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THREE NEW SPECIES OF SECOTIACEAE FROM PATAGONIA *

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(With 21 Text-figures)

Thaxterogaster dombeyi, *T. brevisporus*. and *Weraroa spadicea* are described as new species. *Weraroa* subgen. *Neuquenia* subgen. nov. is described.

1. THAXTEROGASTER Sing.

The genus *Thaxterogaster* was first described from Tierra del Fuego in the *Nothofagus* zone of South America (1). It was then found to have been observed and described (as *Secotium*) by Massee and Cunningham, also in the *Nothofagus* zone, in New Zealand, and by Zeller and Hesler in North America (also as *Secotium*). All these species were monographed by Singer & Smith (2) in a recent revision of the Secotiaceae. Now two new South American species, again from the *Nothofagus* zone, but from its northernmost part, near the Chilean-Argentine border are added, which brings the number of species known up to eight (four from Southern South America, and two from New Zealand and North America each).

Thaxterogaster dombeyi Sing., *spec. nov.*

Peridio stipiteque violaceis, siccis, stipite bene evoluto, gastrocarpio vix breviore; sporis 13–15.8 × 8.2–9.7 μ; hyphis fibulatis. Subhypogaeus cum *Nothofago dombeyi*. Typus in Herbario Lilloano conservatur.

Gastrocarp 13–24 mm high and 28–34 mm broad, convex above, sub-globose-compressed so that it is broader than high at maturity, with the peridium not dehiscent neither from the upper portion of the gleba nor even exposing the lower portion of the gleba at maturity since it is covered aside from the peridium by a permanent cortina which connects the apex of the stipe with the lowest portion of the peridium; peridium about 1 mm thick, surface dry, glabrous to subsericeous smooth, not splitting, violet (42–A–3, 42–A–4, 43–A–5, M & P, 1st ed.) becoming pallid when dried.

Gleba loculate with irregular (not lamellarly extended) small chambers up to 1 mm in diameter, filling the interperidial space completely, except for the columella, not dehiscent or exposed at any time, color fresh near Natal brown or gray-brown (between "thrush" and "new cocoa" M & P), dried between "cigarette" and "Sudan br." (M & P), tramal plates violet.

Stipe up to 21 × 11 mm, well developed and conspicuous from youth to maturity, typically almost as long as the height of the gastrocarp, concolorous with the peridium, solid, glabrous and naked except for the cortina, dry, broadest at juncture with lower portion of peridium, but almost subequal; columella continuous with the stipe, solid, strongly tapering in lower portion of gleba, in upper half of gleba

* Portions of the types of the new species will be deposited in the Rijksherbarium, Leiden.

oblique and thin (about 1 mm in diameter), concolorous with stipe, merging with the upper portion of the peridium; cortina well developed, concolorous with the peridium, not tearing apart, bleaching to white in very old and dried material.

Context (including peridial trama, tramal plates, and interior of stipe and columella) concolorous with surfaces, but in age bleaching to white, white in dried material, fresh inodorous, but in dried material occasionally with an odor of fish, consistently fleshy-putrescent throughout.

Spores 13–15.8 × 8.2–9.7 μ, most frequently 14–15 × 8.8–9 μ, axially symmetric with a hilar appendage continuing the axis of the spore, or with and oblique and slightly eccentrically attached hilar appendage, the ornamentation brown to ferruginous on an ocher brownish ground, consisting of a (double-layered) endosporium and a deeper colored thin episporium, covered by an exosporial ornamentation which is low and verruculose-punctate (rarely some short thin lines) and sometimes finer towards the lower end of the spore, ellipsoid, much like those of *T. violaceus* but slightly shorter in an average, not pseudoamyloid or amyloid.

Hymenium: Basidia e.g. 37 × 9.7 μ, clavate, hyaline, 4-spored, most of the sterigmata apical and straight and upright, accompanied by some shorter "empty" bodies, but true cystidia none.

Hyphae: Hymenophoral trama thin, regular, consisting of subparallel hyphae which are hyaline and not gelatinized. Peridium entirely of repent subparallel to subinterwoven filamentous hyphae which are not gelatinized. All hyphae with clamp connections and non-amyloid.

In *Nothofagus-Saxegothaea* mixed woods under *Nothofagus dombeyi*, subhypogeous. Fruiting in fall.

ARGENTINA: Rio Negro (Patagonia), Nahuel Huapí National Park, Arroyo Blest, 17 March 1959, *R. Singer M 1861* (typus, LIL).

This species keys out with and comes close to *T. violaceum* Sing., the type of the genus. It differs from it in the development of the stipe and in slightly less elongated spores. It grows, instead of with *Nothofagus pumilio*, with the evergreen *Nothofagus dombeyi*.

Thaxterogaster brevisporus Sing., *spec. nov.*

Peridio griseolo-albido vel pallido, gelatinascente; stipite 13–14 mm lato, albo, velo elastico-gelatinascente, haud diffracto, gleba castanea, numquam exposita; sporis angulosis, dein subglobosis, 16.5–18.5 × 13.7–16.7 μ, ornamentatione exosporiali typi (VI), IV, IV–II, IIIb, 1.2–2.5 μ projiciente, atrobrunnea instructis. In Nothofageto. Typus in Herbario Lilloano depositus est.

Gastrocarp 28–29 mm high, 22–28 mm broad, subglobose or globose, never exposing the gleba, although a veil-like continuation of the peridium, connecting the lower portion of the peridium with the apex of the stipe, covers the lowest extension of the gleba rather loosely; peridium about 0.5 mm thick or less, elastic-skin-like, loosely attached where it forms a veil-like transition to the covering of the stipe, the veil-like portion becoming almost chestnut color on drying, otherwise pallid to grayish white, somewhat viscid when fresh, smooth and glabrous.

Gleba loculate with irregular very small chambers, not lamellarly arranged anywhere, "chestnut, brownstone" (M & P) when fresh, deep chocolate brown when dried (8–J–12, M & P), tramal plates pallid, not dehiscent and exposed at any time.

Stipe short, about 11 mm long, about 13–14 mm broad below gastrocarp attach-

ment, pallid on the outside, with white tissue showing through a continuation of the veil-like portion of the peridium covering the surface of the stipe, not distinctly viscid when fresh, glabrous, smooth, equal or slightly tapering downwards, solid; columella continuous with the stipe, solid, tapering cone-like above the stipe and continued and percurrent through the upper portion of the gleba as a thin (1 mm diameter) pallid column which merges with the context of the upper portion of the peridium; veil-like portion skin-like, hyaline-pallid, elastic, gelatinous-horny.

Context (including peridial context, tramal plates and interior of stipe and columella) white in fresh and dried condition, fleshy-putrescent, with a pleasant odor (of cake).

Spores 16.5–18.5 × 13.7–16.7 μ, axially symmetric with the hilar appendage continuing the axis of the spore, the ornamentation exosporial, in early development stages gibbous-verrucose and hyaline, not colorable in cresyl blue mounts, later heavily verrucuose (small and large blunt warts, often merging into crested short ridges and connected by thin vein-like anastomoses: type (VI), IV, IV–II, IIIb, and strongly dyed blackish lilac in cresyl blue mounts), projecting 1.2–2.5 μ and covered by an indistinct hyaline perisporium, underneath a thin (0.4 μ) brownish episporium, beneath this a broad (probably two-layered) subhyaline endosporium of 2 μ diameter which is not metachromatic in cresyl blue mounts, many spores pseudoamyloid, without germ pore or callus, at first distinctly angular as *Inocybe* (*Clypeus*)-spores, at maturity becoming less angular (or angular outline less visible because of the heavy ornamentation) and more subglobose, hilar appendage mostly straight and centrally attached, rarely oblique or eccentrically attached, divided from the sterigma proper by a septum; ornamentation often heavier toward apex of spore.

Hymenium: consisting of a continuous layer of basidia exclusively (although there are also some hyaline resinous-incrusted cystidioid elements with abundant oily amorphous contents but these elements are probably basidioles or permanently sterile and morphologically scarcely differentiated cystidioles), hyaline, with or without abundant oily amorphous contents, with four straight obtuse sterigmata (e.g. 5–6 μ long), basidia very variable in length (22–45 μ), 11–14 μ broad.

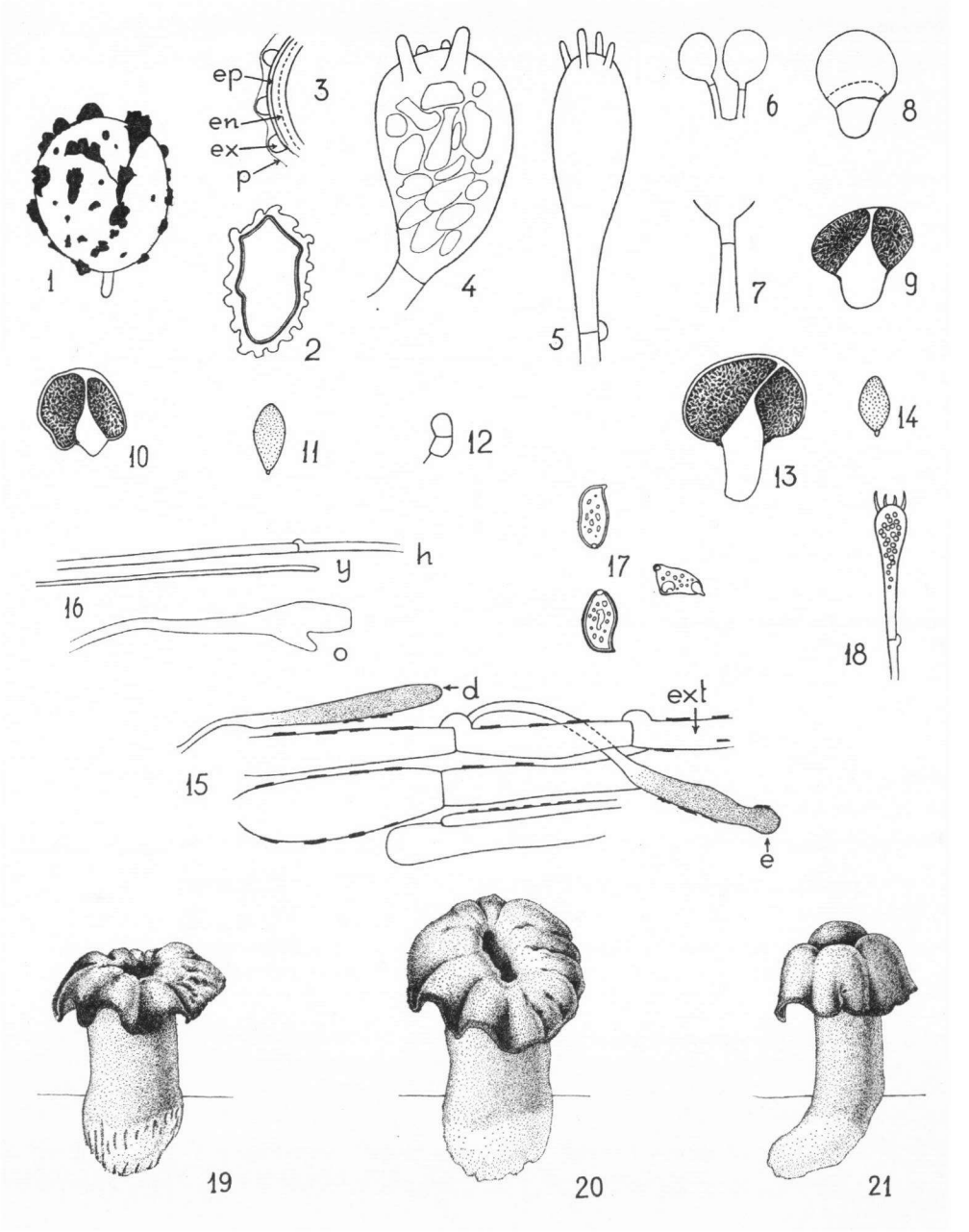
Hyphae: Subhymenium a thin layer of small irregular elements; hymenophoral trama thin, regular, filamentous; peridium consisting of thin-walled filamentous hyphae which are narrow and strongly gelatinized, wavy, repent, forming a broad layer; underneath this the non-gelatinized context of the peridium, consisting of hyaline to pale melleous filamentous hyphae which are arranged periclinally, the layer altogether not more than 80–100 μ thick. All hyphae filamentous, non-amyloid, with numerous clamp connections.

Subhypogeous in *Nothofagus-Saxegothaea* woods under *Nothofagus dombeyi*. Fruiting in fall.

ARGENTINA: Rio Negro (Patagonia): Nahuel Huapí National Park, Los Cántaros, 15 March 1959, *R. Singer M 1817* (typus, LIL).

This species keys out with *T. leucocephalus* (Mass.) Sing. & Smith but differs in spore shape and size, the high coarse ornamentation, the color of the gleba, the broader stipe, and other minor characters.

In spite of the short spores, this species is undoubtedly generically identical with the other species of *Thaxterogaster*. The angular young spores with their heavy exosporial ornamentation give the first hint, on the gastromycetous level, of the—generally recognized—affinity of *Inocybe* and *Cortinarius*. If it is assumed that on the agaricoid level, the spore wall diameter is reduced and the original non-



Figs. 1–21

resinous ornamentation is maintained, the gibbous spore type commonly found in *Inocybe* would result (as for phylogenetical problems, see my earlier paper, 3).

2. WERAROA Sing.

The genus *Weraroa* was first described from New Zealand (4) in 1958. It was subsequently monographed by Singer & Smith (5) and after this latter paper had been published, a further species, this time from South America, was added by Singer & Wright (6). A fifth species has now been discovered in Patagonia, one that not only emphasizes still more the affinity of the New Zealand and Patagonian mycoflora (because in this case we do not deal with a species naturally following the species of *Nothofagus*) but also shows that *Weraroa* is not only related to the dark-spored and purple-spored Strophariaceae (subfamily Stropharioideae) but, as might have been expected, also shows close links to the subfamily Pholiotoideae. The spores of the new species which is described below are of a color generally encountered in *Pholiota* and related genera and the wall is likewise thinner than in the *Weraroa* species known until now. The size, structure and pigmentation of the spores, correlated with the non-gelatinized tissue of the external layer of the peridium seems to justify the separation of this species under a special section which we propose to call *Neuquenia*.

We are grateful to Mr. José Diem who collected this rare species and also sent us a colored sketch with notes on the fresh material.

Weraroa subgenus **Neuquenia** Sing., *subgen. nov.*

Sporis melleo-ochraceis, minoribus, peridio haud gelatinoso. Typus: *W. spadicea* Sing.

Weraroa spadicea Sing., *spec. nov.*

Peridio spadiceo, haud orbiculari, sinuoso, mox centro depresso, sicco; gleba lamelliformi, maturitate libera, flavida; stipite cum parte inferiore gastrocarpii cortina ope alba fibrillosa juncto. Stipite cum columella confluente, haud tereti, glabro vel subglabro, 45–50 mm longo,

EXPLANATION OF FIGURES 1–21

Figs. 1–9. *Thaxterogaster brevisporus* Sing.: 1—spore × 1350; 2—id., immature × 1350; 3—detail of spore wall × 1350 (en = two layers of endosporium; ex = exosporium; ep = episporium; p = perisporium); 4—basidium with oily contents × 1000; 5—basidium × 1000; 6—showing the attachment of very young spores to the sterigma; 7—id. × 2000; 8—carpophore × ½ (between stipe attachment and dotted line: the veil); 9—longitudinal section through a carpophore × ½.

Figs. 10–12. *Thaxterogaster violaceus* Sing.: 10—section through carpophore × ½; 11—spore × 500; 12—primordium.

Figs. 13–14. *Thaxterogaster dombeyi* Sing.: 13—section through carpophore × ½; 14—spore × 500.

Figs. 15—21. *Weraroa spadicea* Sing.: 15—external layer of the peridium × 600 (ext = hyphae; d = dermatocystidia; e = endocystidia); 16—elements of the tramal plates × 600 (h = hyphae; y = yellow conducting element; o = oleiferous conducting element); 17—spores × 1000 (at right an abnormally shaped spore); 18—basidium × 600; 19–21—carpophores in fresh condition × ½ (after the original painting by the collector).

basi albomycelioso, columella in peridium duplex tenue intus flavidum nec gelatinosum percurrente; sporis ochraceo-melleis, levibus, poro germinativo instructis, membrana duplici praeditis, heterotropis, 5.5–8.3 × 3.5–5.5 μ; basidiis tetrasporis, dimorphis; endocystidiis et dermatocystidiis luteo-citrinis praesentibus; hyphis peridii in strato externo brunneo-incrustatis, elongatis, parallelis, repentibus; tramate hymenophorali regulari, hyphoso; hyphis fibuliferis. Ad detritum ligneum sub *Libocedro Nothofago*que, Patagonia septentrionalis. Typus in Herbario Lilloano conservatur.

Gastrocarp reaching 25 mm in height, up to 70 × 65 mm horizontally, oval-elliptic (not orbicular) in outline when seen from above, convex above but soon with a crater-like depression in the center, this depression characteristically horizontally elongated, 22 × 8 mm, with acute margin and the latter at first in part touching the stipe-columella but later exposing the entire lower surface of the gleba, remaining incurved; peridium up to 1 mm thick, i.e. thin, consisting of an internal fleshy yellowish layer, and an external layer which is spadiceous, "sepia P" to even darker with lighter colored areas ("olive wood" M & P), not gelatinized, with irregularly wavy-grooved, dry, glabrous surface.

Gleba at maturity horizontally radially lamellar but with the tramal plates (lamellae) not wedge-shaped but of equal thickness and often forked and with numerous anastomoses, of unequal breath and even the broadest ones rather narrow, attenuate-attingent to the stipe-columella, dull yellow ocher with a slight brownish shade from the spores when seen under a lens, not shedding spores, fully exposed at maturity.

Stipe-columella 45–50 mm long, in cross section 36 × 27 mm (not terete), at first a columella portion (above the attachment of the peridium) distinguishable from the stipe proper but later becoming a typical stipe-columella, the peridium touching the stipe-columella at a distance of about 5 mm from the gleba, stipe-columella equal to somewhat bulbous-ventricose, smooth except at the base where it is often longitudinally short-furrowed, glabrous to very finely adpressedly fibrillose-squamulose under a lens, hollow when fresh according to the collector, yellowish ochraceous; volva none; cortina fibrillose, well developed, at least in young specimens, eventually disappearing, white or whitish, dry; mycelium at base of stipe abundant, white.

Context fleshy, firm, at least partly concolorous with the surface.

Spores 5.5–8.3 × 3.5–5.5 μ, ellipsoid or irregularly ellipsoid, sometimes (rarely) with a bulge in the upper inner side, with amorphous contents and small droplets, smooth, with or without a slight suprahilar depression, with a wall consisting of a rather thin ochraceous brown episporium and a likewise rather thin subhyaline endosporium which is not pink in cresyl blue mounts, with a broad hyaline germ pore and often truncate at apex, but also sometimes with rounded ends, ochraceous melleous (in NH_4OH); hilar appendage oblique, eccentric, small.

Hymenium: Basidia of two kinds, but of equal measurements: 27–36 × 7.5–9.5 μ, all clavate, 4-spored; normal type of basidia with hyaline protoplasmatic contents and pale lilac or violet in cresyl blue mounts; another type of basidia scattered all over the hymenium characteristically brown, mainly because of an oily guttulate brown contents, and this type showing at first (very dilute solution) bright blue discoloration of the droplets (which have a diameter of about 2 μ) but finally the whole basidium becomes deep lilac or violet in cresyl blue mounts; sterigmata generally half-sickle shaped and curved inwards. Cystidia none seen although occasional conducting elements may enter the hymenial layer slightly.

Hyphae: Subhymenium consisting of small, elongate, somewhat irregular elements forming a dense non-gelatinized layer. Hymenophoral trama (tissue of the tramal

plates) consisting of thin filamentous hyphae which run parallel with each other and the hymenium, regular, non-gelatinized, with a more hyaline lateral stratum and a more brownish mediostratum. Endoperidium consisting of thin hyphae occasionally incrusted by brown pigment, running periclinally, the whole internal layer yellowish under the microscope, not gelatinized, about 600 μ thick; exoperidium about 300 μ in diameter, consisting of broader (4–20 μ diameter) cylindric or somewhat ventricose hyphae which are parallel with each other and much stronger pigment-incrusted than those of the endoperidium, occasionally interrupted by endocystidia which are incrusted or not, bright yellow from an internal yellow granulation, long-clavate or sometimes with an apical constriction, broadly rounded above, 4–6 μ thick, entirely blackish violet in cresyl blue mounts, of the chrysocystidial type; dermatocystidia of the same type numerous on the surface of the exoperidium, at least in certain areas; conducting elements of two types, (i) bright yellow very narrow (2 μ) hyphal elements, and these almost blackish violet in cresyl blue mounts, and (ii) ordinary oleiferous hyphae which are not so strongly colorable by that dye and show irregular thickenings at places, hyaline. All hyphae with numerous, often rather large, clamp connections.

On woody trash in a stand of *Austrocedrus chilensis* under *Nothofagus dombeyi*, fruiting in fall; epigeous,

ARGENTINA: Neuquén (Patagonia), Nahuel Huapí National Park, Quetrihué, 3 May 1959, *J. Diem 2875* (typus, LIL).

This species differs from all others in smaller spores with thinner wall, in the lack of a gelatinized exoperidium, in the lighter color of the spores and gleba, in the more strongly lamellar structure of the gleba and in the color of the peridium.

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