

Phellodon secretus (Basidiomycota), a new hydneaceous fungus from northern pine woodlands

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Phellodon secretus Niemelä & Kinnunen (Basidiomycota, Thelephorales) resembles *Phellodon connatus* (Schultz : Fr.) P. Karst., but differs in having a thinner stipe, cottony soft pileus, and smaller and more globose spores. Its ecology is peculiar: it is found in dry, old-growth pine woodlands, growing in sheltered places under strongly decayed trunks or rootstocks of pine trees, where there is a gap of only a few centimeters between soil and wood. Basidiocarps emerge from humus as needle-like, ca. 1 mm thick, black stipes, and the pileus unfolds only after the stipe tip has contacted the overhanging wood. In its ecology and distribution the species resembles *Hydnellum gracilipes* (P. Karst.) P. Karst. It seems to be extremely rare, found in Northern boreal and Middle boreal vegetation zones, in areas with fairly continental climate.

Key words: Aphyllorphorales, *Phellodon*, hydneaceous fungi, taxonomy

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Introduction

Virgin pine woodlands of northern Europe make a specific environment for fungi. The barren sandy soil, spaced stand of trees and scanty lower vegetation result in severe drought during sunny summer months, in particular because such woodlands are usually situated on exposed hillsides, river banks, and tops of eskers. *Pinus sylvestris* grows in almost pure stands, accompanied by single *Picea abies* and *Betula pubescens* here and there. Slowly growing and straight pine trees give excellent timber, and nowadays fairly little is left intact of these handsome forests.

Fungal decomposition proceeds slowly in such dry habitats, and just a few wood-rotting species can easily occupy dry coarse woody debris there. In natural conditions pine trees die of wildfires or fall down in storms, but quite a lot of them succeed to reach a high age of 300–500(–800) years,

eventually dying while standing. Such dead pine trees may keep standing for another 200–500 years, losing their bark and thinner branches: in this way the so-called *kelo* trees develop, common and characteristic for northern old-growth pine woodlands. This process was described in detail by Niemelä et al. (2002), and in that paper many wood-inhabiting fungi of the *kelo* trees were listed.

A team of mycologists from the University of Helsinki (Yu-Cheng Dai, Juha Kinnunen, Olli Manninen, Tuomo Niemelä, Dmitry Schigel, Olli Turunen) has inventoried protected old forests of North and East Finland during the years 1998–2002. These studies were initiated and organized by the local offices of the governmental Natural Heritage Services; for the background of the inventories in Lapland, see Niemelä et al. (2003).

This intensive and laborious fieldwork revealed a number of previously unknown fungal species, among them the peculiar hydnyaceous fungus described here.

During the preparation of this paper it turned out that Pertti Renvall had collected the same species already in the 1980s in eastern Lapland.

Materials and methods

Specimens of the new species were collected by the authors with coworkers. They were photographed in the field, and fresh character and ecology notes were made. Specimens were dried soon after field trips in mushroom dryer with ventilated 30–40°C temperature.

In addition to the new species, selected voucher materials of related *Phellodon* species were studied for comparison. All the specimens listed are deposited in the Botanical Museum of the University of Helsinki (H), unless otherwise indicated. Herbarium abbreviations are according to Holmgren et al. (1990).

Microscopic studies were done and spores were measured from sections mounted in Cotton Blue (abbreviated CB): 0.1 mg aniline blue (Merck 1275) dissolved in 60 g pure lactic acid; CB+ means cyanophily, CB(+) weak but distinct cyanophilous reaction, CB– acyanophily. Amyloid and dextrinoid reactions were tested in Melzer's reagent (IKI): 1.5 g KI (potassium iodide), 0.5 g I (crystalline iodine), 22 g chloral hydrate, aq. dest. 20 ml; IKI– means neither amyloid nor dextrinoid reaction. Occasionally also 5% KOH was used as mountant or reagent.

As a rule 30 spores were measured from each specimen selected for closer scrutiny; spore spines were excluded while measuring the dimensions. Measurements were done using $\times 1250$ magnification, phase contrast, oil immersion; eyepiece scale bar showed a 1- μm -grid, and dimensions were estimated visually with an accuracy of 0.1 μm . In presenting the variation of spore size, 5% of the measurements out of each end of the range are given in parentheses. L= mean length (arithmetical mean of all spores), W= mean width, Q= extreme values of the length/width ratios among the studied specimens, and n= the number of spores measured from given number of specimens.

SEM photographs were taken by Cambridge Scan S-2 microscope (20 Kv, registration of secondary electrons). Preliminary picture editing was made in MicroCapture 2.2. and further editing in Corel PhotoPaint 9.

The main reference books used were: Coker & Beers (1951), Nikolaeva (1961), Maas Geesteranus (1971, 1975), Domański (1975), Baird (1986a, b), Breitenbach & Kränzlin (1986), Stalpers (1993), and Hansen & Knudsen (1997). Special colour terms are from Anonymous (1969), Rayner (1970) and Petersen (1996).

Phellodon secretus Niemelä & Kinnunen, species nova

– Figs. 1–4

Fungus stipitatus, aculeatus, terrestris, parvus. Pileus mollis, tomentosus, griseoalbus, azonatus, stipite tenui, spiculoso, nigro, aculeis al-

bidis vel griseoalbis. Hyphae hyalinae, afibulatae; sporae hyalinae, globosae, spiculatae, 2.9–3.3 \times 2.7–3 μm .

Typus: **Finland**, Pohjois-Karjala Prov., Ilomantsi, Koivusuo, 26.IX.2002 Niemelä 7460, Kinnunen & Schigel (holotype, H).

Etymology: *secretus* (Latin, adj.) = separate, hidden, set aside, secret, etc., referring to the way of growth out of sight under fallen trunks.

Basidiocarp terrestrial, stipitate, small, slender and fragile, single or confluent with 2 or more, separate stipes supporting a common pileus. Pileus plane or funnel-shaped or irregularly roundish and lobed, 0.9–3(–5.5) cm in diam., very thin, 0.3–1.5(–3.5) mm, cottony soft throughout, at first white with ash-grey tint, later darker grey (mouse-grey) or with a hue of sepia, evenly coloured (young) or paler towards the margin (old), but not zonate. Lower surface at first white, then light greyish white (pale mouse-grey), spines sharp, slender, regular, dense, finally 0.3–0.9(–1.5) mm long and 0.06–0.12 mm diam. at base. Stipe black, glabrous, very thin, 0.3–1.8(–2.3) mm and of even thickness, 10–18 mm long, brittle when dry. A slice of context stains olivaceous (pale brownish green) in KOH. Fresh basidiocarp odourless, dry with very faint spicy scent.

Monomitic, hyphae simple-septate, hyphal walls CB+, IKI–, mostly KOH–; hyphae of context and stipe covered with minute, scattered, amyloid granules. *Context* hyphae thin-walled, of even thickness (not inflated), hyaline except close to lower surface where slightly grey-brown, (2.8–)3–4.2(–4.7) μm in diam. (n=30/1), making a spaced interwoven network where a few hyphae often run parallel in bundles; *context* hyphae olivaceous in KOH. *Stipe* surface with parallel, slightly thick-walled, black-brown hyphae with prominent septa, (3.2–)3.6–5(–5.7) μm in diam. (n=30/1); of them long, single hyphal tips arise upwards, but no differentiated tomentum present; stipe medulla with brown, regular, subparallel hyphae, (2.7–)3.4–4.7(–5) μm in diam. (n=30/1). *Tramal* hyphae in spines very thin-walled, fragile, of even thickness, subparallel, hyaline (pale brownish in inner parts close to attachment), (2.1–)2.6–3.5(–3.7) μm in diam. (n=30/1); subhymenium not differentiated. *Hymenium* with basidia and basidioles only, basidia clavate with long, rooting base, 21–34 \times 4.9–5.6 μm (n=10/1), sterigmata 4, no basal clamp; basidioles clavate, (16–)20–29 \times (3.8–)4.7–5 μm (n=10/1); hyphal tips regular at spine apex.

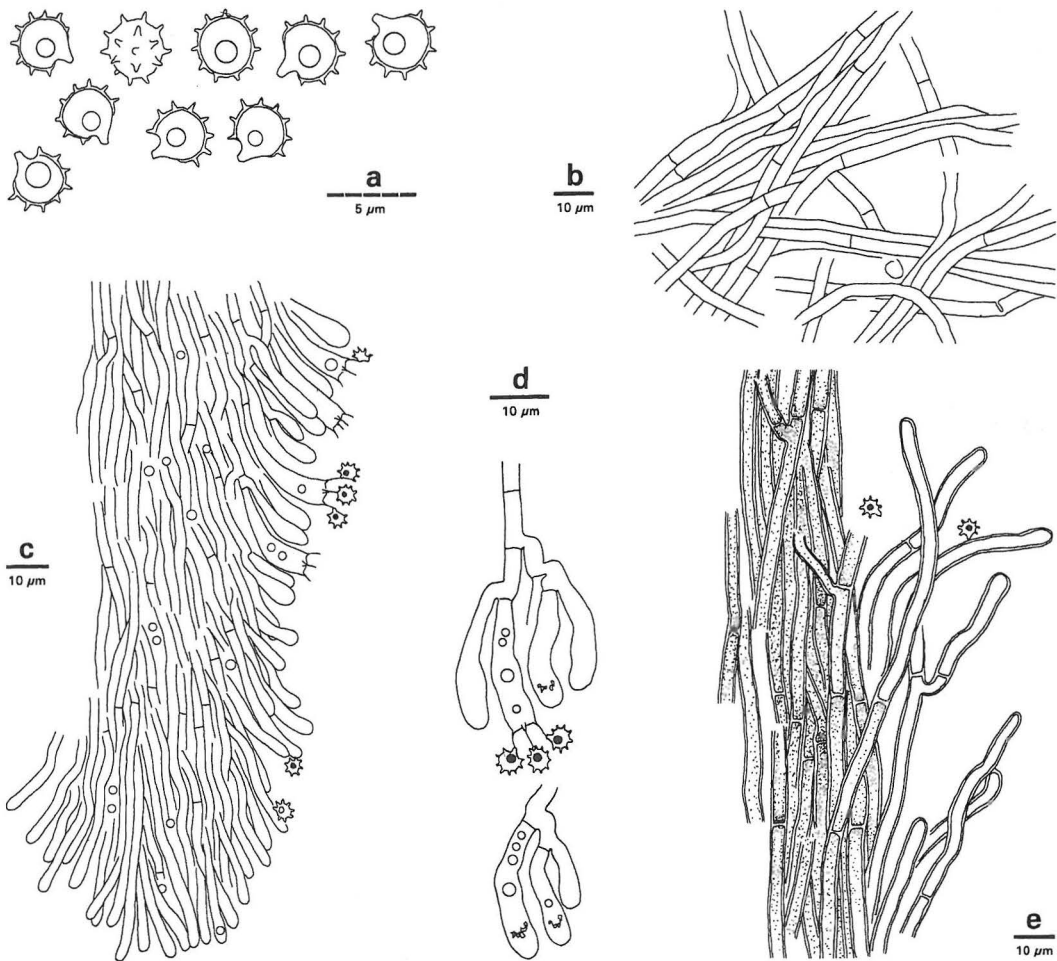


Fig. 1. *Phellodon secretus* Niemelä & Kinnunen. a) spores, b) hyphae from context, c) vertical section of aculeus, d) hymenial cells, e) section from stipe surface. Drawn by TN in CB from holotype.

Basidiospores globose, thin-walled, hyaline, CB- or CB(+), IKI-, KOH-, (2.8-)2.9-3.3(-3.8) × (2.4-)2.7-3(-3.2) μm, L=3.10 μm, W=2.87 μm, Q=1.06-1.10 (n=180/6), with separate spines, distinct oblique apiculus, and medium to small guttule.

Specimens studied: **Finland.** Etelä-Häme Prov.: Tammela, Mustiala, Syrjäås, 21.VIII.1866 *Karsten* 4677; 6.X.1866 *Karsten* (F. Fenniae Exs. 10: 907, H; Herb. E. Fries, UPS). Pohjois-Karjala Prov.: Ilomantsi, Hattuvaara, Koivusuo Strict Nat. Res., 26.IX.2002 *Niemelä* 7460, *Kinnunen & Schigel*;



Fig. 2. *Phellodon secretus* Niemelä & Kinnunen, basidiocarps *in situ*. Holotype, approximately natural size, photo TN.

29.IX.2002 Kinnunen 1727, Niemelä & Schigel. Kittilän Lappi Prov.: Kolari, Ylläsjärvi, Tunturipalo, 9.IX.1999 Niemelä 6646, 6648 & Renvall 3873 (KUO). Muonio, Äkäskero, 22.VIII.1999 Niemelä 6508, 6509 & Dai. Sompion Lappi Prov.: Savukoski, Urho Kekkonen Nat. Park, Jaurujoki, Peuraselkä, 23.IX.1987 Renvall 628.

Ecology and distribution

The new species is very special in its ecology. All fruit bodies found by us were growing in virgin, dry pine woodlands, in narrow spaces under fallen pine trees. The wood was either extensively rotten trunk, or rootstock of long-ago fallen tree, preferably kelo (Niemelä et al. 2002). Such sheltered places were dry even in rainy days. The reason of favouring such places may be that there is less competition between mycelia there, or that even though the site is dry, its humidity is very constant throughout the season, because of little ventilation in the narrow gap.

We got an impression that the new species is mycorrhizal, because basidiocarps clearly arose

from the humus. According to Urmas Kõljalg (pers. comm.), 'so far it is known that all the tested species of the Thelephorales, including the resupinate genera *Pseudotomentella*, *Tomentella* and *Tomentellopsis*, are mycorrhizal. Therefore it is logical to deduce that *P. secretus* is mycorrhizal, too.'

Basidiocarps start to develop as black, needle-thin stipes, sharp at their apex. In some cases tens of such erect stipes were emerging side-by-side on humus or sandy soil. The pileus usually starts to grow only after the tip touches the overhanging wood, and if the distance is too long, the growth may terminate and only needle-like stipes are left (e.g., specimen 6509). The growing pileus spreads along the wood surface above, and becomes lightly attached to it so that when the wood is lifted up, the stipe sometimes breaks apart and pileus follows the wood, or the pileus becomes detached and whole basidiocarp remains standing on the ground beneath.

Our finds imply that the new species is at least nowadays a rarity of northern pine forests. However, two collections by P.A. Karsten from the

year 1866 (in H and UPS) derive from southern Central Finland. It seems that Karsten hesitated to name his material (evidently recollected from a single site), because he sent the second collection to Fries; no new name was proposed by either Karsten or Fries. The collecting site at Ilomantsi belongs to slightly continental section of Middle boreal zone (Ahti et al. 1968). Most collections were made in Finnish Lapland (Northern boreal zone): in easternmost parts (Savukoski, Renvall 628) and communes of Kolari and Muonio in the west, in forests belonging to the planned, extensive Ylläs–Pallas National Park (Koivisto 2003), extending in north-south direction throughout western Finnish Lapland. We have not seen material from other countries.

Related species

In its size, the very thin stipe and the peculiar way of growth *Phellodon secretus* resembles *Hydnellum gracilipes* (P. Karst.) P. Karst., and in fact the two species were sometimes found growing in the same forest, under separate tree trunks but not far from each other. While the 'stipe' of *H.*

gracilipes (see Kõljalg & Renvall 2000) is just a fragile rhizomorph or mycelial cord, the present species has a true, differentiated stipe. The two species differ clearly in their colours, *H. gracilipes* being bright purple-brown.

The closest relative is *Phellodon connatus* (Schultz : Fr.) P. Karst. (= *P. melaleucus* (Fr. : Fr.) P. Karst.), also having a black, glabrous stipe. That species is usually more robust: both cap and stipe are thicker and tough both when fresh and dry. The spicy odour of dry *P. secretus* is faint, hardly noticeable, while it is strong and pungent in *P. connatus*. At least in Finland *P. connatus* usually grows in spruce-dominated forests amongst thick moss and fairly moist ground; also when found in pine forests the moss layer is thick in places where the fruit bodies of *P. connatus* emerge. In most cases macroscopy and ecology are enough to separate it from *P. secretus*, but every now and then dwarf basidiocarps are found. Then spore size and shape are the differentiating characters (Fig. 3, Tab. 1); context hyphae of *P. connatus* are more densely packed than in the new species, and almost parallel, thus offering another striking difference.

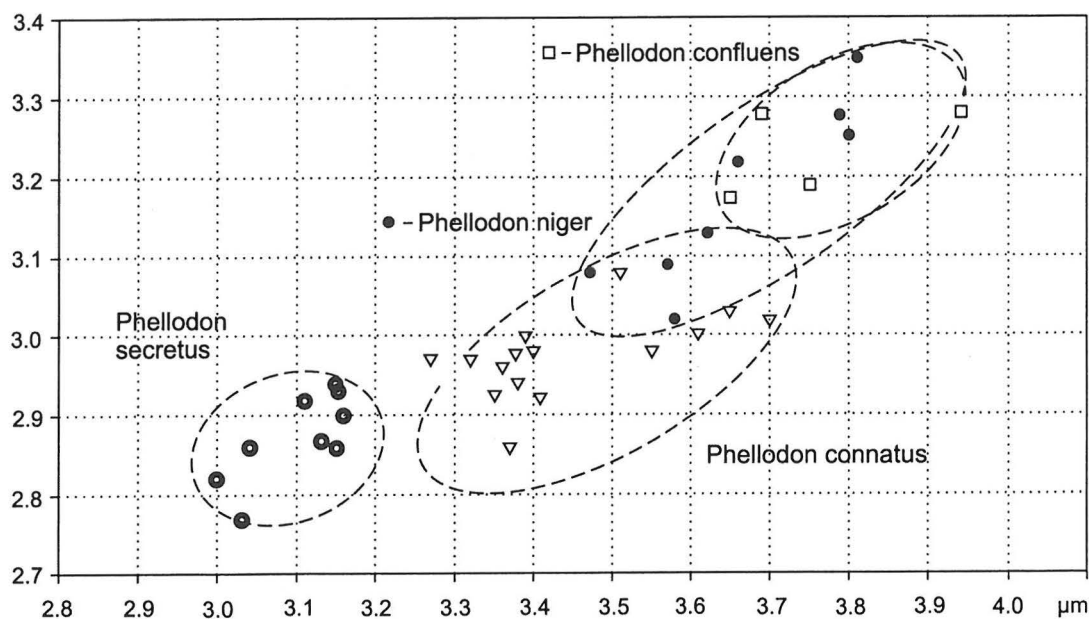


Fig. 3. Spore dimensions in four species of *Phellodon*. Spore spines were excluded from the measurements. Each symbol indicates a single specimen, mean value of 30 spores measured in CB.

Table 1. Spore dimensions of the specimens studied. 30 spores were measured for each specimen. Spore spines were excluded from the measurements.

| Specimen | Spore dimensions | Spore L × W | Q |
|-----------------------------|---|-------------|------|
| <i>Phellodon secretus</i> | | | |
| Karsten 4677 | (2.9–)3.0–3.3(–3.5) × (2.5–)2.6–3.0 | 3.15 × 2.86 | 1.10 |
| 1866 Karsten (UPS) | 3.0–3.3 × (2.8–)2.9–3.0 | 3.15 × 2.94 | 1.07 |
| Kinnunen 1727 | (2.9–)3.0–3.4(–3.6) × (2.5–)2.7–3.0(–3.1) | 3.17 × 2.90 | 1.09 |
| Niemelä 6508 | (2.8–)2.9–3.3(–3.4) × (2.6–)2.8–3.1 | 3.11 × 2.92 | 1.06 |
| Niemelä 6509 | 3.0–3.3 × 2.8–3.0(–3.1) | 3.17 × 2.94 | 1.08 |
| Niemelä 6646 | (2.9–)3.0–3.2(–3.3) × 2.7–3.0 | 3.04 × 2.87 | 1.06 |
| Niemelä 6648 | (2.8–)2.9–3.2(–3.3) × (2.4–)2.6–3.0(–3.1) | 3.03 × 2.78 | 1.09 |
| Niemelä 7460 | 2.8–3.1(–3.5) × 2.6–3.0(–3.1) | 3.01 × 2.82 | 1.07 |
| Renvall 628 | 3.0–3.3(–3.7) × (2.5–)2.7–3.9(–3.1) | 3.13 × 2.87 | 1.09 |
| <i>Phellodon connatus</i> | | | |
| Haikonen 20367 | (2.9–)3.0–3.8(–4.0) × (2.6–)2.8–3.1(–3.3) | 3.32 × 2.97 | 1.12 |
| 1934 Häyrén | (3.0–)3.1–3.7(–4.0) × (2.7–)2.8–3.1 | 3.35 × 2.92 | 1.15 |
| Karsten 2038 | (3.2–)3.3–4.0(–4.1) × (2.6–)2.9–3.2(–3.5) | 3.62 × 3.00 | 1.21 |
| Kinnunen 1518 | (3.1–)3.3–4.0(–4.1) × 2.8–3.2(–3.7) | 3.70 × 3.01 | 1.23 |
| 1985 Koski-Kotiranta | (3.0–)3.1–3.8(–4.0) × (2.5–)2.6–3.0(–3.1) | 3.37 × 2.87 | 1.18 |
| Kytövuori 871177 | (3.1–)3.2–3.7(–3.9) × (2.8–)2.9–3.2 | 3.38 × 2.98 | 1.13 |
| Kytövuori 921484 | (3.1–)3.2–3.6(–4.0) × (2.6–)2.9–3.2(–3.3) | 3.39 × 3.00 | 1.13 |
| Kytövuori 922480 | (3.1–)3.2–3.6(–3.8) × (2.6–)2.8–3.0(–3.1) | 3.38 × 2.94 | 1.15 |
| Kytövuori 922648 | 3.2–3.6(–3.8) × (2.8–)2.9–3.1(–3.2) | 3.40 × 2.98 | 1.14 |
| Kytövuori 981743 | (3.0–)3.1–4.0(–4.1) × (2.7–)2.8–3.0(–3.1) | 3.41 × 2.92 | 1.17 |
| Kytövuori 982290 | (3.0–)3.1–3.5(–3.7) × (2.8–)2.9–3.1(–3.2) | 3.27 × 2.97 | 1.10 |
| 1944 Malmström | (3.2–)3.4–4.0 × (2.7–)2.9–3.3(–3.6) | 3.65 × 3.04 | 1.20 |
| Saarenoksa 29993 | (3.0–)3.2–3.6(–3.8) × (2.6–)2.8–3.0(–3.3) | 3.36 × 2.97 | 1.13 |
| 1960 Sältin | (3.1–)3.2–3.8(–4.0) × (2.9–)3.0–3.3(–3.4) | 3.51 × 3.08 | 1.14 |
| 1977 Ulvinen | (3.1–)3.2–4.0(–4.1) × (2.6–)2.8–3.1(–3.2) | 3.55 × 2.98 | 1.19 |
| <i>Phellodon niger</i> | | | |
| Askola 407 | (3.2–)3.3–4.0(–4.1) × 3.0–3.6(–3.7) | 3.66 × 3.21 | 1.14 |
| Askola 1811 | (3.1–)3.4–4.0(–4.1) × (2.9–)3.0–3.7(–3.9) | 3.80 × 3.25 | 1.17 |
| Askola 2492 | (3.1–)3.2–4.0 × (2.8–)3.0–3.3(–3.4) | 3.61 × 3.13 | 1.15 |
| 1943 Häyrén | (3.0–)3.2–4.0(–4.2) × (2.7–)2.9–3.1(–3.5) | 3.58 × 3.02 | 1.19 |
| Niemelä 5682b | 3.1–3.8(–4.0) × (2.8–)2.9–3.2(–3.5) | 3.47 × 3.08 | 1.12 |
| Niemelä 1712 | (3.1–)3.4–4.1(–4.3) × (3.0–)3.1–3.7(–3.9) | 3.79 × 3.28 | 1.16 |
| Niemelä 2310 | (3.3–)3.4–4.0 × (3.0–)3.1–3.7(–3.8) | 3.81 × 3.35 | 1.14 |
| 1948 v. Schulmann | (3.0–)3.2–4.0 × (2.9–)3.0–3.3(–3.6) | 3.57 × 3.09 | 1.15 |
| <i>Phellodon tomentosus</i> | | | |
| Kytövuori 901839 | (3.5–)3.7–4.0(–4.2) × (3.0–)3.2–3.6(–3.7) | 3.86 × 3.38 | 1.14 |
| Kytövuori 902033 | 3.9–4.3(–4.7) × (3.4–)3.5–3.9(–4.0) | 4.13 × 3.74 | 1.10 |
| Korhonen 11230 | (3.6–)3.8–4.2 × (2.8–)3.0–3.6(–3.7) | 3.97 × 3.26 | 1.22 |
| <i>Phellodon alboniger</i> | | | |
| 1961 Hintikka | (4.0–)4.2–4.8(–5.2) × (3.2–)3.6–4.0(–4.3) | 4.45 × 3.84 | 1.16 |

Phellodon tomentosus (L. : Fr.) Baker is brown-coloured (fawn, clay-buff, hazel, sienna etc.), with zonate upper surface, larger than the new species, and grows on open ground in gregarious or ring-shaped groups. The other related European species, *Phellodon niger* (Fr. : Fr.) P. Karst. and *P. confluens* (Pers.) Pouzar have a well-developed tomentum in their stipe, and their spores are larger than in *P. secretus* (Fig. 3, Tab. 1).

The species name of *Hydnum occultum* Britz. somehow points to the present species, but it was described to be 'fibrous, corky, woody', and having tints of yellow and brown; Maas Geesteranus (1960) suspected it to be an uncommon colour variety of *Phellodon connatus*. Karsten identified his collection of the new species (*Karsten 4677*, listed above) as *Hydnum cyathiforme* Schaeff., which is considered to be a synonym of *Phellodon tomentosus* (Maas Geesteranus 1975): 'stipe rusty, aculei rosy; common' (Fries 1821). Original collection of *Hydnum hepaticum* Kalchbr. (UPS) was studied; the specimen is badly preserved, but it is much too robust to be our species, and Maas Geesteranus (in herb.) has measured the spores to be $4.5\text{--}4.9 \times 4.3 \mu\text{m}$.

There are very many other, old, poorly understood names for stipitate hydnums, often missing authentic collections and identifiable by brief macroscopic descriptions and hand-made habit illustrations only. They were surveyed in particu-

lar from Fries (1821) and Maas Geesteranus (1958, 1960, 1964, 1971, 1975), but none of them seemed to match our new species. If this turns out to be a northern species, as it seems now, the probability of an older name is small.

Phellodon sinclairii (Berk.) G.H. Cunn., found in New Zealand, has larger spores than our species, $3.6\text{--}4.5 \times 3.1\text{--}3.8 \mu\text{m}$ (Maas Geesteranus 1971).

Hydnum pygmaeum Yasuda resembles our species in being small and having a dark stipe; the English translation of the description was published by Maas Geesteranus (1971: 31), who suspected this to be another synonym of *P. connatum*. The stipe was said to be 'brown to black' and the cap surface 'rather dark brown, with soft dense hairs', which does not fit well with *P. secretus*. We tried to get the type material on loan from TNS (Tokyo), but in vain.

Related species studied: Phellodon connatus:
Finland. Varsinais-Suomi Prov.: Pohja, Dalkarby, 3.IX.1960 *Sältin*. Uusimaa Prov.: Espoo, Luukki, 20.VIII.1985 *Koski-Kotiranta*. Helsinki, Laajasalo, 28.IX.1934 *Häyrén*; Vuosaari, Kallvikudde, 2.IX.1993 *Saarenoksa 29993*. Tuusula, Klemet-skog, Mätäkivenmäki, 21.IX.1944 *Malmström*. Satakunta Prov.: Tyrvää, 4.IX.1859 *Karsten 2038*. Etelä-Savo Prov.: Joutseno, Konnunsuo, Leppälä, 4.IX.1987 *Kytövuori 871177*. Kerimäki, Ruokojärvi, Louhi, 8.IX.1998 *Kytövuori 981743*. Pohjois-Savo Prov.: Savonranta, Muhamäki, 19.IX.1990 *Haikonen 20367*. Pohjois-Karjala Prov.: Eno, Uimaharju, 19.IX.1992 *Kytövuori 922648*. Liperi, Viinijärvi, Ahonkylä, 18.IX.1992 *Kytövuori 922480*. Oulun Pohjanmaa Prov.: Ylikiminki, Karahka, 15.IX.1977 *Ulvinen*. Koillis-maa Prov.: Kuusamo, Oulanka Nat. Park, 21.VIII.1992 *Kytövuori 921484*. Kittilän Lappi Prov.: Kolari, Äkäslompolo, Kesänki, 21.IX.2001 *Kinnunen 1518*. **Sweden.** Småland Prov.: Västra Ed, Västervik, 27.IX.1998 *Kytövuori & Kytövuori 982290*. **Germany.** '*Hydnum melaleucum* Fr., Germania, in silvis montosis abiegnis Thuringiae ad Saalfeldiam, Klotzsch Herb. Myc. n. 122, Septbr. *Klotzsch et Opatowski*' (Herb. E. Fries, UPS). **Austria.** '*Hydnum melaleucum*, Österrrike, Gabelberg prope Grein, 24.VIII.1866 *Heufler*' (Herb. E. Fries, UPS).

Phellodon niger: **Finland.** Uusimaa Prov.: Elimäki, Mustila, 1948 *Schulmann*. Espoo, Luukki, 3.IX.1993 *Niemelä*. Nurmijärvi, Parkkimäki, 25.IX.1988 *Askola 2492*; Pitkämäki, 10.IX.1977

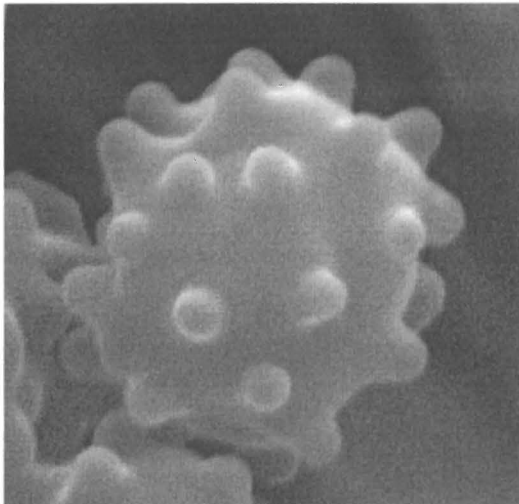


Fig. 4. *Phellodon secretus* Niemelä & Kinnunen, spore ornamentation. SEM from holotype, $\times 15\ 000$, prepared by DS.

Askola 407; Kiljava, 22.IX.1985 *Askola 1811*. Tuusula, Nummenkylä, 9.IX.1943 *Häyrén*. Etelä-Häme Prov.: Lammi, Evo, Kotinen Virgin Forest, 14.IX.1979 *Niemelä 1712*; Alinen Rautjärvi, 4.IX.1981 *Niemelä 2310*.

Phellodon tomentosus: **Finland**. Varsinais-Suomi Prov.: Karjaa, NE of Kleven, Lövkullauden, 25.IX.1990 *Kytövuori 902033*. Kemiö, Pedersä, 21.IX.1990 *Kytövuori 901839*. Tammisaari, Bromarv, 17.IX.1992 *Korhonen 11230*.

Phellodon confluens: **Sweden**. Östergötland Prov.: Vadstena, 23.IX.1985 *Kytövuori 851344*. Gryt, 16.IX.1950 *Nannfeldt 11181*. **U.S.A.** Michigan: Washtenaw County, Waterloo, 10.X.1961 *Hintikka*.

Phellodon alboniger: **U.S.A.** Michigan: Wilderness State Park, 17.IX.1961 *Hintikka*.

Hydnum hepaticum: **Hungary**. 'Hydnum hepaticum nov. sp. Ungern: Scepusii, Oct. 1860 C. Kalchbrenner 173' (Herb. E. Fries, UPS).

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