canoe. American Rough-legged Hawk — 1; Duck Hawk — 2; Glaucous Gulls — 4.

**North Shore of Minto Inlet:** Sept. 10, 1953. During two hours walking ashore at about

the midpoint of the north shore of the inlet. American Rough-legged Hawks — 2; Arctic Hares — 2.

**Baillie Island: Sept. 23-27, 1952.** About 300 Rock Ptarmigan (*Lagopus mutus*) concentration apparently due to some sort of a migratory movement perhaps from Banks Island; only a few Willow Ptarmigan.

**Cape Dalhousie** (mainland coast between Baillie Island and Tuktuoyaktuk). A. H. McPherson saw a grizzly bear (*Ursus horribilis*) about 12 miles south of the cape on September 28, 1952. Sept. 6 to 8th, 1951: A Pintail and a Willow Ptarmigan as well as 6 male Rock Ptarmigan, tentatively assigned to the subspecies *Lagopus mutus rupestris* were collected here, also a Glaucous Gull.

## REFERENCES

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## NOTES ON FUNGI FROM NORTHERN CANADA II BOLETACEAE <sup>1</sup>

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**R**ECORDS of Boletaceae from the far north in North America appear to be very few. *Boletus scaber* Bull. ex Fr. was reported from Greenland by Rostrup (1888, 1904), from Herschell Island by Dearness (1928), and from Alaska by Cash (1953). No other records of this group of fungi have been encountered by us so far. It is, therefore,

of some interest to record the species of boletes collected by members of the biological survey parties operating in the Canadian north under the auspices of the Defence Research Board during the summers of 1948-51.

For the most part, North American authors have recognized only three genera of boletes, *Boletus*, *Boletinus*, and *Strobilomyces*. It has been clearly evident that the genus *Boletus* contained a heterogeneous assemblage of species, and recently Snell

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(1941, 1942), Slipp and Snell (1944), and Singer (1945a, 1945b, 1947), have proposed classifications aimed at splitting the old genus *Boletus* into more natural groups and bringing the nomenclature into line with the International Rules.

Although the classification of the boletes cannot be considered to be stabilized as yet, it is believed that these proposals represent a distinct advance in the taxonomy of the group. It is, therefore, proposed to adopt them, and on this basis the boletes collected by the northern biological survey parties, fall into five genera, *Boletinus*, *Boletus*, *Leccinum*, *Suillus* and *Xerocomus*.

The genus *Boletinus* is used in the traditional sense to include species in which the pores are not readily separable from the pileus or from each other, and show a more or less radial arrangement, especially near the stipe, sometimes approaching a lamellate configuration. The spores in *Boletinus* are smooth and narrow-ellipsoid, and usually rather small. The type species is *B. cavipes* (Opat.) Kalchbr.

It is difficult to draw a sharp dividing line between *Boletinus* and *Suillus* which comprises the old section *Viscipelles* of *Boletus* in the broad sense. The spores are very similar in both *Boletinus* and *Suillus* and often the tubes in *Suillus* species show more or less radial arrangement especially in young stages. The genus is principally characterized by having a viscid pileus and ellipsoid spores. The type species is *S. luteus* (L. ex Fr.) S. F. Gray.

In *Xerocomus* the pileus is dry and may be glabrous to subtomentose, the tubes are never stuffed and do not have red mouths, the stipe is not subbulbous and the spores are subfusiform. The type species is *X. subtommentosus* (L. ex Fr.) Qué. l.

*Leccinum* includes the species formerly placed in the section *Versipelles* of *Boletus*. The tubes are very long, whitish (or yellow in the section *Luteoscapra* which is not represented in the northern collections), free, or if adnate when young becoming deeply depressed around the stipe. The stem is relatively slender and furfuraceous-scabrous. The spores are subfusiform and usually relatively large. The type species is *L. aurantiacum* (Bull. ex) S. F. Gray.

Among the northern collections, the only representative of the genus *Boletus* in the

more limited sense is *B. edulis* Bull. ex Fr. which is the type of the genus.

The following species have been identified.

***Boletinus cavipes*** (Opat.) Kalchbr. Bot. Zeit., XXV, p. 181, 1867.

*Boletus cavipes* Opat. Comm. Bolet. p. 11. 1836.

The specimen cited below consists of three fruit bodies 3-5 cm. broad in the dried condition. The colour was described by the collector as "light lemon yellow" when fresh. They are now "Ochraceous Tawny" <sup>4</sup> to "Straw Yellow". The cap is fibrillose-squamulose and the stem is hollow. The spores measure (7-) 8-9.5 (-10) x (2.5-) 3.0-3.5 (-4.0)  $\mu$ . The species is associated with *Larix* and widely distributed in North America and Europe.

Specimen examined: DAOM 22073, Yellowknife, N.W.T. Coll. Cody & McCause (3518), Aug. 17, 1949.

***Boletinus glandulosus*** Peck Bull. N.Y. St. Mus. 131:34. 1909.

Snell and Dick (1941) stated that the only collections of this species known to them were from Nova Scotia and Maine and they reported an additional collection from New Hampshire. It is interesting that this apparently rare species should appear so many times in these northern collections. Evidently its range is predominantly northern and the Fort Smith collections represent a very considerable extension of its range. In addition to the specimens listed below, we have collections in the herbarium from Nova Scotia and from St. Aubert, L'Islet Co., Que.

The dried specimens are 2.5-6 cm. broad, dark reddish brown to dark maroon brown or nearly black, ("Hay's Maroon", "Diamine Brown", "Hessian Brown", "Dark Indian Red"), somewhat shiny. The spores are 8.5-11 x 3-4.5  $\mu$ . The distinctive character from which it takes its name is the presence of abundant glandular dots on the tubes and upper part of the stem above the annulus. The presence of these glandular dots and the viscid cap are characters which indicate that this species should be placed in *Suillus* rather than *Boletinus*. However, no combination is available in *Suillus* and it is not considered desirable to make a new combination in this paper.

<sup>4</sup> Colour names according to Ridgway, R. 1912. Color Standards and Color Nomenclature. Washington, D.C.



Specimens examined: DAOM 38661, St. Anthony, Nfld. Coll. D. B. O. Savile & J. Vaillancourt (2827), August 9, 1951; DAOM 28449, St. Anthony, Nfld. Coll. D. B. O. Savile & J. Vaillancourt (2922), August 16, 1951; DAOM 28453, St. Anthony, Nfld. Coll. D. B. O. Savile & J. Vaillancourt (2834), August 9, 1951; DAOM 27593, Fort Smith, N.W.T. Coll. C. C. Loan (L244), August 16, 1950; DAOM 28414, St. Anthony, Nfld. Coll. D. B. O. Savile & J. Vaillancourt (2791), August 8, 1951; DAOM 27592, Fort Smith, N.W.T. Coll. C. C. Loan (L256), August 17, 1950; DAOM 27564, Fort Smith, N.W.T. Coll. C. C. Loan (L278), August 19, 1950.

*Boletinus spectabilis* (Peck) Murrill N. Amer. Fl. 9:160. 1910.

*Boletus spectabilis* Peck. Ann. Rep. N.Y. St. Mus. 23:128. 1872.

The red scaly caps of this fungus make it a very showy species. It has generally been considered as rather rare. It is usually, and perhaps exclusively, found with larch, with which it is said to form mycorrhiza.

It is likely to be confused with *B. pictus* Peck. The latter has red scales on a yellow background whereas in *B. spectabilis* the scales are usually grayish on a red background. They can be distinguished with certainty by the spores which are 11-14 x 4.5-6  $\mu$  in *B. spectabilis* and (7.5-) 8-10 (-11) x 3.0-4.0  $\mu$  in *B. pictus*. Singer (1945b) also points out that in *B. spectabilis* the veil is duplex, the inner veil gelatinizing, and for this reason he places it in a separate section of *Boletinus*.

Only a single collection was received among the northern specimens and *B. pictus* was apparently not collected at all.

Specimen examined: DAOM 21946, Great Whale River, Que. Coll. J.R. Vockeroth, September 7, 1949.

*Boletus edulis* Bull. ex Fr. Syst. Mycol. 1:392. 1821.

This well known and widely distributed species appears to be very variable and a large number of forms and varieties have been described. The distinguishing characters of the species are the tubes, which are at first whitish and stuffed, becoming greenish yellow; the bulbous stem which is more or less reticulate; and the rather large spores, 13-18 (-21) x 4.0-6.0  $\mu$ . The colour of the cap is variable, usually in shades of yellow to reddish-yellow to reddish-brown often paler on the margin.

The collection referred here consists of two fruiting bodies 6 and 8 cm. diam. in the dried condition. They were described as cream to fawn when fresh and when dried are "Cinnamon Buff" to "Tawny Olive" to "Verona Brown". A striking character of these specimens is that they are deeply rimose to frustose and suggest *Boletus frustulosus* Peck in this character. However Singer (1947) stated that this frustulose character is simply the result of meteorological conditions and he regarded *B. frustulosus* as a synonym of *B. edulis*.

Kallenbach (1926) published a photograph of *B. edulis*, Fig. 14, that almost exactly illustrates the condition found in these fruit bodies. These specimens have spores matching those of typical *B. edulis* and the stem is reticulate on the upper third but not very strongly so.

Specimen examined: DAOM 43638, Goose Bay, Labrador. Coll. J.M. Gillett & J.S. Barton (5733), August 14, 1950.

*Suillus hirtellus* (Peck) Kuntze Rev. Gen. Plant. 32:535. 1898.

*Boletus hirtellus* Peck. Bull. N.Y. St. Mus. 8: 94. 1889.

The collection referred to this species was rather difficult to place. It consisted of two fruit bodies 4-6 cm. in diameter when dried. It was obviously a *Suillus* from the spores and viscosity of the cap but lacked an annulus and apparently lacked glandular dots on the stem. Careful search revealed that a few were present near the apex. The scales on the cap are very inconspicuous and appressed-fibrillose, but they are similar to those in specimens from Michigan identified by A. H. Smith. The stems are stout and shorter than in the Michigan specimens and the glandular dots on the stem are less evident, but this seems to be the best disposition of these specimens. The species appears to be rather rare and not very well known. We have no other Canadian record.

Specimen examined: DAOM 34971, Whitehorse, Y.T. Coll. J. M. Gillett (3417), June 20, 1949.

*Suillus piperatus* (Bull. ex Fr.) Kuntze Rev. Gen. Plant. 32:535. 1898.

*Boletus piperatus* Bull. ex. Fr. Syst. Myc. 1: 388. 1821.

The specimen cited below consists of three fruit bodies, 2-4 cm. in diameter in the dried condition. The caps are close to "Clay Color" and the pores near "Prout's Brown" to



"Mummy Brown" and are quite large. The stem shows some yellow at the base. The spores are  $8-11 \times 3-4 \mu$ .

This is a common species in the Ottawa District and one of its most distinctive characters is the very acrid, peppery taste. There were no notes on the taste in this specimen but it matches dried specimens in every respect.

Specimen examined: DAOM 34973, St. Anthony, Nfld. Coll. D.B.O. Savile & J. Vaillancourt (2833), August 9, 1951.

**Xerocomus chrysenteron** (Bull. ex Fr.) Quel. Fl. Myc. Fr. 418. 1888.

*Boletus chrysenteron* Bull. ex Fr. Epicr. Syst. Mycol. 415, 1838.

This is also a widely distributed and fairly well known species. It is rather variable and a number of forms and varieties have been described. Coker and Beers (1943) stated that the spores are truncate at one end but Singer (1945a) claimed that this fungus with truncate spores is not the true *X. chrysenteron*.

In the herbarium at Ottawa there are several specimens identified as *X. chrysenteron* in which the spores are truncate, but there are as well, several specimens, also identified as *X. chrysenteron*, in which the spores are not truncate. In other characters such as the olive-brown, velvety cap, cracking on the margin, the rather large, greenish-yellow tubes, and the striate, partly reddish stem, they seem very similar.

The Newfoundland specimens cited below have spores  $11.0-14.5 \times 3.0-5.0 \mu$  and they are not truncate. These specimens, therefore, seem best disposed as *X. chrysenteron* if we accept Singer's statement that the form with truncate spores is not the European *X. chrysenteron*.

Specimens examined. DAOM 34954, St. Anthony Nfld. Coll. D.B.O. Savile & J. Vaillancourt (2921), August 15, 1951; DAOM 34959, St. Anthony, Nfld. Coll. D.B.O. Savile & J. Vaillancourt (2826), August 9, 1951.

**Xerocomus subtomentosus** (L. ex Fr.) Quel. Fl. Myc. Fr. 418. 1888.

*Boletus subtomentosus* L. ex Fr. Syst. Myc. 1: 389. 1821.

This species is similar to *X. chrysenteron* in the colour of the cap and the velvety tomentose character but the cracks in the cuticle of this species show yellow whereas in *X. chrysenteron* they show red. The stem

of *X. subtomentosus* is somewhat reticulate at the apex, not striate and not coloured red. The spores in the specimen cited below are  $11-14 \times 4-5 \mu$ , very close to *X. chrysenteron* in size. *X. subtomentosus* occurs in both North America and Europe.

Specimen examined: DAOM 26285, Goose Bay, Lab. Coll. J. Gillett and W. Findlay (5428), July 22, 1950.

#### *Leccinum*

The genus *Leccinum* includes the species formerly placed in the section *Versipelles* of the genus *Boletus*. Most of the collections of boletes received from the far north belonged here and they proved much the most difficult to identify.

Snell (1936) recognized and attempted to distinguish eight species in the section *Versipelles*: *B. albellus* Peck, *B. aurantiacus* Bull. ex. Pers., *B. chromapes* Frost, *B. leucophaeus* Pers., *B. niveus* Fr., *B. scaber* Bull. ex Fr., *B. subpunctipes* Peck, and *B. versipellis* Fr. Singer (1947) concluded from an examination of the type of *B. subpunctipes*, that it was a synonym of *Tylopilus ferrugineus* (Frost) Sing. and did not belong with this group. *B. chromapes* is quite distinct but the remaining six species comprise a difficult group.

Singer (1947) revised this group as section *Versipelles* of the genus *Leccinum*, and he recognized seven species, *L. albellum* (Peck) Sing., *L. aurantiacum* (Bull. ex) S. F. Gray, *L. chalybaeum* Sing., *L. duriusculum* (Schulz.) Sing., *L. oxydabile* (Sing.) Sing., *L. scabrum* (Bull. ex. Fr.) S. F. Gray, and *L. testaceo-scabrum* (Secr.) Sing. For the purpose of this paper two of these may be disregarded: *L. chalybaeum* known only in Florida, and *L. duriusculum* known only in Europe. Of the remainder, the concepts of *albellum* and *aurantiacum* remain the same whereas *B. versipellis* becomes *L. testaceo-scabrum*. *B. scaber* is split into two species, *L. oxydabile* and *L. scabrum*, and the latter is further subdivided into two subspecies, *L. scabrum* ssp. *rotundifoliae* (Sing.) Sing. and *L. scabrum* ssp. *niveum* (Fr.) Sing. *B. niveus* is thus reduced to the rank of subspecies but the status of *B. leucophaeus* is still somewhat uncertain. Singer's disposition of this species is not clear and it may possibly be recognizable as a tomentose form in which the flesh blackens.

The principal characters used in distinguishing these five species are the colour of the cap, the colour and colour changes of



the flesh, microscopic structure of the cuticle of the cap, and the spores. In view of the difficulty of separating these species and the confusion that has existed concerning them, the entire collection in the Mycological Herbarium of the Division of Botany and Plant Pathology, comprising about 110 specimens, was worked over independently by both of us with these characters particularly in mind in an attempt to evaluate them as a means of distinguishing species in the light of Singer's (1947) treatment.

The character of the colour changes of the flesh was of no assistance to us because the material consisted entirely of dried specimens and in only a few instances were there any notes on the fresh condition referring to colour changes.

Examination of the cuticle was carried out by moistening with alcohol, removing a very thin shaving with a sharp scalpel, and mounting in KOH. The size range of the spores and the A.M. number were determined.

The concept of the A.M. number was proposed by Snell and Dick (1941). In determining this number the extremes of both the length and width are ignored and the number is constructed by taking the average size of the majority of spores. Thus, if the spores were found to be (12-) 15-17 (-18) x (4-) 5-6 (-8)  $\mu$  the A.M. number would be 16-5.5. In proposing the use of this number Snell and Dick recognized that it was to some extent a subjective character and that different individuals might not obtain the same numbers. We found this to be true for the number as determined by the senior author almost invariably proved to be slightly larger than that determined by the junior author for the same specimen. A.M. numbers published by one author must be used with caution by others. Nevertheless we are convinced that with experience it is an extremely valuable tool to aid in the identification of boletes, especially dried material.

Of the five species recognized by Singer that might be expected to occur in this region, *L. albellum* (Peck) Sing. is the most distinctive by reason of the cuticle being composed of several layers of sphaerocysts arranged in chains. This character was easily observed in some specimens, but in others it was difficult to demonstrate and several mounts were necessary before sphaerocysts could be found. The spores were (12-) 14-18 (-20) x (4.5-) 5-6 (-6.5)  $\mu$  with an A.M. number of 16-5.5 or in some specimens slightly

smaller to 15-5.5. Most of the specimens referred here had light coloured caps, whitish to pale grey, although a few were evidently fairly dark grey. *L. albellum* was not found among the northern collections.

In *L. oxydabile* (Sing.) Sing. the cuticle is predominantly filamentous but there are a few chains of short, vesiculose cells. The hyphae are up to 15  $\mu$  in diameter. The spores are large (15-) 17-22 (-24) x (5.0-) 6-7.5 (-8.0)  $\mu$  with an A.M. number of 19-7 or 19-6.5. Among the specimens examined, a consistent correlation was found between the presence of large spores and the occurrence of some chains of vesiculose cells in the cuticle and some hyphae up to 15  $\mu$  or occasionally more in diameter. The flesh of *L. oxydabile* is said to turn red when cut and the field notes on one specimen recorded this colour change. The cap is greyish, or grey-brown to blackish.

Among the collections examined, sixteen were referred to *L. oxydabile* on this basis. Most of them had originally been identified as *Boletus scaber* Fr. but some had been called *B. leucophaeus* Pers. No specimens from northern Canada were referred to *L. oxydabile*.

*L. aurantiacum*, *L. testaceo-scabrum* and *L. scabrum* all have a filamentous cuticle. *L. scabrum* may be various shades of grey-brown from whitish to nearly black, whereas the other two species are more brightly coloured, yellowish to orange or rufous, although *L. aurantiacum* may occasionally be brownish or nearly whitish.

The principal characters in which *L. aurantiacum* and *L. testaceo-scabrum* differ according to Singer may be listed as follows:

1. An orange pigment is present in the hyphae of the cuticle in *L. aurantiacum* but not in *L. testaceo-scabrum*.
2. The context rarely turns blue on injury in *L. aurantiacum* but usually turns blue or occasionally reddish in *L. testaceo-scabrum*.
3. The scabrosity of the stipe is at first whitish to brownish and finally blackish in *L. aurantiacum*, and is black from the beginning in *L. testaceo-scabrum*.
4. The mycelium of *L. aurantiacum* is associated with *Populus*, *Carpinus*, *Fagus* or *Quercus*, whereas that of *L. testaceo-scabrum* is associated with *Betula*.

In the material we examined, in most cases we had no information concerning colour changes of the flesh, colour of the sca-



brosity on the stipe when fresh, or the tree-associate. The cuticle was examined microscopically and in every specimen it was possible to demonstrate pigment in the hyphae. We found that it was also possible to demonstrate pigment in the surface hyphae of *L. scabrum* and *L. oxydabile* which often appeared as brightly coloured as those of *L. aurantiacum*. Consequently we are rather inclined to question the value of this character as a basis of species distinction, and, at least, we found nothing in the material we examined that could be referred to *L. testaceo-scabrum* on this basis.

Nearly fifty specimens were, therefore, referred to *L. aurantiacum* (Bull. ex) S. F. Gray. Most of these had been originally identified as *Boletus aurantiacus* Bull, or *Boletus versipellis* Fr. but a few as *B. scaber*. In these specimens the cuticle is filamentous, the hyphae are rather variable in width, usually up to about 15  $\mu$ , but in occasional specimens hyphae up to 25  $\mu$  in diameter were observed. The hyphae tended to break up rather readily into separate cylindric or curved cells. These separate cells were always at least twice as long as broad, and often proportionately much longer, and they did not resemble the rounded, or short, broad cells found in *L. oxydabile*. Another character that appears to be constant is that the margin is appendiculate in *L. aurantiacum* and is not in *L. oxydabile* or *L. scabrum*.

The spores in *L. aurantiacum* are smaller than in *L. scabrum* and were found to be rather variable in different collections. The A.M. number was usually about 13-4, but often 14-4, and sometimes up to 15-4.5. Snell and Dick (1941) noted that more than one A.M. number could be obtained for this species and Singer (1947) also noted that it was a somewhat variable species. Since we were unable to correlate any other character with this difference in spores, all of these specimens were referred to *L. aurantiacum*. The northern collections are listed below.

The remaining species, *L. scabrum*, has long been regarded as one of our commonest and best known boletes, but it is now evident that it is easily confused with *L. oxydabile* and can only be distinguished microscopically, at least in the dried condition.

The specimens considered to be typical *L. scabrum* all have the cuticle entirely filamentous composed of slender hyphae that very rarely exceed 10  $\mu$  in diameter and are mostly 5-7  $\mu$ . The spores are smaller than

those of *L. oxydabile* but larger and more deeply coloured under the microscope than those of *L. aurantiacum*. The size range is (14-) 15-19 (-22) x (4.5-) 5-7 (-7.5)  $\mu$  and the A.M. number is 17-6. The cap is coloured various shades of grayish-brown. Five collections from the north were considered to belong to the typical form of *L. scabrum*.

There is some doubt concerning the Baffin Island specimen because of the locality, but the spores are too narrow for ssp. *rotundifoliae* and the cap is considerably larger than any other specimens placed in *rotundifoliae*. It seemed best disposed as *L. scabrum*.

As noted above, Singer (1942) recognized two subspecies of *L. scabrum*, ssp. *niveum* and ssp. *rotundifoliae*. It is not clear why these were regarded as subspecies rather than varieties and, in fact, there does not seem to be any very good reason why they should not be regarded as autonomous species, although admittedly very close to *L. scabrum*. It does seem desirable that they should be accorded some taxonomic status and, in order to avoid creating new combinations at this time, Singer's nomenclature is followed.

*L. scabrum* ssp. *niveum* proved the more difficult to determine. There were a number of specimens in the herbarium labelled *Boletus niveus* but careful examination revealed the presence of sphaerocysts in the cuticle in most of these and necessitated their re-disposition as *L. albellum*. The sphaerocysts were sometimes difficult to demonstrate and several mounts were necessary before they could be found. This raised the question as to whether ssp. *niveum* might not be simply *L. albellum* in which the sphaerocysts had been overlooked.

Three collections were studied in which we failed to find sphaerocysts, but in which the spores were smaller than in typical *L. scabrum* and very similar to those of *L. albellum*. Two of these specimens were accompanied by field notes. In one it was noted that the cap had green tones in the colouring and that grub channels were pinkish, and in the other a colour change to pinkish in the cut flesh was noted. The occurrence of green tones in the colouring of ssp. *niveus* was noted by Peck (1908) and Singer (1942), and Singer (1947) stated that the flesh of *L. albellum* was strictly unchanging. It was concluded, therefore, that these specimens were properly referred to ssp. *niveum*. It is probable that *L. scabrum*



ssp. *niveum* and *L. albellum* have frequently been confused, but they are distinct entities and can be distinguished by careful examination. One collection from Newfoundland was considered to belong to *L. scabrum* ssp. *niveum*.

*L. scabrum* ssp. *rotundifoliae* appears to have been distinguished by Singer (1942) principally on the basis of its association with *Betula rotundifolia* (*B. glandulosa*) and he noted (1947) that it had been found in arctic Canada. It seemed probable that this subspecies would be found among our northern collections. Among the specimens received, only one was definitely noted by the collector as being associated with *Betula glandulosa*. The spores of this specimen are slightly longer and broader than those of typical *scabrum* and gave an A.M. number of 18-7. The cuticle is filamentous but the hyphae are broader than in typical *scabrum*, up to 15  $\mu$  in diameter and fairly readily separating into cylindric cells as found in *L. aurantiacum*. Eight other specimens that exhibited the same combination of characters were found among the northern collections. In general, the fruit bodies were also somewhat smaller than those of *L. scabrum*.

In working through the collections of *L. scabrum*, four specimens were found which, on the basis of the characters above, would have to be placed in ssp. *rotundifoliae* but which were collected outside the range of *Betula glandulosa*. Two of these specimens were from Ringwood, N.Y., one from Montreal Island, and one from the Petawawa Forest Experiment Station, Ontario. No information was available on the tree-associates of these specimens, but it is possible that ssp. *rotundifoliae* is not strictly limited to *B. glandulosa* but might be associated with other *Betula* species, possibly *B. pumila*.

***Leccinum aurantiacum*** (Bull. ex) S.F. Gray. Nat. Arr. Brit. Pl. I:646. 1821.

*Boletus aurantiacus* Bull. ex Pers. Mycologia Europ. 2: 147. 1825.

Specimens examined: DAOM 21916, Great Whale R., Que. Coll. D.B.O. Savile, July 20, 1949; DAOM 21939, Rock Creek, Yukon. Coll. J.A. Calder and L.G. Billard (3953) July 26, 1949; DAOM 21948, West Dawson, Yukon. Coll. J.A. Calder and L.G. Billard (3244), June 22, 1949; DAOM 21953, MacRae, Yukon. Coll. D.A. Mitchell (210), Aug. 11, 1949; DAOM 21980, Great Whale R., Que.

Coll. D.B.O. Savile and J. R. Vockeroth, Aug. 11, 1949; DAOM 21985, Great Whale R., Que. Coll. D.B.O. Savile, July 27, 1949; DAOM 21997, Great Whale R., Que. Coll. J.R. Vockeroth, Sept. 4, 1949; DAOM 26276, Fort Smith, N.W.T. Coll. C. Loan (259), Aug. 17, 1950; DAOM 26280, Fort Smith, N.W.T. Coll. C. Loan (119), Aug. 6, 1950; DAOM 26281, Goose Bay, Labrador. Coll. J.M. Gillett and W.I. Findlay (5924), August, 1950; DAOM 28446, St. Anthony, Nfld. Coll. D.B.O. Savile and J. Vaillancourt (2408), July 19, 1951; DAOM 28448, St. Anthony, Nfld. Coll. D.B.O. Savile and J. Vaillancourt (2551), July 28, 1951; DAOM 43637, King Salmon, Alaska. Coll. W.B. Schofield (265), Aug. 9, 1952.

***Leccinum scabrum*** (Bull. ex Fr.) S.F. Gray. Nat. Arr. Brit. Pl. I:647: 1821.

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Specimens examined: DAOM 28426, St. Anthony, Nfld. Coll. D.B.O. Savile and J. Vaillancourt (2832), Aug. 9, 1951; DAOM 28433, St. Anthony, Nfld. Coll. D.B.O. Savile and J. Vaillancourt (2831), Aug. 9, 1951; DAOM 28435, St. Anthony, Nfld. Coll. D.B.O. Savile and J. Vaillancourt (2793), Aug. 8, 1951; DAOM 26270, Fort Smith, N.W.T. Coll. C.C. Loan (275), Aug. 19, 1950; DAOM 21318, Hudson Bay Post, Ward Inlet, Frobisher Bay, Baffin Island. Coll. T. N. Freeman, July 19, 1948.

***Leccinum scabrum* ssp. *niveum*** (Fr.) Singer. Ann. Mycol. 40:36. 1942.

*Boletus niveus* Fr. Obs. I, p. 111, 1815.

Specimen examined: DAOM 28444, St. Anthony, Nfld. Coll. D.B.O. Savile and J. Vaillancourt (2407), July 19, 1951.

***L. scabrum* ssp. *rotundifoliae*** Singer. Ann. Mycol. 40:36. 1942.

Specimens examined: DAOM 21722, West Dawson, Yukon. Coll. W.W. Judd, 1949; DAOM 21738, Yellowknife, N.W.T. Coll. Cody and McCause (3517), Aug. 17, 1949; DAOM 21937, Jensen Flats, Yukon. Coll. J. A. Calder and L. G. Billard (3919), 1949; DAOM 25819, Great Whale R., Que. Coll. D.B.O. Savile, July 13, 1949; DAOM 25829, Gillam, Man. Coll. W.B. Schofield (1162), July 16, 1950; DAOM 25858, Chesterfield Inlet, Keew. Coll. D.B.O. Savile and J. Vockeroth (1353), Aug. 9, 1950; DAOM 26288, Goose Bay, Labrador. Coll. J.M. Gillett and W.I. Findlay (5393), July 20, 1950; DAOM 34972, St. Anthony, Nfld. Coll. D.B.O. Sa-





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