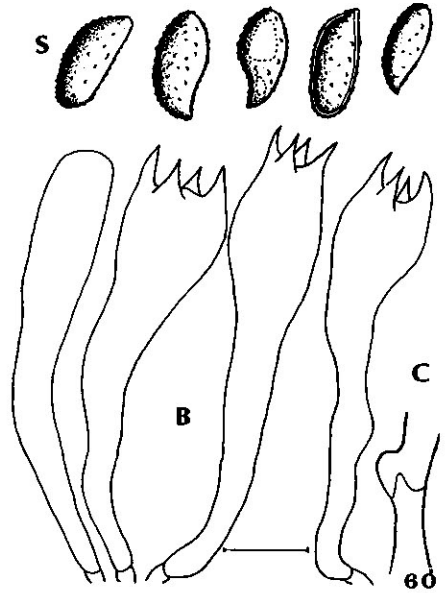
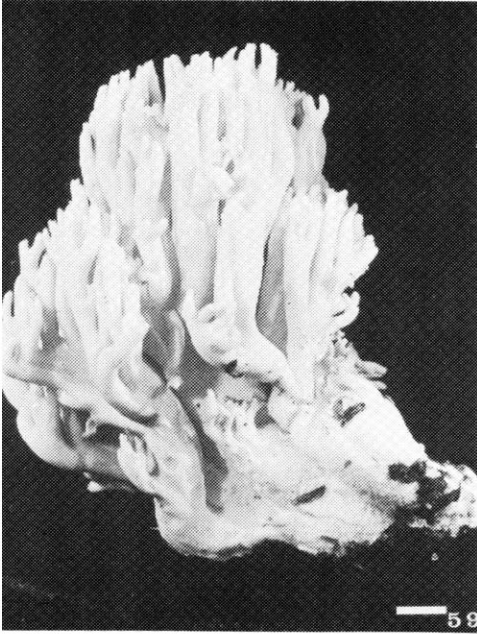
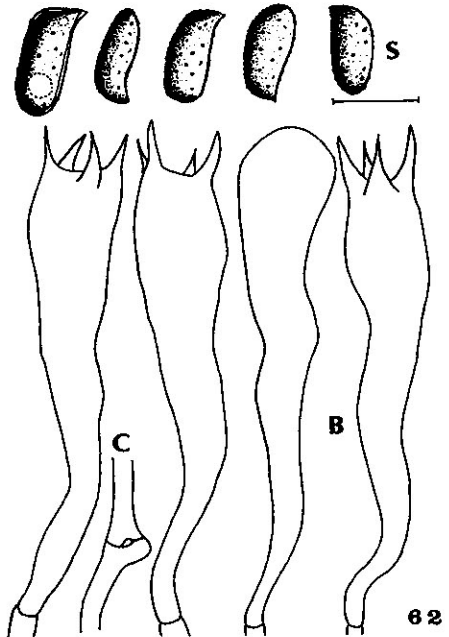
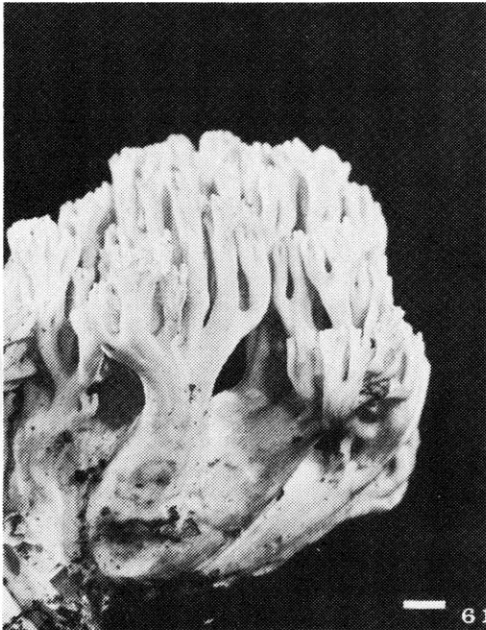


Figs 56, 57, 58. *Ramaria flavobrunnescens* var. *formosoides*.



Figs 59, 60. *Ramaria formosa*.



Figs 61, 62. *Ramaria formosa* var. *concolor*.

ground level, upper branches dense, axils rounded, apices blunt, simple or cuspid. Context pinkish white—8A2 (pale yellowish pink—31), bruising brown—6E8 (deep brown—56), fleshy but firm, drying hard and brittle. Stem white, 0.5-2.0 cm long, glabrous. Spore deposit cinnamon—6D6 (light brown—57). Odor absent. Taste mild in fresh material, dried flesh acidic. Terrestrial, in deciduous woods.

Macrochemical Tests: Positive color changes with all tests.

Microscopic Structures: Spores 9-14 x 4-5.5 μm , ochre, ellipsoid, finely verruculose. Basidia 50-60 x 6-8 μm with granular contents; 4 sterigmata, 3-5 μm long. Hymenium 55-65 μm thick, subhymenium 10-20 μm . Contextual hyphae 5-10 μm broad, subhymenial hyphae 1.5-4 μm . Clamp connections present.

Collections Examined: ACAD 12968, 25/8/77, Nicholasville, Kings Co.

Discussion: *Ramaria formosa* is easily recognized by its pinkish fruiting body with yellow-tipped branches. As Coker (1923) has pointed out, the chalky friable consistency of the dried flesh usually causes fragmentation in herbarium specimens and serves as an aid in the identification of dried material. *R. subbotrytis* also has a pinkish fruiting body with yellow-tipped branches but the pigmentation is more reddish, the spores are finely verruculose rather than ornamented with warts, and the consistency of the dried flesh is not friable.

Vinaceous-brown bruising reactions have been reported for the European specimens (Corner 1950) and Doty (1944) has confirmed this in material from the Pacific Northwest. Marr and Stuntz (1973) reported a brunnescent reaction in their material. A deep brown reaction was observed in var. *concolor*, while the bruising color in var. *formosa* was light orange.

Var. *concolor* also has the following dissimilarities with var. *formosa*; concolorous rather than yellow tips, a pinkish white context and an overall larger spore size (9-14 x 4-5.5 μm). ACAD 12968, the only specimen collected during the 1977 season, was found in deciduous woods, while collections of var. *formosa* were made in mixed woods, generally under hemlock.

R. formosa is reported to be poisonous, causing diarrhea (Huber, Heim, in Corner 1950).

***Ramaria gracilis* (Pers. ex Fr.) Quél.**

Flore Mycol., 463, 1888.

Clavaria gracilis Pers., Comm. Fungi. Clavif., 50, 1797.

Clavaria gracilis Fr., Syst. Mycol. 1: 475, 1821.

Clavaria alutacea Lasch, in Rabenh. Klotzs. Herb. Viv. Mycol., cent. 16, No. 1519, 1851.

Clavariella gracilis (Fr.) Karst., Hattsv. Ryssl. 2: 188, 1882.

Clavaria fragrans E. & E., North Am. Fungi, 2nd ser., No. 2023, 1888.

Clavaria fragrantissima Atk., Ann. Mycol. 6: 57, 1908.

Clavaria flavuloides Burt, Ann. Mo. Bot. Gard. 9: 28, t. 5, f. 34, 1922.

gracilis (L)—slender

Figs 63, 64

Fructifications: 3-8 x 1-5 cm, greyish orange—5B4 (light yellowish brown), upper branches pastel yellow—2A4 (pale greenish yellow—104), drying concolorous. Branches dichotomous to polychotomous, numerous, widely spaced, divergent, axils acute, apices single or bifid, tapered, slender, acute or subscristate. Context white, unchanging, tough, drying brittle. Stem 0.5-1.5 cm long, single, slender,

white or paler concolorous, mycelioid with white floccose mycelial strands at the base. Spore deposit greyish orange—6B5 (light brown—57). Taste bitter. Odor faintly of anise. Terrestrial, in coniferous or mixed woods.

Macrochemical Tests: Positive color reactions occurring with FeSO_4 , pyrogallol, α -naphthol, guaiac tincture. No significant color changes with guaiacol, 2% phenol or aniline.

Microscopic Structures: Spores 5-8 x 3-4 μm , pale yellow, ellipsoid to ovoid, apiculate, minutely warted with warts in subspiral arrangement, 1-2-guttate. Basidia 30-45 μm , basally clamped, with 4 sterigmata 4-5 μm long. Hymenium 40-60 μm thick, subhymenium 20-25 μm . Contextual hyphae 3-9 μm broad, thin-walled; subhymenial hyphae 2-3 μm broad, thin-walled, tightly interwoven. Clamp connections abundant. Thick-walled skeletal hyphae, walls 0.5-2.0 μm .

Collections Examined: ACAD 12946, 22/8/77, Moores Falls, Kings Co.; ACAD 5052, 2/9/59, Nashwaak Bridge, N.B.

Discussion: *Ramaria gracilis* has a delicate appearance somewhat resembling *Ramariopsis kunzei* or *Clavulina cristata*. The small, ovoid, faintly warted spores, the pliable flesh, the presence of skeletal hyphae and the odor of anise are distinctive features of the species.

The color in the hymenium is caused by the pale yellowish sap and guttae of the basidia (Corner 1970).

***Ramaria longissimispora* sp. nov.**

longissimispora (L)—very long-spored

Figs 65, 66, 69

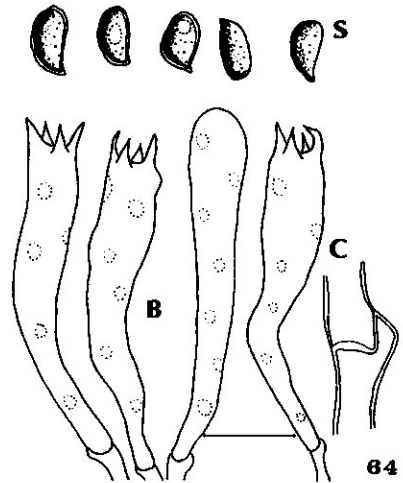
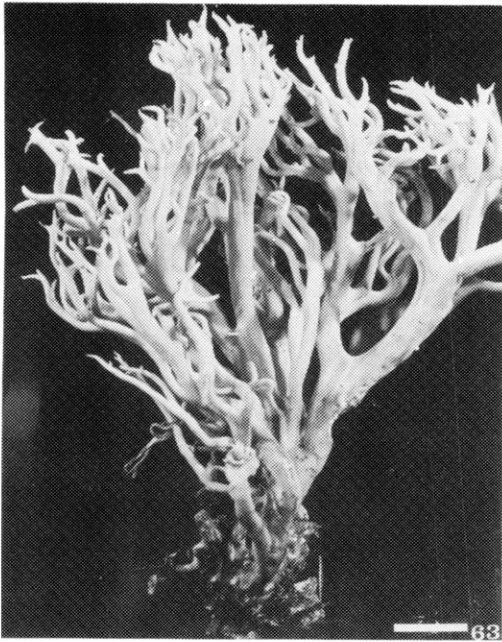
Basidiocarpia 8-10 cm alta, 4-7 cm lata, crassa, ramis parallelis apicibusque digitatis; basis 1-2 x 1-2 cm, crassa, ramis abortivis, alba; rami inferni armeniacy, superi incarnati; contextus albus, odore fungali, sapore miti. Sectiones ramorum speciminum vivorum solutionibus alpha-naphtholi, guaiacoli, guaiacy, et anilini haud adfectae autem solutionibus ferri sulphati, phenoli et pyrogalloli adfectae. Sporae 11-24 x 2-4.5 μm , oblongae-ellipticae, subtiliter ornatae vel rasiles. Basidia 40-60 x 6-7 μm , basi fibulata. Hyphae contexti 4-8 μm , fibulata. Fructificationes terrestres in sylvis deciduis.

Holotypus ACAD 12947 in Nicholville in comitato Kings lectus, in herbario E.C. Smithii, Universitatis Acadiae conservatus.

Fructifications: 8-10 x 4-7 cm, lower branches light orange—5A5 (moderate orange—53), upper branches pastel red—8A4 (moderate yellowish pink—29), drying apricot—5B6 (light brown—57), tips browning with age and withering. Branches polychotomous, stout, parallel, axils of lower branches rounded, upper branches subacute, apices pluridigitate, blunt or rounded. Context white, unchanging, fleshy-fibrous. Stem white, massive, stout, with abortive branches, 1-2 x 1-2 cm. Spore print greyish orange—6B5 (light brown—57). Taste mild. Odor fungal. Terrestrial, in deciduous woods.

Macrochemical Tests: No significant color reactions with α -naphthol, guaiac tincture, guaiacol, or aniline. Positive reactions with FeSO_4 , pyrogallol, 2% phenol.

Microscopic Structures: Spores 11-24 x 3-4.5 μm ochre, oblong-elliptical to subfusiform, finely ornamented to smooth, multiguttate. Basidia 40-60 x 6-7 μm , basally clamped; 2-4 sterigmata, 4-7 μm . Hymenium thickening to 100 μm ;



Figs 63, 64. *Ramaria gracilis*.

subhymenium 20-30 μ thick, interwoven, hyphae of short rounded cells 2-3 μ m in diameter. Contextual hyphae 4-8 μ m. Clamp connections abundant.

Collections Examined: ACAD 12947, 25/8/77, Nicholasville, Kings. Co.

Discussion: In the field, the red pigmentation and blunt apices of this species resemble *R. subbotrytis*. *R. longissimispora* differs, however, in the white flesh, the stout branching habit and the presence of clamps. The long, smooth, subfusiform spores are characteristic of the species.

***Ramaria magnipes* Marr & Stuntz**

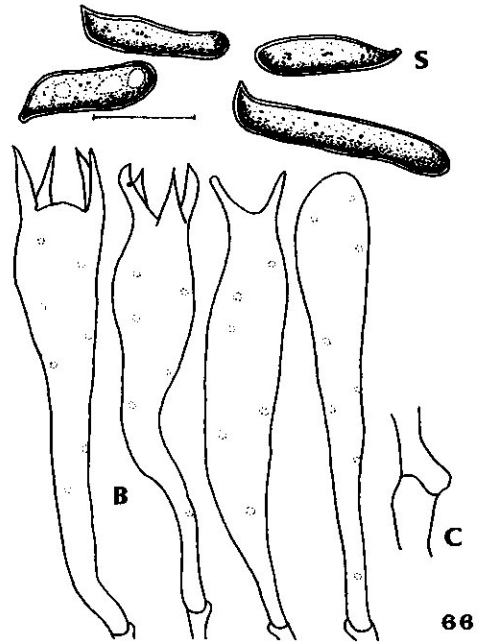
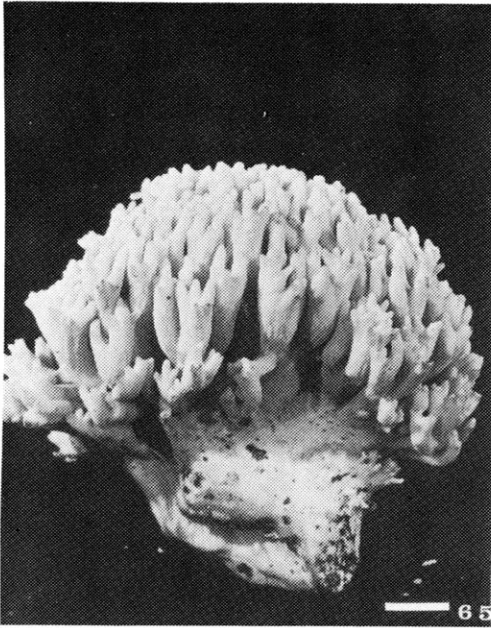
Bibl. Mycol. 38: 105, 1973.

magnipes — magnus (L)—large
pes (L)—foot

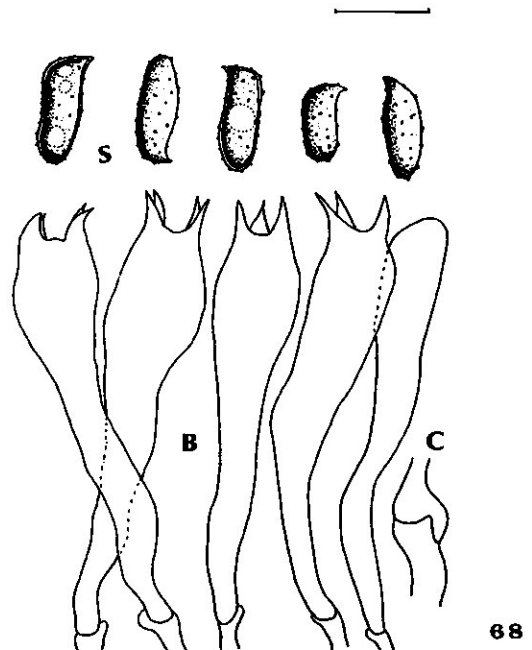
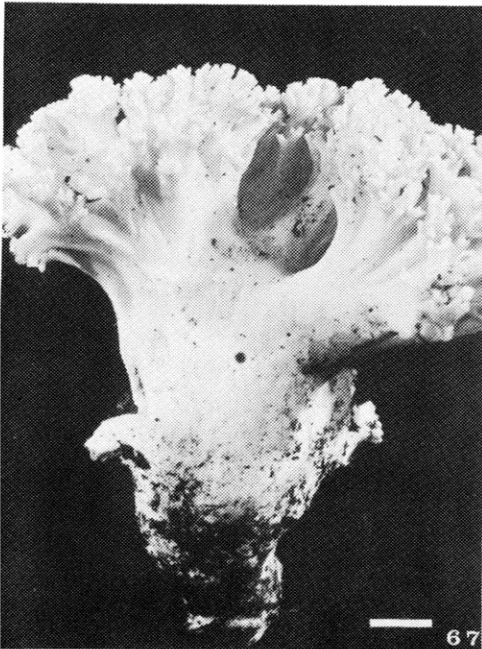
Figs 67, 68, 70

Fructifications: Gregarious, 6-11 x 7-12 cm, genet-3A7 (brilliant yellow—83), drying light yellow—4A4 (pale yellow—89). Branches polychotomous, thick, stout, short, compact, divaricate, axils acute, apices polydigitate rounded, browning with age, resembling a loose-headed cauliflower. Context white, bruising chrome orange—6A8 (strong orange—50), fleshy but firm becoming spongy with age, drying hard. Stem white, smooth, 5-8 x 2.5-4.0 cm, abortive branches present. Spore deposit greyish orange—6B5 (light brown—57). Taste mild. Odor sweet. Terrestrial, in mixed woods, open fields and lawns.

Macrochemical Tests: No positive color changes in pyrogallol, guaiac tincture, 2% phenol, aniline or FeSO_4 . Positive color reactions with α -naphthol, guaiacol and Melzer's reagent.



Figs 65, 66. *Ramaria longissimispora*.



Figs 67, 68. *Ramaria magnipes*.

Microscopic Structures: Spores 7-15 x 3-4.5 μm , average 8-10 x 4 μm , ochre, oblong-ellipsoid, punctulate, faintly warted. Basidia 30-55 μm , basally clamped, with 4 sterigmata 4-6 μm . Hymenium 40-70 μm thick; subhymenium 20 μm . Contextual hyphae 4-6 μm broad; subhymenial hyphae 2-3 μm . Clamp connections present.

Collections Examined: ACAD 12948, 18/8/77, Lequille, Annapolis Co.; ACAD 12949, 31/8/77, Moses Mountain, Hants Co.; M-583, 1/7/67, 12 miles east of Stevens Pass, 3 miles west of Merritt, Wash.

Discussion: The deep-yellow upper branches and the smooth white stipe, generally with abortive branches at the base, may cause this species to be identified in the field as *R. flavobrunnescens* var. *flavobrunnescens*. The concentration of short, compact branches, cauliflower-like in appearance, towards the top of the fruiting body, are easily distinguished from the elongated, brush-like branches of *R. flavobrunnescens*.

***Ramaria obtusissima* (Pk.) Corner**

Ann. Bot. Mem. 1: 609, 1950.

obtusissima (L)—markedly obtuse, blunt

Figs 71, 72

Fructifications: 10-20 x 8-15 cm, cream—4A3 (light orange yellow—70), drying greyish orange—5B5 (light brown—57), tips light yellow—4A4 (pale orange yellow—73), turning brown with age and withering. Branches polychotomous, breaking up into stout main branches at ground level which quickly divide into a dense mass of branchlets 1-5 mm wide, axils rounded, apices blunt, pluridigitate, branches finely channelled. Context white bruising brownish grey—6E2 (brownish grey—64) or violet brown—11F8 (very dark purplish red—260), fleshy fibrous drying hard and brittle. Stem 5-9 x 2-5 cm, massive, rooting, white, finely mycelioid. Spore deposit greyish orange—6B5 (light brown—57). Taste mild. Odor sweet. Terrestrial, in mixed woods.

Macrochemical Tests: No significant color change occurring in pyrogallol, α -naphthol, guaiac tincture, guaiacol, 2% phenol or aniline. Positive reaction with FeSO_4 .

Microscopic Structures: Spores 10-15 x 3-5 μm , ochre, subcylindrical-ellipsoid, often bent or reflexed, smooth or faintly roughened. Basidia 40-60 x 7-9 μm , basally clamped; 4 sterigmata, 5-7 μm . Hymenium 45-70 μm thick; subhymenium 10-20 μm . Contextual hyphae 5-13 μm broad; subhymenial hyphae 2-4 μm . Clamp connections present.

Collections Examined: ACAD 12950, 2/9/77, Harrington slope, Kings Co.; ACAD 12951, 4/9/77, Vault Road, Melvern Square, Annapolis Co.; ACAD 12952, 22/8/77, Moores Falls, Kings Co.; ACAD 12914, 2/9/77, Harrington slope, Kings Co.; ACAD 12915, 7/9/77, Harrington slope, Kings Co.; ACAD 5082, 2/9/62, Lake Kejimikujik area, Queens Co.

Discussion: *Ramaria obtusissima* is a variable species. Although similar to *R. secunda* it is generally larger in size, has yellow rather than pink tips and longer, narrower spores which are typically swayed back. Corner (1970) recognizes the following forms: 1) rough-spored form, 2) pink form, 3) vinescent form, 4) rich yellow form. The bruising reactions observed would place the examined collections in the vinescent form. Wehmeyer (1935) described a similar reaction for collections that he examined from Nova Scotia.

Ramaria rubripermanens Marr & Stuntz.

Bibl. Mycol. 38: 43, 1973.

rubripermanens—ruber (L)—red
 permanens (L)—persistent, lasting

Figs 73, 74, 75

Fructifications: Gregarious, 7-25 x 4-20 cm, cream—4A3 (light orange yellow—70), drying apricot yellow—5B6 (light yellowish brown—76), tips dull red—9B3 (greyish yellowish pink—32), giving an overall vinaceous tinge. Branches polychotomous, crowded, axils rounded to subacute, slightly divaricate, apices pluridigitate, subacute to rounded. Context white, unchanging, firm when fresh, drying hard. Stem simple, white, cylindrical or conic, thick, 3-5 x 2-5 cm with primordial branches at the base. Spore deposit gold yellow—5B7 (strong orange—50). Taste mild. Odor not distinctive. Terrestrial, in mixed woods, sometimes under *Quercus*.

Macrochemical Tests: Positive color reactions with FeSO_4 , pyrogallol. No significant color change in α -naphthol, guaiac tincture, guaiacol, 2% phenol or aniline.

Microscopic Structures: Spores 9-14 x 3-5 μm , average 10 x 4 μm , ochre, longitudinally striate, subellipsoid to mummy-shaped. Basidia 45-70 x 6-8 μm , basally clamped; 4 sterigmata, 4-7 μm . Hymenium 45-70 μm thick, subhymenium 15-20 μm . Contextual hyphae parallel, 4-12 μm broad; subhymenial hyphae 2-4 μm . Clamp connections frequent.

Collections Examined: ACAD 12953, 14/8/77, Agriculture Canada Experimental Station, Kentville, Kings Co.; ACAD 12954, 20/9/77, Aylesford Lake, Kings Co.; ACAD 12955, 7/9/77, Harrington slope, Kings Co.; ACAD 12956, 12/9/77, Harrington woods, Kings Co.

Discussion: In the field, *R. rubripermanens* is not easily distinguished from *R. botrytis*. The smaller spores and the negative bruising reaction of *R. rubripermanens* serve to separate the 2. This species often occurs in a "fairy ring".

Ramaria sandaracina Marr & Stuntz var. sandaracina

Bibl. Mycol. 38: 81, 1973.

sandaracina (L)—sandaraca—red coloring matter

Figs 76, 77

Fructifications: Gregarious, 5-10 x 3-9 cm, branches and apices melon—5A6, (moderate orange yellow—71), yellow—2A6, (brilliant yellow—83) in the region just above the stipe, fading from pale yellow—2A3 (pale yellow—89) to white at the base of the stipe; drying apricot—5B6 (dark orange yellow—72), apices drying garnet brown—7D8 (brownish orange—54). Branches polychotomous, subparallel, elongated, some branches marked with a central furrow or several fine furrows; apices acute to subacute, forked. Stem 2 x 1 cm, subfasciculate, mycelioid. Context subconcolorous with the surface, fleshy-fibrous, drying brittle. Spore deposit wheat—4A5 (pale yellow—89). Taste and odor indistinct. Terrestrial in coniferous woods.

Macrochemical Tests: Positive reaction with FeSO_4 . No color changes occurring in pyrogallol, α -naphthol, guaiac tincture, guaiacol, 2% phenol or aniline.

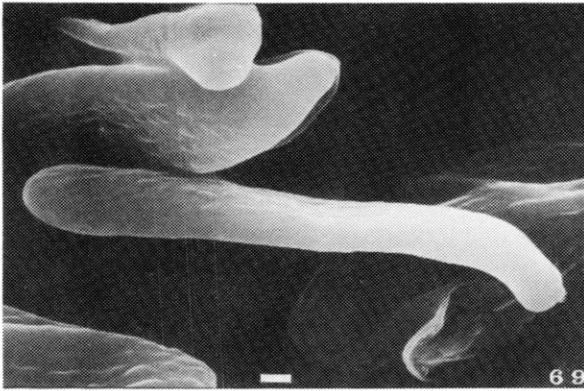


Fig 69. *Ramaria longissimispora*.

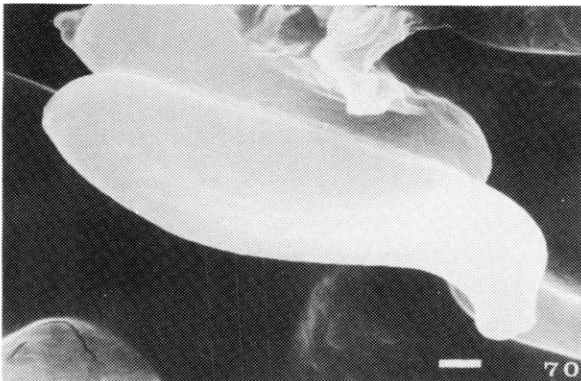
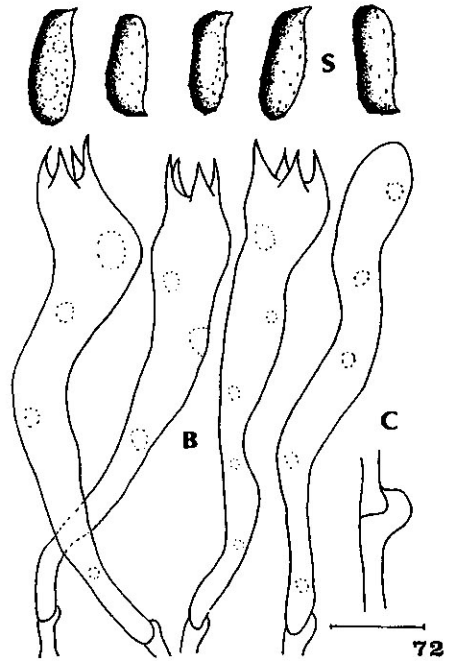
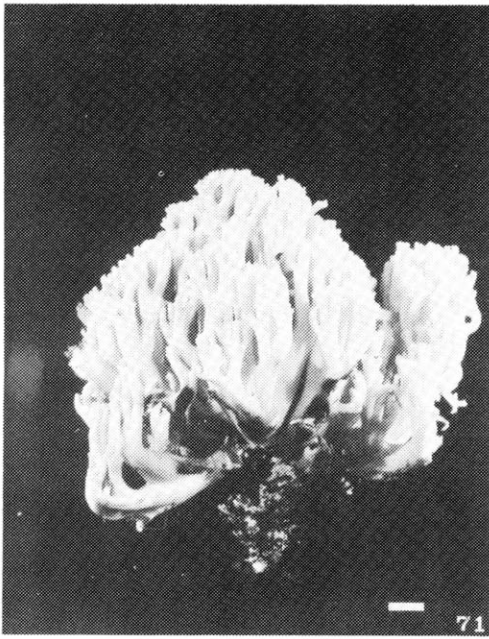


Fig 70. *Ramaria magnipes*.



Figs 71, 72. *Ramaria obtusissima*.

Microscopic Structures: Spores 6.5-9.0 x 3.0-4.5 μm , ochre, ellipsoid, asperulate. Basidia 30-47 μm x 5-9 μm , basally clamped; 4 sterigmata, 3-5 μm long. Hymenium 40-55 μm thick, subhymenium 15-20 μm , hyphae thin-walled, 6-10 μm broad, clamped. Gloeoplerous hyphae 4-6 μm broad.

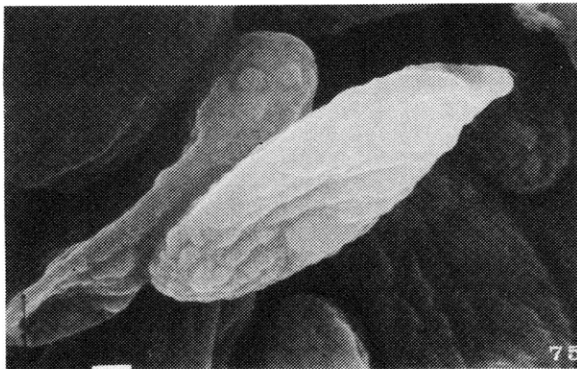
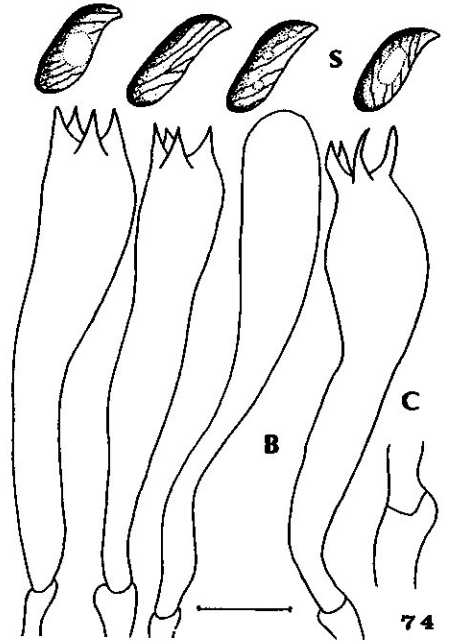
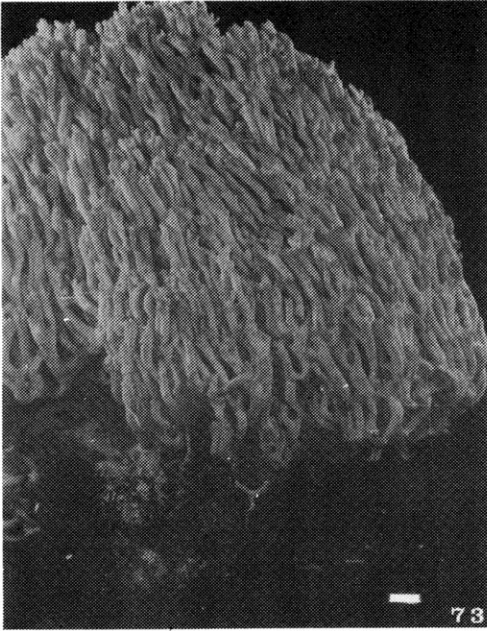
Collections Examined: ACAD 12924, 15/8/77, Scots Bay, Kings Co.

Discussion: The distinctive features of *R. sandaracina* are the deep orange pigmentation of the upper branches, with bright yellow pigmentation in the upper region of the stipe, the small asperulate spores, and the presence of clamped hyphae.

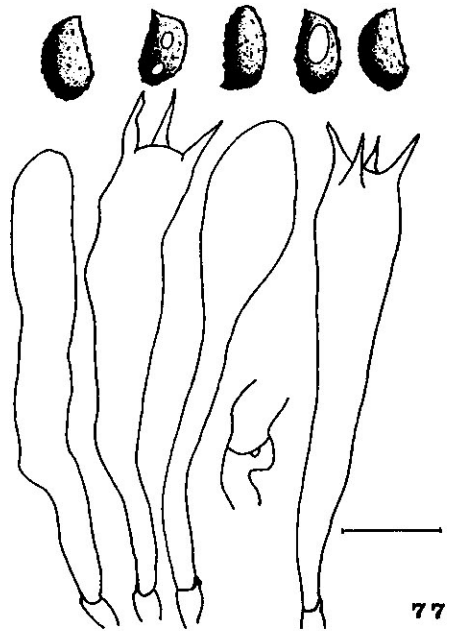
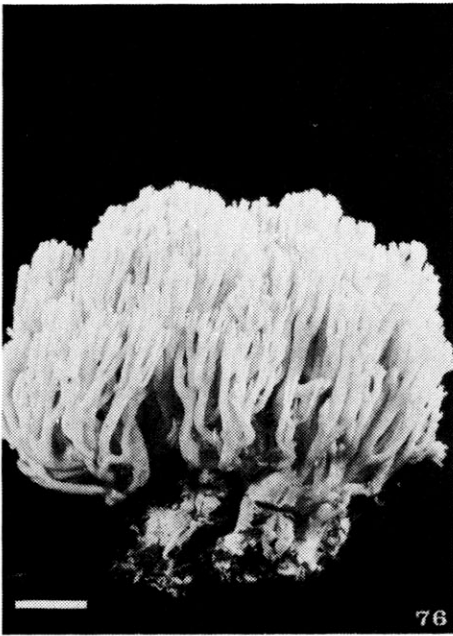
It is similar to *R. conjunctipes* in overall appearance, but *R. sandaracina* has a deeper pigmentation with concolorous tips and clamped hyphae.

The greyish violet bruising reaction reported by Marr and Stuntz (1973) was not observed in collection 12924.

Marr and Stuntz (1973) have published 2 additional varieties: var. *chondrobasis* having larger fruiting bodies of subgelatinous consistency without distinct single or subfasciculate smooth base, and var. *euosma* with broader, more profusely branched fruiting bodies, light yellow apices and a sweet odor.



Figs 73, 74, 75. *Ramaria rubripermanens*.



Figs 76, 77. *Ramaria sandaracina* var. *sandaracina*.

Ramaria secunda (Berk.) Corner

Ann. Bot. Mem. 1: 620, 1950.

Clavaria secunda Berk., Grevillea 2: 7, 1873.*Clavaria crassipes* Pk., Bull. N.Y. State Mus. 67: 27, 1903.*secunda* (L)—having branches turned towards the same side.

Figs 78, 79, 80

Fructifications: 4-12 x 1.5-6.5 cm, salmon—6A4 (light orange—52) to orange grey—5B5 (light brown—57), drying apricot—5B6 (moderate orange—53), tip concolorous, often turning reddish brown—8E8 (moderate reddish brown—43) on bruising or with age. Branches dichotomous, numerous, slightly divergent, rather lax, smooth, becoming hollow, axils rounded, apices blunt or subacute, bifid. Context white or pale concolorous, fibrous, spongy. Stem 1-5 cm high, stout, but distinct, white, soft, glabrous, often with abortive branches. Taste mild. Odor brassicaceous. Spore deposit greyish orange—6B5 (light brown—57). Terrestrial, in mixed woods.

Macrochemical Tests: Positive color reactions occurring with FeSO_4 , pyrogallol, α -naphthol, guaiac tincture, guaiacol, 2% phenol, aniline.

Microscopic Structures: Spores 8-12 x 3.5-5.0 μm , ochre, ellipsoid, slightly apiculate, faintly roughened, 1-2-guttate. Basidia 35-60 x 7-9 μm ; 4 sterigmata, 3-5 μm . Hymenium 50-70 μm thick, subhymenium 20-25 μm . Contextual hyphae 3-8 μm broad, slightly thick-walled, walls up to 0.5 μm thick; subhymenial hyphae 3-4 μm broad. Clamp connections present.

Collections Examined: ACAD 12957, 15/8/77, Scots Bay, Kings Co.; ACAD 12958, 24/8/77, West Gaspereau, Kings Co.; ACAD 5822, 14/9/63, Lake Kejimikujik area, Queens Co.; ACAD 5451, 14/9/63, Lake Kejimikujik area, Queens Co.; ACAD 5442, 1/9/63, Moosehorn, Maine.

Discussion: *Ramaria secunda* is nearest to *R. obtusissima* in form and habit but differs in its shorter, broader spores which are not reflexed and in its pinkish rather than yellowish pigmentation. The stout, soft, glabrous stem, with abortive branches arising from the base, is a distinctive feature of *R. secunda*.

Corner (1970) after having examined the type specimens of *R. secunda* (Herb. Berk. 534, leg. M.A. Curtis, Car. sup.; Herb. Berk. 991, Santee River, leg. Ravenel; both at Kew) reduced the species to a variety (*holorubella*) of *R. botrytis*. The herbarium specimens of Berkeley were found to be side branches of a larger tuft, giving the impression that the species is characterized by secund branching. Marr and Stuntz (1973) made *C. holorubella* (Atk.) synonymous with *R. botrytis*. *Ramaria secunda* and *R. holorubella* were both cited as synonyms of *R. botrytis* var. *holorubella*, (Atk.) Corner.

The specimens examined in this survey differed from Corner's description of *R. holorubella* (Atk.) Corner, in the presence of abortive branches at the base of the stem, the pinkish tinge to the fruiting bodies, the more lax branching and the absence of a dull vinaceous staining reaction of the stem. Collections ACAD 12957, 12958, 5822, 5451, and 5442 form a group that appears to be beyond the circumscription of *R. botrytis*, and thus the same name *R. secunda* has been assigned.

Scanning electronmicrographs illustrate the differences in spore morphology. The specimens assigned to *R. botrytis* have distinctly striate spores while the

spores of those specimens considered as *R. secunda* are verruculose although the verruculae are not always distinct and in some cases appear as striations (Fig 80).

***Ramaria stricta* (Pers. ex. Fr.) Quél.**

Flore Mycol. 464, 1888.

Clavaria stricta Pers., Comm. Fung. Clavif., 45, 1795.

Clavaria stricta (Pers. ex. Fr.), Syst. Mycol. 1: 468, 1821.

Merisma stricta (Pers. ex. Fr.) Sprengel, Syst. Veg. 4: 495, 1827.

Clavariella stricta (Pers. ex. Fr.) Karst., Bidr. Känn. Finl. nat. o Folk. 37: 184, 1882.

Corallium strictum (Pers. ex. Fr.) Hahn., Pilzsammler, 73, 1883.

Clavaria syringarum Pers., Mycol. Eur. 1: 164, 1822.

Lachnocladium odoratum Atk., Ann. Mycol. 6: 58, 1908.

stricta (L)—close

Figs 81, 82

Fructifications: Solitary or gregarious, 5-10 x 3-5 cm, coffee color—6D3 (light greyish brown—60), upper branches pale orange—5A3 (light orange—52), drying greyish orange—6B5 (moderate orange—53), dried plants blackish and metallic-looking at tips. Branches somewhat flattened, dichotomous, parallel, numerous, elongate, slender, rather lax, axils rounded, apices bifid and acute, straight or divaricating. Context concolorous, tough, unchanging, drying dark. Stem 0.5-1.0 x 0.5-1.0 cm, white, mycelioid, branched from or near the base, arising from a white thick, woolly basal tomentum with white thread-like rhizomorphs extending into the substratum. Spore deposit greyish orange—6B5 (light brown—57). Taste and odor indistinct. Lignicolous, on dead wood, bark or humus of coniferous trees.

Macrochemical Tests: Positive color reactions occurring in FeSO_4 , pyrogallol, guaiac tincture, guaiacol, 2% phenol, aniline. No reaction was observed with α -naphthol.

Microscopic Structures: Spores 7-9 x 3.5-5.0 μm , pale yellow, ellipsoid, finely ornamented or minutely verruculose. Basidia 35-45 x 6-7 μm , basally clamped; 4 sterigmata, 5-7 μm long. Hymenium 40-50 μm thick; sybhyemenium 20 μm . Contextual hyphae 3-7 μm broad, walls thickened, 1-2 μm ; subhymenial hyphae 2.5-3.5 μm . Rhizomorphs dimitic. Clamp connections abundant.

Collections Examined: ACAD 10913, 27/8/77, West Gaspereau, Kings Co.; ACAD 5782, 17/9/67, Priest River Experimental Forest, Idaho.

Discussion: *Ramaria stricta* is similar to *R. concolor* but it differs in its generally smaller size, laxer branching, pale yellowish or greenish-yellow branch tips, and its tougher denser flesh. *R. stricta* is characteristic of a coniferous habitat (although it is occasionally found on deciduous wood), whereas *R. concolor* is characteristically in deciduous woods. In comparison with *R. concolor*, *R. stricta* is considered to be rare. It was collected only once during the 1977 season.

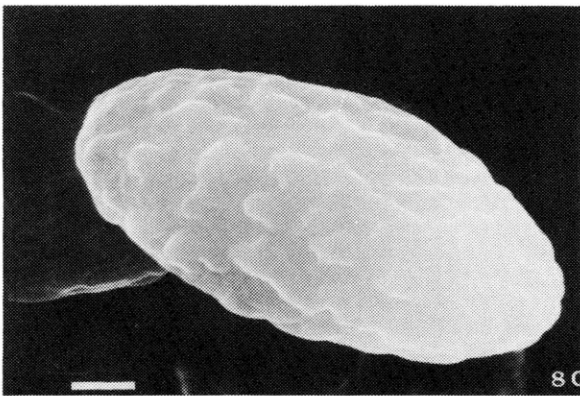
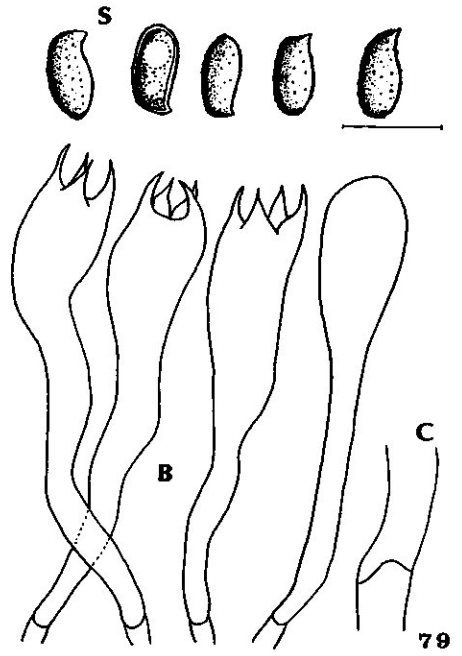
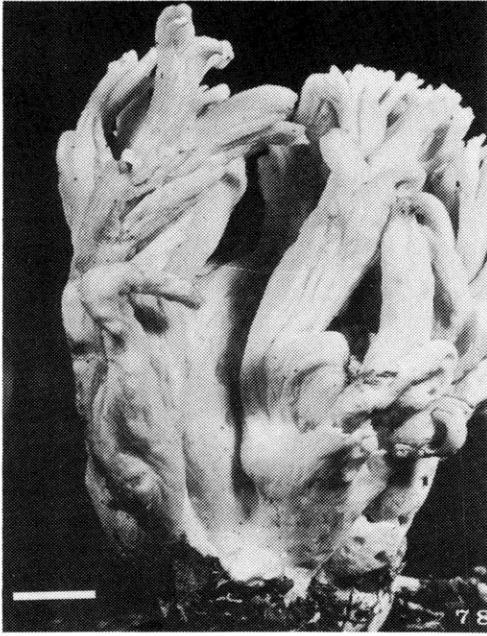
***Ramaria subbotrytis* (Coker) Corner**

Ann. Bot. Mem. 1: 625, 1950.

Clavaria subbotrytis Coker, Clav. U.S. Can, 116, 1923.

Figs 83, 84

Fructifications: 3-10 x 2-7 cm, madder red—9A7 (deep yellowish pink—27), drying greyish orange—5B5 (moderate orange—53), tips light yellow—4A4 (light orange yellow—70), when young, becoming concolorous at maturity. Branches



Figs 78, 79, 80. *Ramaria secunda*.

polychotomous, acutely divaricate, apices pluridigitate and blunt, axils acute. Context vivid red—9A8 (deep yellowish pink—27), remaining red longer than the surface, unchanged by bruising, tender but not brittle, not chalky when dry. Stem smooth, white, multiple, 0.5-2.5 cm, tapering downwards. Spore deposit cinnamon—6D6 (light brown—57). Taste mild. Odor absent. Terrestrial, in humus in mixed woods, under *Fagus grandifolia*.

Macrochemical Tests: Positive color changes with FeSO_4 , pyrogallol, α -naphthol, guaiac tincture, guaiacol, 2% phenol, aniline.

Microscopic Structures: Spores 7-11 x 3-4 μm , ochre, ellipsoid, finely verrucose. Basidia 50-60 x 6-8 μm , with granular contents; 4 sterigmata 3-5 μm long. Hymenium 55-65 μm thick, subhymenium 10-20 μm . Contextual hyphae 5-10 μm broad, interwoven; subhymenial hyphae 1.5-4 μm . Clamp connections absent.

Collections Examined: ACAD 12967, 16/9/77, Gospel Wood Road, Kings Co.

Discussion: Corner (1950) regarded *R. subbotrytis* as a rather rare species and only 1 specimen was collected in Nova Scotia throughout the 1977 season. In the field, it may be confused with *R. conjunctipes*, but *R. subbotrytis* has an overall deeper red pigmentation, vivid red context, an absence of clamps and positive reactions to all the applied chemical tests. The yellow tips suggest an affinity with *R. formosa*, but *R. subbotrytis* is distinguished by its deeper red pigmentation, narrower and smoother spores, and in the texture of the dried flesh which is not chalky-friable.

***Ramaria suecica* (Fr.) Donk**

Rev. Niederl. Homobas., Aphyll. 2: 105, 1933.

Clavaria suecica Fr., Syst. Mycol. 1: 469, 1821.

Clavariella suecica (Fr.) Karst., Hattsv. Ryssl. 2: 184, 1882.

Clavaria circinans Pk., Rep. N.Y. State Mus. 39: 43, 1886.

Suecica (L)—Sweden

Figs 85, 86

Fructifications: Gregarious, 2-6 x 1-4 cm, apricot yellow—5B6 (moderate orange—53) to light orange—5A4 (light orange—52), drying concolorous, tips concolorous or whitish to greyish orange—6B5 (light brown—57). Branches polychotomous, smooth, erect, branched one to three times at approximately the same levels with a brush-like mat of pointed tips, somewhat divergent or erect on one side of the stem and outcurved on the other, axils rounded, apices forked, subacute. Context white or paler concolorous, sometimes bruising rufescent, tough, drying brittle. Stem 4-20 mm, smooth, white, arising from a white tomentose base. Spore deposit greyish orange—6B5 (light brown—57). Taste not distinctive. Odor musty or rancid. Terrestrial, in coniferous or deciduous woods.

Macrochemical Tests: No positive color reactions occurring in α -naphthol, guaiac tincture, guaiacol, 2% phenol or aniline. Positive reaction with FeSO_4 and a weakly positive reaction with pyrogallol.

Microscopic Structures: Spores 6-10 x 3.5-5.0 μm , hyaline to pale yellow, oblong-ellipsoid, asperulate to minutely verrucose. Basidia 35-50 μm ; 4 sterigmata, 5-7 μm long. Hymenium 40-70 μm thick, subhymenium 10-20 μm . Contextual hyphae 2-9 μm broad, thin-walled, inflating to 18 μm ; subhymenial hyphae 2-4 μm . Clamp connections absent.

Collections Examined: ACAD 12969, 31/8/77, Moses Mountain, Hants Co.; ACAD 12970, 7/9/77, Harrington slope, Kings Co.; M-615, 3/10/67, North Olympics, near Park, Wash.

Discussion: *Ramaria suecica* is a northerly, subarctic or mountain species. (Corner 1950). The distinctive features are its small warted spores, small size, and tough but soft flesh. It differs from *R. stricta* in its sparser branching, without long close branches, and in the lighter color and softer, more chalky texture of the dried flesh. The latter is similar to the chalky-friable flesh of *R. formosa*.

Corner (1950) reports clamp connections but none was observed in either collection examined.

***Ramaria xanthosperma* (Pk.) Corner**

Ann. Bot. Mem. 1: 632, 1950.

Clavaria xanthosperma Pk., Bull. N.Y. State Mus. 94: 21, 1905.

xanthosperma — xantho (Gk)—yellow
sperma (L)—seed

Figs 87, 88

Fructifications: 5-9 x 4-7 cm, yellowish white—3A2 (yellowish white—92), drying concolorous, tips pastel yellow—3A4 (light yellow—86), browning with age and withering. Branches polychotomous, lower branches stout, upper branches numerous, compact, erect with a broad curving angle, tapering, lower axils rounded, upper axils acute, apices acute, forked or pluridigitate. Context concolorous, bruising dull vinaceous, fleshy-fibrous, slightly gelatinous. Stem 1.0-1.5 x 1.0-1.5 cm, stout, with abortive branches at the base, intense vinaceous stain when bruised. Spore deposit greyish orange—6B5 (light brown—57). Taste mild. Odor sweet. Terrestrial, in mixed woods.

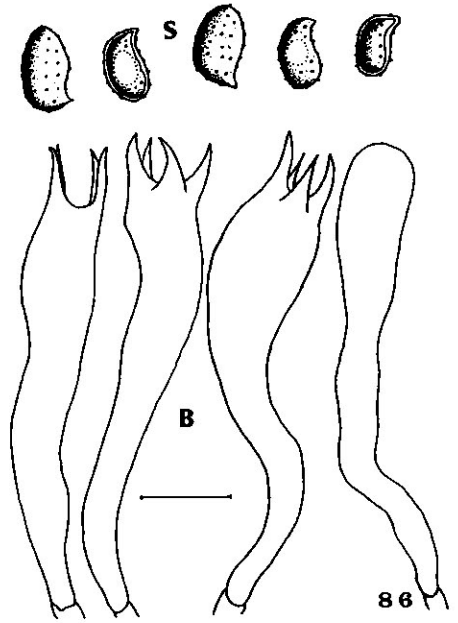
Macrochemical Tests: No positive color reactions occurring in pyrogallol α -naphthol, guaiac tincture, guaiacol, 2% phenol, aniline. Positive reactions occurring with FeSO_4 .

Microscopic Structures: Spores 9-15 x 3.5-5.0 μm , buff, oblong-ellipsoid, sinuous, nearly smooth or very slightly verruculose, with faint spiral lines or grooves. Basidia 45-65 μm ; 4 sterigmata, 3-5 μm . Hymenium 60-70 μm thick; subhymenium 15-20 μm . Contextual hyphae 5-10 μm broad, thin-walled. Clamp connections absent.

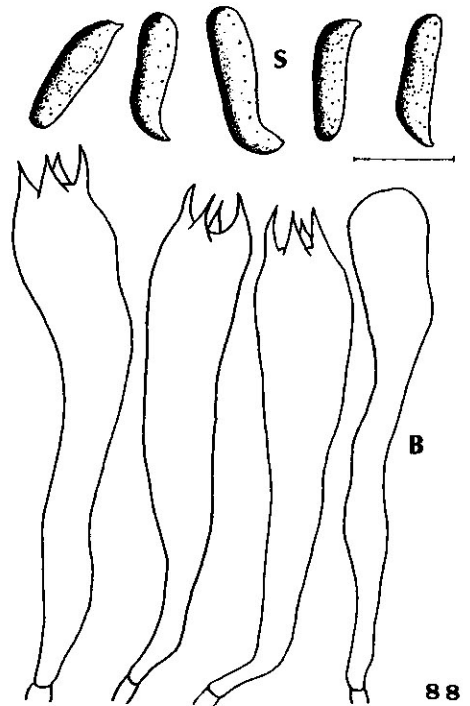
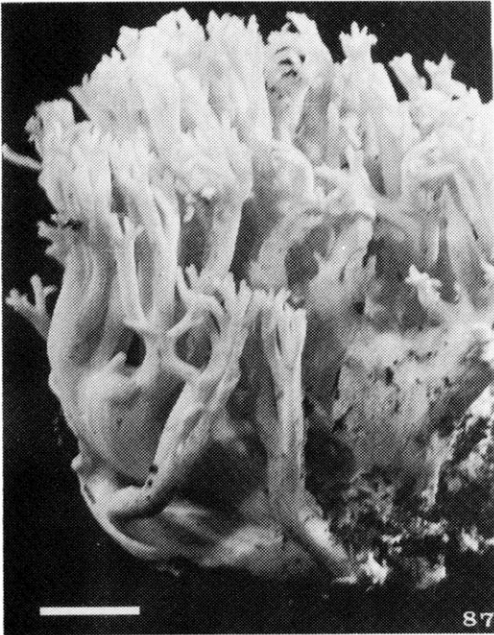
Collections Examined: ACAD 12972, 24/8/77, West Gaspereau, Kings Co.; ACAD 644, 1/9/32, Agriculture Canada Experimental Station, Kentville, Kings Co.

Discussion: *R. xanthosperma* is a rare species (Corner 1950). The pale ivory color with pale yellow tips, the vinaceous discoloration and the long smooth spores are characteristic of the species. There is a close similarity with *R. obtusissima* but *R. xanthosperma* has a smaller fruiting body, lacks clamp connections and has spores ornamented with faint spiral lines or grooves.

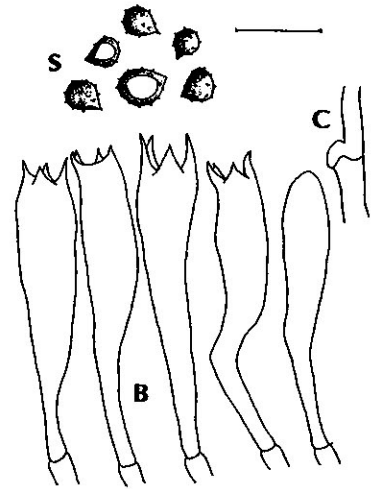
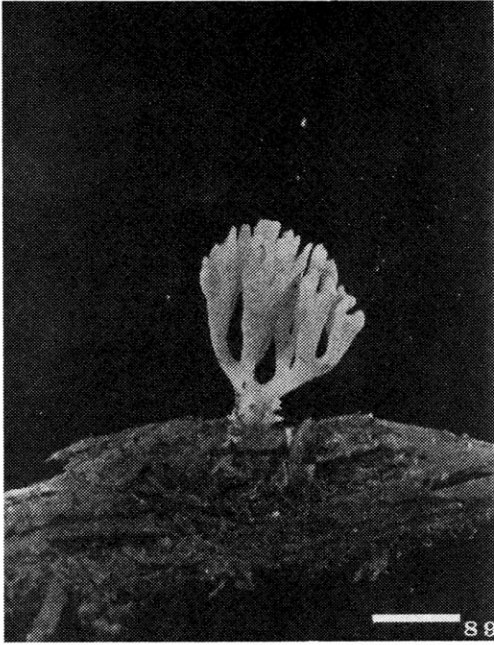
Wehmeyer (1935) has reported the hymenium to be "filled with gelatinous, granular, gloecystidium-like elements, possibly young basidia". When mounted in phloxine, some contextual hyphae showed greenish oil droplets.



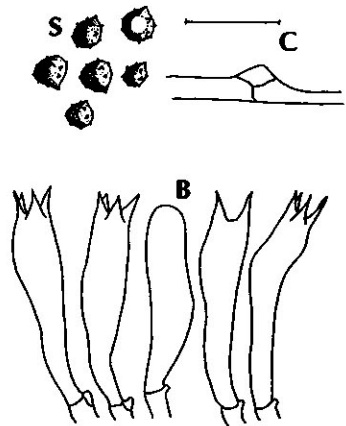
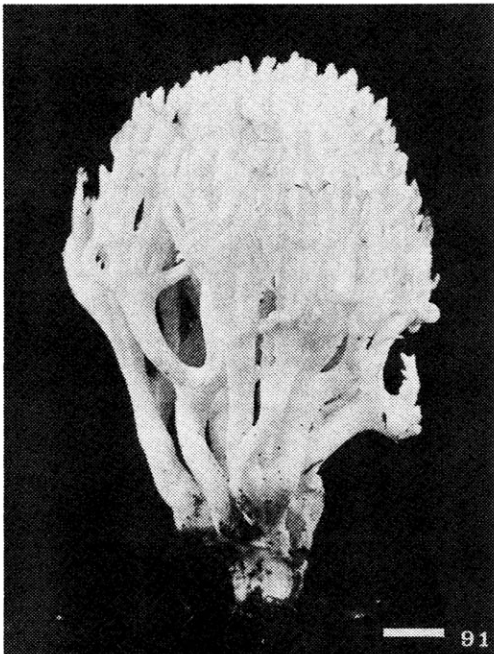
Figs 85, 86. *Ramaria suecica*.



Figs 87, 88. *Ramaria xanthosperma*.



90

Figs 89, 90. *Ramariopsis crocea*.

92

Figs 91, 92. *Ramariopsis kunzei*.

Circumscription of the Genus *Ramariopsis*

Ramariopsis Donk emend. Corner, Ann. Bot. Mem. 1: 636, 1950.

Type species: *R. kunzei* (Fr.) Donk, Rev. Niederl. Homobas., Aphyll. 2: 89, 1933.

Donk (1933) described *Ramariopsis* as a subgenus of *Clavaria* having branched fruit bodies, short basidia, and small, round or subellipsoid, finely asperulate hyaline spores. Corner (1950) excluded *C. subtilis*, *C. pyxidata* and *C. angulispora* and added several species traditionally placed in *Clavaria*, raising *Ramariopsis* to generic rank. The total number of species was raised to 12 when Petersen (1964) added 2 new species, *C. luteo-ochracea* and *C. minutula*, which Corner had placed in *Clavulinopsis*.

Petersen (1966) emended Corner's description to include smooth-spored and hysterocroic species, thereby including some species of *Clavulinopsis*.

Corner (1970) has agreed that with gathering evidence, *Ramariopsis* may merge with *Clavulinopsis*, but he still considers the echinulate spore and the branched fruiting body as distinctive marks of *Ramariopsis*. His description of the genus is as follows: "Fruit bodies branched, rarely simple, variously colored; branches radial, polychotomous or dichotomous. Spores white, ellipsoid or subglobose, finely verruculose or echinulate, 1-guttate. Basidia small to medium sized, 4-sterigmate, occasionally 2. Hyphae monomitic, inflating, clamped, with thin or slightly thickened walls, generally rather narrow".

The genus includes 10 species, mostly north temperate.

Key to the Species of *Ramariopsis*

1. Fruiting bodies 3-10 cm high, white, often tinged light red or tangerine: spores 2.5-4.0 x 2.5-4.5 μm , subglobose, finely echinulate *R. kunzei* p. 70
1. Fruiting bodies up to 5 cm high, deep orange; spores 3-5 x 3-3.5 μm , subglobose, asperulate *R. crocea* p. 69

Ramariopsis crocea (Fr.) Corner

Ann. Bot. Mem. 1: 638, 1950.

Clavaria crocea Fr., Syst. Mycol. 1: 472, 1821.

Clavaria kalchbrenneri Muell., Proc. Linn. Soc. N.S. W., 105, 1882.

Clavaria crocea (Fr.) Harter, Krypt. Fl. Mark Brand. 6: 164, 1910.

crocea (Gk)—saffron

Figs 89, 90

Fructifications: Solitary or gregarious, up to 5 cm tall, laxly branched dichotomously 2-4 times, cylindrical then flattened, axils lunate, tips acute or blunt, deep orange—5A8 (vivid orange yellow—66), drying carrot red—6B7 (deep orange—51). Context concolorous, tender, slightly elastic, not brittle. Stem distinct, up to 1 cm long, minutely furfuraceous. Spore deposit white. Odor and taste absent. Growing in the humus layer in mixed or deciduous woods on decaying leaves or wood.

Macrochemical Tests: No significant color reactions in FeSO_4 , α -naphthol, guaiac tincture, guaiacol, 2% phenol, aniline.

Microscopic Structures: Spores 3.0-5.0 x 3.0-3.5 μm , hyaline, subglobose, asperulate. Basidia 15-25 x 4-5 μm ; 4 sterigmata, 3-5 μm long. Hymenium 30-40 μm thick, agglutinated, not thickening; subhymenium 5-10 μm , of small rounded

cells. Contextual hyphae 2.5-6.0 μm broad, subhymenial hyphae 2-3 μm . Clamp connections present.

Collections Examined: ACAD 12973, 20/9/77, Agriculture Canada Experimental Station, Kentville, Kings Co.; ACAD 12974, 25/9/77, Gospel Wood Road, Kings Co.

Discussion: Coker (1923) described this as a rare species. Corner (1950) reports *R. crocea* to be very rare in Europe but widespread in temperate or subtropical regions.

Corner (1950) has described the spores as 3.0-4.0 x 2.0-3.5 μm but points out that there appears to be variation in this character.

Spores from collections ACAD 12973 and ACAD 12974 measured 3.0-5.0 x 3.0-3.5 μm . Hyphal outgrowths, projecting 10-20 μm beyond the hymenial layer, were observed in ACAD 12973.

The rich orange coloration, delicate form and small size of *R. crocea* serve to identify this species in the field.

***Ramarlopsis kunzei* (Fr.) Donk.**

Rev. Niederl. Homobas., *Aphyll.* 2: 89, 1933.

Clavaria kunzei Fr., *Syst. Mycol.* 1: 474, 1821.

Clavaria chionea Pers., *Mycol. Eur.* 1: 161, 1822.

Clavaria subcorticalis Schw., *Trans. Am. Philos. Soc.* 2: 4, 182, 1832.

Lachnocladium subsimile B. & C., *Grevillea* 1: 161, 1873.

Clavaria velutina E. & E., *North Am. Fungi*, Ser. 2, No. 2024, 1888.

Clavulina kunzei (Fr.) Schroet., Cohn, *Krypt. Fl. Schles.*, Pilze, 442, 1888.

Ramaria kunzei (Fr.) Quél., *Flore Mycol.* 464, 1888.

Clavaria asperula Atk., *Ann. Mycol.* 6: 54, 1908.

Clavaria asperulans Atk., *Ann. Mycol.* 6: 57, 1908.

Clavaria elongata Britz., *Rev. Hym.*, 221, 1909.

Clavaria subcaespitosa Pk., *Bull. N.Y. State Mus.* 167: 39, 1913.

Lachnocladium subcorticale (Schw.) Burt, *Ann. Mo. Bot. Gard.* 9: 66, 1922.

kunzei—after Karl Sebastian Heinrich Kunze

Figs 91, 92

Fructifications: Solitary, gregarious or caespitose, 3-10 cm tall, loosely branched, polychotomous below, becoming narrow and dichotomous above, cylindrical, ending in forked tips either blunt or acute, axils rounded and narrow, snow white, often tinged light red-9A5 (strong yellowish pink-26) or tangerine-6B8 (strong orange-50), drying orange white-5A2 (pale orange yellow-73). Stem distinct, 0.5-2.0 cm long, sometimes becoming yellowish or pinkish at base, villous tomentose. Context concolorous varying from rather pliant and elastic to brittle. Spore deposit white. Odor and taste indistinct. Terrestrial, in deciduous or mixed woods.

Macrochemical Tests: No significant color reactions in FeSO_4 , pyrogallol, α -naphthol, guaiac tincture, guaiacol, 2% phenol, aniline.

Microscopic Structures: Spores 3.5-4.0 x 2.5-4.5 μm , hyaline, globose to subglobose, finely echinulate, apiculate, 1-guttate. Basidia 12-20 x 4-5 μm ; 2 or 4 sterigmata, 3-4 μm long. Hymenium 30 μm at first, thickening to 60-100 μm , agglutinated; subhymenium 7-10 μm . Contextual hyphae 3-5 μm broad, subhymenial hyphae 2-3 μm . Clamp connections present.

Collections Examined: ACAD 12975, 26/8/77, Scots Bay, Kings Co.; ACAD 12976, 12/9/77, Harrington woods, Kings Co.; ACAD 12977, 12/9/77, Harrington woods, Kings Co.

Discussion: Ramariopsis kunzei, the type of the genus, is a common and variable species (Corner 1950). It is recognized by its snow white color, delicate habit, tomentose stem and small, subglobose, finely echinulate spores.

Acknowledgements

We express sincere appreciation to Dr. K.A. Harrison (Research Associate, Acadia University) for his valuable advice throughout the course of this study.

Thanks are extended to J. McLachlan, C. Bird, and C.D. Marr for their assistance in preparation of the manuscript, and to C. Collings for technical assistance with the electron microscopy.

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