

P E R S O O N I A

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NOTES ON HYDNUMS—VII

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(With nine Text-figures)

Nine further species are dealt with. *Hydnum beneolens* is transferred to *Cautinia*, a new genus of Polyporaceae. *Hydnum fuligineo-violaceum* sensu Bresadola is redescribed as a new species, *Sarcodon talpa*. The correct name for *Sarcodon fuligineo-violaceus* is shown to be *Sarcodon joeides*.

In the preparation of this paper I have again drawn heavily on the co-operation of several institutes, and in one case also on the patience. I gratefully record my obligation to the following for the loan of material: National Fungus Collections, Beltsville (BPI); Herbarium of the Komarov Botanical Institute of the Academy of Sciences of the U.S.S.R., Leningrad (LE); The Herbarium, University of Michigan, Ann Arbor (MICH); Istituto e Orto Botanico dell'Università, Padova (PAD); Národní Museum (Mykologické oddělení), Praha (PR); Naturhistoriska Riksmuseet, Botaniska Avdelningen, Stockholm (S); Herbarium of the University of California, Berkeley (UC); Naturhistorisches Museum, Botanische Abteilung, Wien (W).

My sincere thanks are also due to Mrs. E. van Maanen, Amsterdam, for improvement of the English language.

Beneolens. — *Cautinia beneolens* (Bres.) Maas G., *comb. nov.* — *Hydnum beneolens* Bres. in *Mycologia* 17: 72. 1925 (basionym). — Type: "Ex Herbarium of James R. Weir / No. 16363. *Hydnum beneolens* Bres., n. sp. / on dead trunks / Lautaro, Cautin, Chile, VI 1918 / *M. R. Espinosa*" (BPI).

The type consists of a cuneate fragment, measuring about 8 × 6 cm, torn off a massive fruit-body which, according to Weir, may attain a diameter of up to 30 cm. Fruit-body sessile or stipitate, divided into numerous pileoli. Pileoli closely united ("like *Polyporus sulphureus*"), 2-18 cm broad by 2-12 cm long, imbricate, spatulate or flabelliform, glabrous, not zoned (but radially rugulose in dried condition), hygrophanous, at first white, than straw, and finally cream to ochre; soft and elastic when fresh, hard and brittle when dry; margin thin, acute (in the specimen examined found to be sublacerate or running out into lamellar spines). Tubes 3-6 mm long, decurrent on the stipe, with a lamellate aspect resembling *Lenzites*, edges uneven or dentate, the mouths unequal in size, sinuate, daedaloid (in the specimen examined there is a gradual passage from interrupted, lamellar dissepiments to subulate spines, all of which have a horny appearance and are yellow-brown to dull reddish-brown). Context 1-8 mm thick (that is, in the pileoli), soft fibrous (tough-spongy in the specimen examined), homogeneous, without zones, white, not

blackening when bruised or exposed to the air. Odour very sweet, almond-like. Taste pleasant (fungus stated by Weir to be edible).

Context of pileoli monomitic, consisting of generative hyphae and oleiferous hyphae (Fig. 1). Generative hyphae 2.7–10.5 μ wide, not inflating but soon widening, even close behind the margin of the pileus, thin-walled to thick-walled (0.8–2.3 μ), branched, anastomosing, septate, with clamp-connections. Oleiferous hyphae numerous, in places often enormously distended (up to 18 μ) or with irregular excrescences. Farther back the difference between generative and oleiferous hyphae is less apparent, hyphae up to 30 μ wide and often thick-walled (~3 μ). Context of the spines and dissepiments equally monomitic, but most hyphae so thick-walled as to be quite solid. Basidia in most cases collapsed, \times 8–9 μ , clavate, 2–4-spored, with basal clamp-connection (Fig. 2). Sterigmata up to 6.7–7.2 μ long. Spores 6.3–7.6 \times 5–5.5 μ , ellipsoid to broadly ellipsoid, slightly flattened adaxially, smooth, colourless, thick-walled, with oil drops, inamyloid and not cyanophilous, with small oblique apiculus (Fig. 3). Gloeocystidia 1.5–4.5 μ wide, numerous, protruding only slightly beyond the (unripe) basidia, flexuous, thin-walled, very probably of tramal origin, remaining unchanged in sulfo-anisaldehyde (Fig. 2).

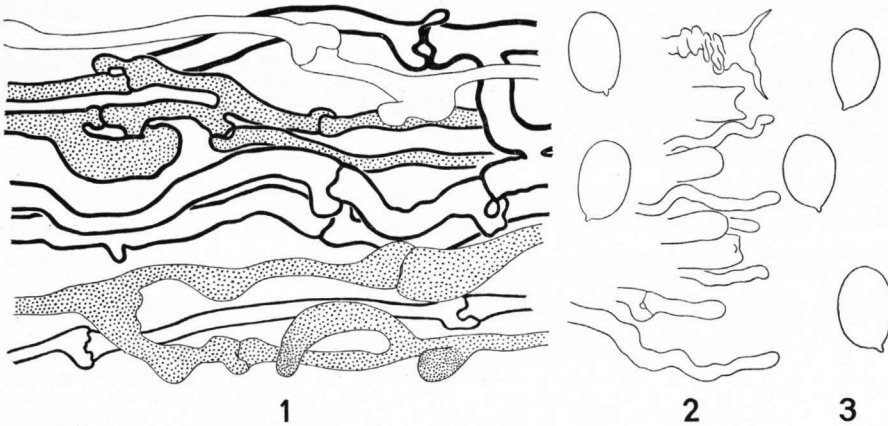
The label of the type packet bears the annotation "preserved in alcohol"; if by this Weir meant to signify that the material had first been preserved in alcohol and subsequently dried, it explains the abominable condition of the specimen. Fortunately, for the macroscopical part the description could draw almost entirely on Weir's excellent field notes. Both the macroscopical and microscopical features make it clear that *Hydnum beneolens* is a species that would not fit well in any of the existing genera, but constitutes a genus of its own.

Cautinia Maas G., *gen. nov.*¹

Sporophorum truncicola, in pileolis divisum. Pileoli numerosi, imbricati, glabri, azonati, hygrophani, ex albo cremei vel ochracei, recentes lenti, sicci duri fragilesque, margine acuti. Tubi in stipitem decurrentes, tuborum dissepimenta interrupta, lamelliformia vel aculeiformia. Caro carnosio-fibrosa, azonata, alba, immutabilis, odore grato, amygdalino, sapore miti. Contextus pilei monomiticus, e hyphis generatoriis et oleiferis, fibulatis, frequenter crasse-tunicatis consistens. Contextus aculeorum similis. Basidia clavata, 4-sporigera, fibulata. Sporae ellipsoideae, laeves, hyalinae, parietibus crassis praeditae. Gloeocystidia numerosa, gracilia, tenuitunicata. — Typus generis: *Hydnum beneolens* Bres.

Fruit-body arboricolous, divided into pileoli. Pileoli numerous, imbricate, glabrous, not zoned, hygrophanous, at first white, then cream or ochre, soft and elastic when fresh, hard and brittle when dry, with acute margin. Tubes decurrent, the dissepiments passing from short lamellar plates into subulate spines. Context soft fibrous, not zoned, white, unchanging, with a sweet, almond-like smell and pleasant taste, monomitic, consisting of generative and oleiferous hyphae, both of which have clamps and, frequently, thick cell-walls. Context of the spines and dissepiments similar. Basidia clavate, 4-spored, with basal clamp-connection. Spores ellipsoid, smooth, colourless, thick-walled, inamyloid and neither cyanophilous nor meta-chromatically stained in Cresyl Blue. Gloeocystidia numerous, slender, thin-walled. — Type-species: *Hydnum beneolens* Bres.

¹ Generic name derived from the River Cautin, type locality of the only species.



Figs. 1–3. *Hydnum beneolens* Bres. (type). — 1. Generative and oleiferous (dotted contents) hyphae. — 2. Detail of the hymenium showing basidia and gloecystidia. — 3. Spores. (Figs. 1, 2, $\times 700$; 3, $\times 1400$).

Bresadola believed that his species was close to *Hydnum septentrionale*, the type species of *Climacodon* P. Karst. This genus, however, has an entirely different hyphal make-up (Maas Geesteranus, 1962: 378), while the cystidia are thick-walled, of a different shape, and of hymenial origin.

The thickness of the spore wall is a conspicuous feature, and this character combined with a monomitic context and an irpicoid-hydroid hymenophore recalls a very similar combination, exhibited in *Spongipellis* Pat. among the Polyporaceae (Kotlaba & Pouzar, 1965: 77). Unlike *Cautinia*, however, the species of *Spongipellis*² are characterized by the uniform diameter of the hyphae in general, the inconspicuousness of the oleiferous hyphae, a different ramification (for which as yet no formula has been invented), the lack of an almond-like smell, and a very different gross morphology.

Another genus that on account of the similarity of a number of characters of the two might be connected with *Cautinia* is *Osteina* Donk (1966: 86). The main features that set *Osteina* apart are the oblong and thin-walled spores, the absence of cystidia, the consistently poroid hymenophore, the thin dissepiments, and the lack of odour.

To judge from the characters shown above, *Cautinia* would seem to be a true member of the Polyporaceae, but in this family it holds an isolated position.

Cyanopodius. — *Hydnellum cyanopodium* K. Harrison in Can. J. Bot. **42**: 1221. 1964. — Type: "Smith 9006 / California, Del Norte County, Crescent City / Nov. 22 '37" (MICH).

² For the purpose of comparison *Spongipellis spumeus* (Sow. ex Fr.) Pat. and *S. pachyodon* (Pers.) Kotl. & Pouz. have been examined.

MISAPPLIED NAME: *Sarcodon fuligineo-violaceus* (Kalchbr. apud Fr.) Pat. *sensu* Nikolajeva in Notul. syst. Sect. cryptog. Inst. bot. Komarov. Acad. Sci. U.R.S.S. 9: 147, fig. 2. 1953. — Collection: "*Sarcodon fuligineo-violaceus* (Kalchbr.) Pat. / SSSR, South Sakhalin / 28 VIII 1946 / S. M. Kravčenko" (LE).

The following is, perhaps somewhat freely translated, Nikolajeva's description of her fungus:—

Carpophore fleshy, stipitate. Pileus 6–10 cm, somewhat irregular, flattened to pulvinate, often with the margin crenate to lobed, surface appressed-felted, somewhat smooth with age, radiately rugose where the pileus joins the stipe, scaly towards the margin, dark blue or dark violet, blackish, purplish-violet along the margin, subsequently unicoloured. Spines decurrent, sharp, at first violet, then pinkish-brown, paler towards the apices. Stipe usually eccentric, narrowed at the base, dingy fuscous or with a rusty tinge, 3–5 × 1.5–2 cm. Context of pileus dark violet to purplish-violet, reddish in the stipe. Taste somewhat acrid and bitter, later agreeable. Hyphae thin-walled, with large clamps, colourless or with dense violaceous granular contents. Spores ellipsoid-angular, with scanty fine warts, 3.5–4.5 × 3.5–4 μ.

In the U.S.S.R. found for the first time in South Sakhalin.

It seems a bold statement to claim that the fungus described by Nikolajeva is actually a *Hydnellum* and conspecific with *H. cyanopodium*, for her and Harrison's descriptions differ on several essential points. I wish to make it clear, however, that at least some of the discrepancies may have their origin in the difficulty of finding a translator who combines knowledge of the Russian language and experience with botanical terminology.

Nikolajeva regarded the context as fleshy, and this very probably led her to think that the material belonged in *Sarcodon*. Fleshiness of the context, however, is not a reliable character to be used for the separation of *Sarcodon* and *Hydnellum*. The one important feature is that the context in her fungus is zoned (compare remarks under *Sarcodon ussuriensis*), while an additional feature is the lack of inflated portions in the hyphae. Both characterize the specimen from Sakhalin as a species of *Hydnellum*.

Nikolajeva gave a description of the stipe and the colour of its context. The specimen received on loan lacks a stipe, while the context of the remaining stub attached to the pileus is dark ink-blue.

Contrary to the description reproduced above the spores are exactly as indicated by Harrison, "cruciate with four to six stout processes" (Fig. 4), and measure 4–5 × 3.6–4 μ (including the warts).

The most convincing resemblance between the specimens from California and Sakhalin is to be found in the pileus, but since it does not show sufficiently in the description of either, the following observations are added:—

Pileus heavily radiately wrinkled, with some of the wrinkles running out into acute scales, concentrically zoned with alternating bands of a dull brownish-grey (in places suffused with brown of a warmer hue) and slate-blue, liberally sprinkled with yellowish-brown dots of excreted matter, pale bluish-grey, brownish-grey, or violet-grey along the margin.

The occurrence of *Hydnellum cyanopodium* on both sides of the northern Pacific Ocean stresses the phytogeographical importance of these coastal regions.

There are several species of *Hydnellum* known to possess a blue colour in at least some part of their context. Some have been briefly discussed in a previous paper (Maas Geesteranus, 1957: 51), but the recent introduction of three more species, *H. cruentum*, *H. scleropodium*, and *H. cyanopodium* (Harrison, 1961: 37 and 1964: 1219, 1221), makes it desirable to provide a tentative key.

KEY (BASED ON HERBARIUM SPECIMENS)

1. Hyphae with clamps (although the latter sometimes hard to find).
 2. Surface of pileus not dotted with excretions of crystalline matter.
 3. Tomentum of stipe orange-brown. No odour of cumarine when dry.
 4. Pileus white or bluish when young, turning fairly dark dull brown with age
H. caeruleum (Hornem. ex Pers.) P. Karst.
 4. Pileus cream when young, passing into a rich ochraceous yellow, then warm brown with age (type seen) *H. alachuanum* Murr.
 3. Tomentum of stipe violet-blue. Odour of cumarine when dry
H. suaveolens (Scop. ex Fr.) P. Karst.
 2. Surface of pileus with numerous dots of excreted matter.
 5. Surface of pileus without concentric bluish zones. Context bluish in a zone next to the spines.
 6. Stipe slender, tapering downwards (type seen) *H. cruentum* K. Harrison
 6. Stipe stout, swollen below (type not seen) *H. scleropodium* K. Harrison
 5. Surface of pileus with concentric bluish zones. Context bluish throughout, streaked with pallid lines (type seen) *H. cyanopodium* K. Harrison
1. Hyphae without clamps. Colour pattern as in *H. alachuanum* (type and other authentic material seen) *H. ferrugipes* Coker

Fulgens. — *Hydnum fulgens* Fr. in Öfv. k. Vetensk.-Akad. Förh. 9: 13, 1852.

In a previous paper (Maas Geesteranus, 1967: 68), and in connection with *Hydnum salmoneum* R. Heim, I suggested that *Hydnum fulgens* "could well represent just another colour form of *Donkia pulcherrima*." In this connection Prof. Nannfeldt kindly pointed out to me that ". . .—strange to say—the type [of *H. fulgens*] is still in existence . . ." while Dr. S. Lundell, on revising the material, had found it to be identical with *Polyporus fibrillosus* P. Karst.

Fearing that I might have made a mistake in placing *H. salmoneum* in the genus *Donkia*, I examined the hyphal structure of *P. fibrillosus*, only to find that both species are quite unrelated. The context in *P. fibrillosus* is monomitic, consisting of generative hyphae only, lacking oleiferous hyphae and tendril hyphae. Generative hyphae not inflating, without clamp-connections, covered with a pigment that immediately turns red in KOH.

Polyporus fibrillosus, the type species of *Pycnoporellus* Murrill, is widely different from *Hydnum salmoneum*, which is a true member of *Donkia* and except for its colour indistinguishable from *D. pulcherrima*.

Innovans. — *Hydnum innovans* G. Beck, Itin. Princ. S. Coburgi 2: 145, pl. 16 fig. 1. 1888. — Type: "*Hydnum (Aps)* *innovans* G. Beck. / No. 282 / Cantagallo; an Urwald-bäumen / Dr. H. Wawra" (W).

The type consists of fifteen fruit-bodies glued to a sheet of paper, some showing pileoli proliferating from the margin, but the upper surfaces of parents and offspring facing in opposite directions. Pileus 25–85 mm long, 18–40 mm wide, laterally attached, either sessile or shortly stipitate, flabelliform, plane or concentrically corrugated, with few to numerous concentric colour zones, one to several of these zones radiately rugulose; originally uniformly pubescent, hairs in the older parts of the pileus subsequently collapsed to form a dense felt, finally disappearing to leave a glabrous surface; yellow-brown along the margin, the darker zones and the area towards the base fulvous or nearly fuscous. Spines up to 1.5 mm long, crowded, subulate to flattened, corneous, yellow-brown to brown, pruinose. Context less than 1 mm thick, tough, fibrous, without apparent zones, yellow-brown.

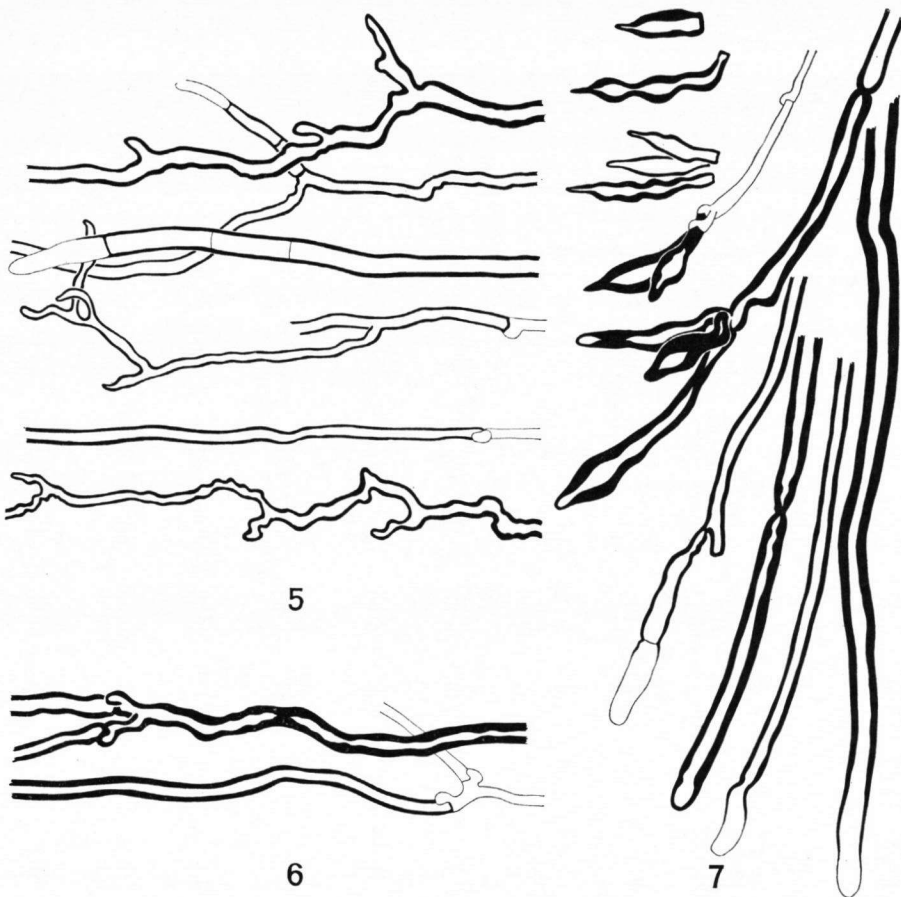
Context of pileus dimitic, made up of generative and skeletal hyphae and an intermediate type. Generative hyphae 2–2.7 μ wide, not inflating, thin-walled, septate, branched, with clamp-connections at all septa. Skeletals 2.7–7 μ wide, moderately to very thick-walled (cell-walls 0.7–2.5 μ), unbranched, straight to somewhat undulating, often thinner-walled at the apex and with 1 to several 'cloisons de retrait'. Intermediate type of hyphae thick-walled, with or without septa, usually without clamps, often very much kinked, variously branched (Fig. 5). Context of the spines dimitic, the axis of the spines predominantly made up of skeletal hyphae, which towards the sides form the cystidia. Basidia collapsed. Spores not seen. Cystidia near the apex of the spines of tramal origin, passing by gradual steps into hymenial cystidia towards the base of the spines, usually thick-walled (Fig. 7).

The collection described above belongs to *Steccherinum rawakense* (Pers. apud Gaud.) Banker and is characterized by its New World type of thick-walled cystidia (compare also Maas Geesteranus, 1964: 171–176).

The intermediate type of hyphae are very much in evidence, but I do not remember having seen them in other collections of this species from South America. I believe, however, that their presence or absence is hardly of taxonomic significance. Usually it is difficult to decide whether they are modified skeletals or generatives, but in one case I found an unmistakable example of a sclerified generative hypha (Fig. 6).

Jooides. — *Hydnum joeides* Pass. in Nuovo G. bot. ital. 4: 157. 1872. — *Sarcodon joeides* (Pass.) Bourd. & Galz., Hym. France 450. 1928 ("*ionides*"). — Type: "*Hydnum jonides* Pass. / In castaneto Collecchio / Pass." (Herb. Saccardo, PAD).

The type consists of three slices, two of the pileus, a third of the stipe. The fragments are rather badly pressed and somewhat mouldy, though otherwise in reasonable condition. Pileus about 30 mm across, plano-convex, glabrous and somewhat shiny, fairly dark reddish-brown. Stipe (broken) about 28 mm long, up to 5–6 mm broad above, tapering downward, somewhat curved, solid, smooth, minutely tomentose above, glabrous below, yellow-brown, not darkened at the base. Spines decurrent, up to 2 mm long, crowded, subulate, brown. Context of the pileus dull greyish-brown under the upper surface, dull grey over the spines, suffused with lilac in the centre.



Figs. 5-7. *Hydnum innovans* G. Beck (type). — 5. Detail of the context showing hyphae of a type intermediate between generative and skeletal hyphae. — 6. Sclerified generative hypha and skeletal hypha. — 7. Detail of the hymenium showing tramal and hymenial cystidia. (All figures $\times 700$).

Context of the pileus monomitic. Generative hyphae inflating, thin-walled, branched, septate, without clamp-connections. Hyphae from the context of the spines similar. Basidia collapsed, clavate, 4-spored. Spores $5.4-6.3 \times 4-4.5 \mu$ (warts included), coarsely tuberculate, brown. Cystidia none.

Until recently I was uncertain of the identity of *Hydnum joeides*, mainly because of Saccardo's note in which the spores were stated to be globose, shortly and finely spinulose, $3-3.2 \mu$ diameter, and hyaline (Maas Geesteranus, 1956: 51). Prof. J. A. Nannfeldt kindly drew my attention to the presence of the type in Saccardo's herbarium. Examination of this material proved the note referred to above to be

erroneous. In spite of the differences between the various original descriptions, I am satisfied that *Hydnum joeides* Pass. (1872), *H. fuligineo-violaceus* Kalchbr. apud Fr. (1874), *Sarcodon commutatus* Bourd. & Galz. (1924), and *Sarcodon inopinatus* Donk (1933) are all referable to the same species, the correct name of which is *Sarcodon joeides*. A definite opinion about *Sarcodon catalaunicus* P. Maire must be postponed.

Continued experience with later collections of the present species necessitates the insertion of the following emendation to my previous description (Maas Geesteranus, 1956: 50): Context bright pinkish-lilac throughout in young specimens, turning violet in the stipe and over the spines with age, gradually becoming streaked with brown, eventually almost entirely faded into dull brown.

Reconsidering Kalchbrenner's illustration of *H. fuligineo-violaceum* (1877: pl. 32 fig. 2) in the light of my better knowledge of the present species, it is now obvious that the rendering of the colours of pileus and stipe is not at all as bad as I had come to believe. The illustration shows some very young specimens, characterized by their regular shape, smooth surfaces, and pale colours; only the colour of the context is beside the mark, as it should have been of a bright lilac-pink.

Puiggarii. — *Hydnum puiggarii* Speg. in Boln Acad. nac. Cienc. Córdoba 11: 457. 1889. — ? Type: "Irpex / 1.709 / Puiggari [in pencil, and in ink:] *Hydnum Puiggarii* Sp." (LPS).

Since Spegazzini indicated No. 1700 as the specimen he described as *Hydnum puiggarii*, it would follow that the material sent on loan under No. 1709 is not the type, unless Spegazzini was in error. Prof. J. C. Lindquist in his letter explained that this is the only specimen extant, while the pencilled cross on the cover is the characteristic way Spegazzini used to mark his type specimens. However, the above loses all its significance, since the packet contains a few bits of bark, but no fungus.

The description given by Spegazzini suggests that his material was referable to *Steccherinum rawakense* (Pers. apud Gaud.) Banker.

Reisneri. — *Clavaria reisneri* Vel., České houby 781. 1922 (Latin translation by Pilát in Op. bot. čech. 6: 282. 1948). — *Ramaria reisneri* (Vel.) Vel., Novit. mycol. noviss. pl. 1 fig. 5. 1947. — *Clavicornia reisneri* (Vel.) Corner apud Pilát in Acta Mus. nat. Prag. (B) 14: 148. 1958. — Type: "No. 154902 / Velenovský: Fungi bohémici / *Clavaria Reisneri* Vel. / Smíchov, 1916-X / *Reisner*" (PR).

The type specimen is small and has been partly eaten by larvae. The existing descriptions, however, drawn up by Velenovský (1922) and Pilát (1958), are more than adequate, so that it remained only to check up the amyloid reaction of the spores. These are 4.9–5.5 μ in diameter, globose to subglobose, punctate to sparsely dotted with very small warts, strongly amyloid. The information now available (the descriptions by Velenovský and Pilát, Velenovský's illustration, the amyloid reaction of the spores) furnishes a clear picture: *Clavaria reisneri* is the name given to a stunted specimen of *Hericium coralloides* (Scop. ex Fr.) S. F. Gray.

It is important to note that Reisner collected the specimen from a log in a timber-yard. The specimen may have been in a position in which it could do little else but grow upwards. Given time and moisture, however, its branches would no doubt have curved to a drooping position. In one particular forest in Poland, during the Fourth European Mycological Congress, I had ample occasion to study the successive stages in the development of the carpophore of *H. coralloides*. The type of *Clavaria reisneri* is an example of a specimen, the development of which was interrupted in its earliest stage. But even in that stage the specimen is recognizable as a member not of *Clavicornona*, but of *Hericium*, as it lacks some of the features, which Corner (1950: 285) emphasized in his diagnosis of the former genus: the fruit-body is *not* "pyxidately branched," the branches are *not* characterized by "sterile cyathiform tops," and there are *no* "proliferating whorls of . . . branchlets from the margin of the top."

Talpa. — **Sarcodon talpa** Maas G., *spec. nov.*³ — Type: "*Hydnum fuligineo-violaceum* Kalchbr. / In sylva conifera Tertiolasii⁴—Val di Sole—1881 / *Læg. G. Bresadola*" (S).

MISAPPLIED NAME: *Hydnum fuligineo-violaceum* Kalchbr. apud Fr. *sensu* Bres., *Fungi trid.* 2: 32, pl. 139. 1892; *Icon. mycol.* 21: 1048, pl. 1048. 1932.

For the Latin description the reader is referred to Bresadola's original account published in 1892, of which the following translation is given, augmented with a few data, mainly microscopical, taken from the type:—

The type consists of four specimens, two medium-sized and two smaller ones, all of which have been poisoned and, consequently, ruined. Pileus 60–90 mm across, at first convex, then depressed, with some irregular humps in the centre, without concentric zones, subtomentose, the tomentum as it ages breaking up into small patches and squamules which, at least near the margin, are radiately aligned; "atrocaeruleus" or "atroviolaceus",⁵ becoming blackish; margin often indented or lobed, somewhat rufous, Stipe 30–50 × 15–20 mm, solid, tapering downward, roughened above from abortive spines, otherwise smooth, minutely tomentose, glabrescent, "rufo-fuligineus". Spines decurrent, crowded, subulate, flesh-coloured fuscous, with pale apices. Context fleshy, not zoned, dark violet in the pileus, reddish in the stipe.

Context of the pileus monomitic. Generative hyphae up to 23 μ wide, inflating, thin-walled, branched, septate, without clamp-connections. Hyphae from the context of the spines similar, less wide. Basidia collapsed, clavate, 4-spored, without basal clamp-connection. Spores 5.2–6.3 × 4.2–5.4 μ (warts included), at first rather sparingly set with prominent warts, becoming increasingly coarsely tubercular, brownish, with oblique apiculus (Figs. 8, 9). Cystidia none.

³ Etymology: Talpa, mole, an allusion to the colour of the pileus.

⁴ This is the Latinized name for Terzolas.

⁵ Some of the terms denoting a colour, which does not tally with the colour shown in Pl. 1048, are left untranslated. The plate published in 1892 is too poor to be of any service.

FURTHER COLLECTIONS EXAMINED: 1. "In pinetis Maestrangi a S. Antonio—24 Oct. 1901 / Leg. G. Bresadola" (S); 2. "Margone pr. Trento, in pinetis, IX 1903 / G. Bresadola" (W); 3. "Margone in pinetis—Nov. 1903 / Leg. G. Bresadola" (S); 4. "Mendola, Bosco di fronte a Ruffrè / Agosto 1907 / Leg. G. Bresadola" (S); all under the name *Hydnum fuliginéo-violaceum*.

Collections 1–4 are in a much better condition than the type. From them the following supplementary details have been drawn up:—

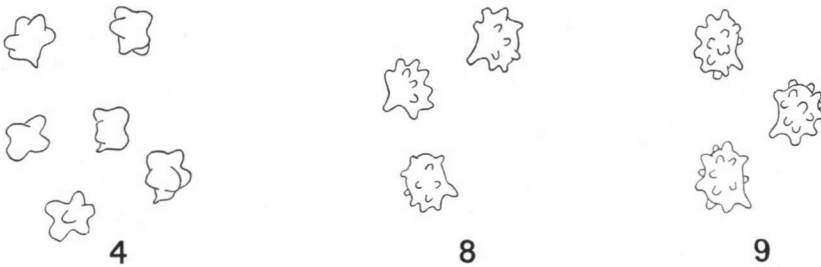


Fig. 4. *Hydnellum cyanopodium* K. Harrison (from South Sakhalin). — Spores ($\times 1400$)
Fig. 8, 9, *Sarcodon talpa* Maas G. (8: type; 9: from Margone, 1903). — Spores ($\times 1400$).

Pileus up to 75 mm across (therefore very likely much larger than 90 mm when fresh), finely radiately fibrillose in some specimens, clearly fibrillose-squamulose in others, the tomentum collapsed to form a glabrous pellicle in most specimens, shiny, dark fuscous to black, the margin apparently remaining tomentose, reddish-brown for a long time. Stipe up to 60 mm long, glabrous and blackish above, the pointed base densely covered with a whitish, creamy to dingy ochraceous velvety tomentum. Spines up to 4 mm long, yellowish-brown to greyish-brown. Context dark slate-coloured or dark violet-grey in the pileus and the upper part of the stipe, pallid with a reddish tint or dingy reddish in the base of the stipe.

A thin slice of the slate-coloured context dropped in a KOH solution immediately stains bright blue-green, but loses its brightness by the subsequent development of a yellow-brown cloud.

Sarcodon talpa is related to two other species with violaceous context, *S. joeides* and *S. fusco-indicus*.⁶ Since they form such a well-defined group, this would seem to be a suitable time to take the first steps towards a subdivision of the genus.

SARCODON sect. SARCODON

Contextus pilei albus vel pallidus, fractus interdum rubescens vel vinaceo-suffusus. Contextus stipitis ad basin concolor vel paulo obscurior. Hyphae fibulatae. — Typus sectionis: *Sarcodon imbricatus* (L. ex Fr.) P. Karst.

Context of the pileus white or pallid, on exposure sometimes becoming flushed with reddish or vinaceous tints. Context in the base of the stipe concolorous or

⁶ *Sarcodon fusco-indicus* (K. Harrison) Maas G., *comb. nov.*; basionym, *Hydnum fusco-indicum* K. Harrison in *Can. J. Bot.* 42: 1213, pl. 1 fig. 3. 1964.

somewhat darker. Hyphae with clamp-connections. — Type species: *Sarcodon imbricatus* (L. ex Fr.) P. Karst.

EXAMPLES: *S. imbricatus* (L. ex Fr.) P. Karst., *S. laevigatus* (Sw. ex Fr.) P. Karst.

SARCODON sect. Amarescentes Maas G., *sect. nov.*

Contextus pilei albidus vel pallidus, fractus rubescens vel vinaceo-suffusus. Contextus stipitis fuscidulus, ad basin atrovenetus vel atro-ardesiacus. Hyphae efibulatae. — Typus sectionis: *S. amarescens* (Quél.) Quél.

Context of the pileus whitish or pallid, on exposure flushed with reddish or vinaceous tints. Context of the stipe brownish, but blackish-green or dark slate blue in the base. Hyphae without clamp-connections. — Type species: *S. amarescens* (Quél.) Quél.

EXAMPLES: *S. amarescens* (Quél.) Quél., *S. fennicus* (P. Karst.) P. Karst., *S. scabrosus* (Fr.) P. Karst.

SARCODON sect. Violacei Maas G., *sect. nov.*

Contextus seu primo roseus, postea violascens, seu ab initio violaceus, saltem in pileo. Hyphae efibulatae. — Typus sectionis: *S. joeides* (Pass.) Bourd. & Galz.

Context either at first pink, later turning violet, or else violet from the beginning, at least in the pileus. Hyphae without clamp-connections. — Type: *S. joeides* (Pass.) Bourd. & Galz.

EXAMPLES: *S. joeides* (Pass.) Bourd. & Galz., *S. fusco-indicus* (K. Harrison) Maas G., *S. talpa* Maas G.

The genus contains several more sections, but these can better be discussed elsewhere.

Harrison (1964: 1214) described a *Hydnum cyanellum*, characterized by "lilac-gray" context, but it is not clear whether it belongs with sect. *Violacei*; I did not examine the material.

The following key should facilitate the differentiation of the three constituent species of this section:—

KEY TO THE SPECIES OF SECT. VIOLACEI

1. Pileus dark grey to blackish, at least centrally.
 2. Context dark violet-grey throughout. Taste mild. Stipe dark coloured throughout, the base not covered with a conspicuous whitish tomentum *S. fusco-indicus*
 2. Context dark violet-grey in the pileus and upper part of the stipe, reddish farther down the stipe. Taste somewhat acrid, bitterish. Stipe dark coloured above, much paler and reddish in the lower part, the base covered with a conspicuous whitish tomentum *S. talpa*
1. Pileus yellow-brown, flesh-coloured pinkish-brown, fulvous *S. joeides*

In connection with our present knowledge of this section, an old and forgotten species should be reconsidered, *Sarcodon violaceus* (Thore apud Pers. ex Roques) Quél. At the time I was engaged in revising the *Hydnum*s of the Netherlands (Maas Geesteranus, 1958: 59), I failed to identify this species, but it now seems possible that this species represents a fourth member of the section.

Apart from the type of *Sarcodon fusco-indicus*, borrowed from the Herbarium at Ann Arbor, I had the opportunity to study two more collections of the same species from the Herbarium at Berkeley, California. These collections (Washington: Bremer-ton, 25 and 29 October 1933, *J. B. Flett*) supplement the already-extensive list published by Harrison.

Ussuriensis. — *Sarcodon ussuriensis* Nikol. in Notul. syst. Sect. cryptog. Inst. bot. Komarov. Akad. Sci. U.R.S.S. 14: 196, fig. 1961; in Fl. Pl. cryptog. U.R.S.S. 6(2): 295, fig. 225, pl. 71 figs. 2-4. 1961. — Type: "*Sarcodon ussuriensis* Nikol." (LE).

The material received on loan was part of the type collection and represented the lower right hand quadrant of the specimen, a photograph of which is shown in Plate 71 fig. 2 referred to above.

The Latin diagnosis given by Nikolajeva agrees in its general lines with this specimen, but a few additional details seem to be called for.

Pileus depressed in centre, its tomentum collapsed, surface, except for a network of fine wrinkles, fairly smooth, somewhat shiny, fairly dark purplish-brown, with whitish to dingy yellowish remnants of the original tomentum towards the margin, the margin itself blackened. Stipe (of which only a fragment was sent along) with the tomentum collapsed, dark brown. Context of pileus not really fleshy, but rather leathery-corky fibrillose, zoned, in the centre dingy bluish-grey over the spines, brownish pallid near the upper surface, the latter layer gradually thinning out towards the margin. Context of stipe warm brown, passing into brownish-orange towards the base.

Context of pileus monomitic. Generative hyphae 3-5.8 μ wide, not inflating, thin-walled to moderately thick-walled, branched, septate, with occasional clamp-connections, geniculate at regular intervals to form a faint zonation.

The zonation of the context caused by the concurrent genuflexion of the hyphae is typical of the genus *Hydnellum*. The collapsed tomentum and the depressed centre of the pileus show that the specimen was already old when it was collected, but enough is left of the original colours of the context of pileus and stipe to determine the species: *Sarcodon ussuriensis* is hereby formally reduced to the synonymy of *Hydnellum caeruleum* (Hornem. ex Pers.) P. Karst.

Harrison (1964: 1205-1206) opposed the use of a zonation of the flesh as a key character to differentiate between *Hydnellum* and *Sarcodon*. He said that "this may be misleading as the production of zones is a reaction to variations in growing conditions and can indicate either alternating phases of daylight and darkness or periods of high and low humidity." Quite true. A *Hydnellum* responds to certain factors in its environment in a definite way. But a *Sarcodon*, growing in the same environment, gives a different (and equally definite) response. It should be kept in mind, of course, that although certain environmental factors may release certain responses, the latter are genetically conditioned, so that a *Hydnellum* invariably gives the same response, which invariably differs from that of a *Sarcodon*. I maintain,

therefore, that the zonation of the context in *Hydnellum* is a good character, which is not known to occur in *Sarcodon*. If, exceptionally, there is a zonation in the latter genus (Maas Geesteranus, 1962: 390), it is brought about in a very different manner. To know the difference, it is indispensable to tease out the tissue patiently and, with a slight alteration of the now classical dictum (Corner, 1953: 153), I would like to point out that it is wasting time not to do this.

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ADDENDUM

After this paper had gone to the press, one half of a *Sarcodon* was received, kindly sent for identification by Miss G. Gulden, Botanical Museum, Oslo. It was a great surprise to recognize *Sarcodon talpa*.

MATERIAL EXAMINED: “Norway, Buskerud: Hole, Vik, 15 Oct. 1967, Kjell Kvavik & Gro Gulden 684/67, under *Picea* on Cambro-Silurian soil” (O).