MONOGRAPHS OF SOUTH AMERICAN BASIDIOMYCETES, ESPECIALLY THOSE OF THE EAST SLOPE OF THE ANDES AND BRAZIL V. — GASTROMYCETES WITH AGARICOID AFFINITIES (SECOTIACEOUS HYMENOGASTRINEAE AND RELATED FORMS)

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The present paper is a survey of the Secotiaceae and related groups occurring in South America. It is very probable that the species here enumerated represent but a small portion of the "secotiaceous" flora of this continent, particularly rich and interesting in Southern and Western Patagonia, South Chile and Southern Brazil. Since however a complete survey of the secotiaceous flora has not been attempted for any part of the world excepting Europe, North America, and Australia-New Zealand, and considering the fact that a modern approach has been introduced in the study of these —phylogenetically and taxonomically so important— fungi in recent revisions by A. H. Smith and the present author, mostly in collaboration, it is thought useful and necessary to sum up our knowledge concerning the South American representatives.

This work is mainly based on the studies on secotiaceous fungi mentioned above, and consequently no attempt has been made to repeat the basic considerations or the detailed descriptions and illustrations provided in the papers cited under each species reported as South American, with exception of such species which require additional documentation or where the documentation available is not readily accessible.

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KEY TO THE FAMILIES OCCURRING IN SOUTH AMERICA

A. Spores relatively small (6-8 μ in diam.), with minutely rough to slenderly echinulate surface (group with uncertain generic position; see under Hydnangiaceae).

B. Brazilian species, also occurring in Guadeloupe **Sclerogaster luteocarneus**

B. South-Chilean species (subantarctic) ..... **Hydnangium thaxteri**

A. Spores larger or more strongly ornamentad, or else smooth.

C. Spores globose or subglobose, with conspicuous mostly spinose ornamentation and hyaline to yellow, either inamyloid (and then no stipe present andand hyphae with clamp connections) or else spores with at least partly amylaceous exosporial ornamentation. ..... HYDNANGIACEAE

C. Not combining all these characteres.

D. Spores smooth or subsmooth, with homo- or heterogeneous wall (heterogeneous because of imbedded spinules or ridges), or else ornamented, and then with distinct longitudinal ridges, but never with epi - or exosporial ornamentation, and not angular at any stage, inamyloid or pseudoamyloid.

E. Spores strongly pseudoamyloid or brownish sepia (and then carpophores much like those of *Agaricus*); mature gleba pulverulent ..... SECOTIACEAE

E. Spores weakly pseudoamyloid or inamyloid (and if inamyloid, not or rarely brownish sepia, and carpophores not like those of *Agaricus*); mature gleba not or scarcely pulverulent.

F. Spores elongate, stramineous, smooth, with homogeneous wall, inamyloid; stipe at maturity strongly elongating, with basal volva ..... BRAUNIELLACEAE

F. Spores different; stipe present or absent; volva present or (generally) absent.

G. Hymenophoral trama strictly regular .....
GALEROPSIDACEAE

G. Hymenophoral trama with a more or less divergent lateral stratum (bilateral or subbilateral) .....
GASTROBOLETACEAE

D. Spores with epi- or (mostly) exosporial punctate to verrucose ornamentation and strongly pigmented (much like spores of the genus *Cortinarius*), or else (not observed in South America) with smooth but angular spores. (In South America:) THAXTEROGASTRACEAE

HYDNANGIACEAE Gäumann (1926)

In our emended sense, this family includes stipitate forms with amylaceous exosporium aside from the typical forms with inamyloid

spores and estipitate gastrocarps. This is the astrogastraceous series (Singer & Smith) or the Astrogastracés of Malençon.

KEY TO THE SOUTH AMERICAN GENERA AND SPECIES

A. Spores 6-8 μ minutely ornamented

B. Subtropical - tropical species ..... **Sclerogaster luteocarneus**

B. Subantarctic species ..... **Hydnangium thaxteri**

A. Spores larger with stronger ornamentation

B. Spores inamyloid ; hyphae witch clamp connections ..... **Hydnangium soederstroemii**

B. Spores at least partly amylaceous-ornamented; hyphae without clamp connections

D. Stipe-columella as such absent; the sterile columella reduced; hymenophoral trama without spherocysts; peridium without external epithelium ..... **Martellia albella**

D. Stipe-columella well defined; hymenophoral trema with a few occasional spherocysts; peridium with an outer layer which is an epithelium ..... **Cystangium depauperatum**

SCLEROGASTER Hesse, Hypog. Deutschl 1:84-86. 1891.

1. **SCLEROGASTER (?) LUTEOCARNEUS** (Bres.) Zeller & Dodge; Ann. Miss. Bot. Gard. 22:370. 1935.

Octaviania luteocarnea Bres., Ann. Mycol. 18:54. 1920.

Arcangeliella luteocarnea (Bres.) Lloyd, Mycol. Notes 67:1142. 1922.

Gastrocarp subspherical or obovate, 7-10 mm in diam.; sterile base conical, about 3 mm tall, forming the suggestion of a columella; peridium not separable, loose, stupose, 360-380 μ thick, whit outer mycelial patches composed of periclinal hyphae next the gleba and on the outside, with tangled thick-walled hyphae between; gleba yellowish flesh color, cavities polyhedral; sterile tramal plates white, composed of hyphae 3-4.5 μ in diameter, basidia clavate 22-24x6-7 μ; spores spherical, tuberculate-echinulate, 6-7.5 μ in diameter, often with the remains of the sterigmata 2-3 μ long.

On wood. Tropical and subtropical America; Guadeloupe, Duss 1895; Brazil, Rio Grande do Súl, Poço das antas (the latter is the type).

We have not seen any specimens and reproduce the description of Zeller & Dodge whose binomial is here accepted conditionally. Without a modern analysis of the type it is impossible to be sure about the generic position of this species which we include in this paper only because of a desire to be complete.

HYDNANGIUM Wallr. in Dietr. Fl. Reg. Bor. 7: (nº 465). 1839.

2. **HLDNANGIUM THAXTERI** Zeller & Dodge, An. M. Bot. Gard. 22:373. 1935.

Gastrocarp spherical, color of crushed strawberries, drying capucin yellow; columella scarcely more than thickened tramal plates branching and disappearing in the middle of the gleba; peridium 125-130 μ thick, outer layer 30 μ thick, of closely woven slender hyphae and inner layer 100 μ thick, of larger more loosely woven periclinal hyphae; gleba orange buff to light ochraceous buff; cavities minute; tramal plates 50-60 μ, of slender interwoven hyphae; subhymenium pseudoparenchymatous; basidia short-cylindric; sterigmata long; spores 7-8 μ in diam., spherical, about 20-24 slender spines per great circle.

On dry hilltop in Southern Chile, Concepción, typus.

We have not studied the type of this species and leave it therefore in the genus where its authors have placed it. It seems however, that it belongs in either *Martellia* or *Gymnomyces*, as a matter of fact in the former if the descriptive data published by Zeller & Dodge are taken at face value. If this is a *Martellia*, it would differ from *M. albella* in the color of the gastrocarp and the smaller spores.

3. **HYDNANGIUM SOEDERSTROEMII** Lagerheim in Pat. & Lagerheim, Bull. Sec. Mycol. Fr. 9:142. 1893.

For a complete description see Singer & Smith in Mem. Torr. Bot. Cl. 21:4. 1960. There it was stated that we were recognizing *H. soederstroemii* as a distinct species "because of a confusion as to the true concept of *H. carneum*...". We are now in a position to provide some data on a European specimen which may well be the type of *H. carneum*. It is a 18th century specimen from the continent which is cited as type by Zeller & Dodge. The label is written in a continental handwriting which may well be that of Klotzsch. A fraction of this specimen was kindly lent to the author by Dr. R. W. G. Dennis and is here proposed as lectotype of *H. carneum*. It shows the following characters:

Spores varying from hyaline to deep yellow (citrine yellow), their large (2-3.5x1.3-2 μ) conic spines are washed off hot KOH, and some of them are curved. Measurements of the spores (with ornamentation) 14-22x13.5-21 μ, shape almost geometrically globose to short ellipsoid (e. gr. 16.5x14.3 μ), most frequently subglobose; wall double with a thinner inner layer and a thicker outer (episporial) layer, both together 1.5-2 μ in diam. Melzer reaction completely negative both in the sporoid as in the extremes of the ornamentation.—Basidia 36-51x11.5-12.5 μ, 2-spored, fewer 1-spored, mostly ventricose-elongate and hyaline; cystidia and pseudocystidia none seen! —Subhymenium

with some inflated but small elements, hyaline; tramal structure not decipherable, but there are undoubtedly a few laticifers of 12 μ or more diameter, some now "empty", apparently scarce. —Base of basidia and all hyphae with clamp connections. —Peridial structure now not decipherable, but spherocysts were not observed in any part of the trama.

This would mean that in the true *H. carneum* the spores are slightly larger than in *H. soederstroemii* and the basidia slightly shorter. It also means that *H. carneum* has a small quantity (perhaps inconstantly so) of laticiferous hyphae.

Singer & Smith (l. c.) have also found that the type of *H. stillingeri* differs from *H. soederstroemii* in smaller basidia. In a form with smaller basidia and many swollen elements in peridium and hymenophoral trama and with some true spherocysts in the basal part of the confluent tramal plates (beginning of a columella), we found spores up to 19.4 μ and ornamented exactly as in the type of *H. carneum*. This was collected by Parks, March 1, 1919 under *Ulmus* at James Park, San José, Calif. It may mean that *H. stillingeri* is compatible with *H. carneum* rather than with *H. soederstroemii*, but at any event, it causes me to believe that the identity of *H. carneum* as described by Smith & Singer with *H. carneum* as described above is somewhat doubtful, and that therefore Murrill's collection of this species is a variety or a different species altogether. On the other hand, the species, commonly collected under *Eucalyptus* and also in European and North American greenhouses in connection with *Eucalyptus* roots, is *H. soederstroemii* rather than *H. carneum*, type form.

With the data on the types of the respective species of this stirps now at hand, it would be desirable to study ample fresh material in order to see whether the differentiating characters of the trama (presence and absence of spherocysts, of laticiferous or oleiferous hyphae) and the spore size are indeed reliable and constant characters which justify the distinction of sparate species.

The South American material comes from Ecuador, Quito, under *Eucalyptus*, TYPUS (LE, FH). It is quite possible hat it has been introduced to Ecuador —as to Europe and North America— with Australian plant material, and that the species is actually native to Australia.

MARTELLIA Matt., Malphigia 78. 1900.

4. **MARTELLIA ALBELLA** Sing. & Smith, Mem. Torr. Bot. Cl. 21:38, 1960. Description, see l. c.

CYSTANGIUM Sing & Smith, Mem. Torr. Cl.: 1960.

5. **CYSTANGIUM DEPAUPERATUM** Sing. & Sm, 1. c. p. 69. Description, see l. c.

GASTROBOLETACEAE Sing. fam. nov.

Tramate hymenophorali plus minusve bilaterali in juvenilibus; sporis poro germinativo destitutis, pigmentatis, haud pseudoamyloideis, levibus vel cristis longitudinalibus ornatis; hyphis fibulatis aut defibulatis. Genus typicum: GASTROBOLETOS *Lohwag. Alia genera eiusdem familiae sunt*: TRUNCOCOLUMELLA, GAUTIERIA, CHAMONIXIA, AUSTROGASTER, BRAUNIELLULA, *probabiliter etiam* GYMNOGASTER.

In South America, there is only one species and genus known:

AUSTROGASTER Sing. gen. nov.

Sporis leviusculis; hymenophoro (gleba) loculato; ex integro in peridio incluso; hyphis fibulatis; columella stipiteque praesentibus; a TRUNCOCOLUMELLA *sporis majoribus et structura strati lateralis hymenophori mox subintermixta et medios trato magis gelatinisato quam stratum laterale, insuper columella percurrente differt; a* GASTROBOLETO *gleba haud tubuliformi, tota inclusa peridio et praesentia fibularum differt; a* CHAMONIXIA *et* GAUTIERIA *sporis levibus; a* BRAUNIELLULA *hyphis fibulatis, inamyloideis sporarumque colore melleo differt; atque a* RHOPALOGASTRO *tramate hymenophorali bilaterali (in* RHOPALOGASTRO *regulari) et hyphis fibuligeris differt. Species typica, A.* MARTHAE, *ab omnibus pariete sporarum heterogenea differt.*

AUSTROGASTER MARTHAE Sing. spec. nov.

Characteribus generis; gastrocarpio 10-38 mm diam.; *sporis* 12-14.5 x 5.7-6.5 µ, *episporio subtiliter perforato; cystidiis hymenialibus nullis. Typus in Patagonia collectus et in Herbario Lilloano conservatus est.*

Gastrocarp saccate to subglobose, 10-38 mm broad, sometimes concrescent in pairs, more often single, peridium covered with copper brown to brown scales, freshly dried between "Kermanshah" and "English oak" (M&P), entirely (including the lower part) covering the gleba, radially fibrillose and squamose on pallid or yellow ground, but ground color appearing sparingly, sometimes evenly fibrillose below and with large appressed scales in upper portion, eventually coarsely fibrillose all over and not squamose, less than 1 mm in diameter, confluent with the columella at the apex and base of the gastrocarp, consisting of a fibrillose outer layer and a fleshy inner layer ("duplex").

Gleba cinnamon brownish, becoming "raw sienna" (rusty) when dried, lacunose, with often elongated chambers, but never lamellose, chambers at first small, later rather wide (reaching 3 x 1 mm); tramal plaques thin to rather thick, soft fleshy.

Columella usually rather broad and percurrent, rarely narrow

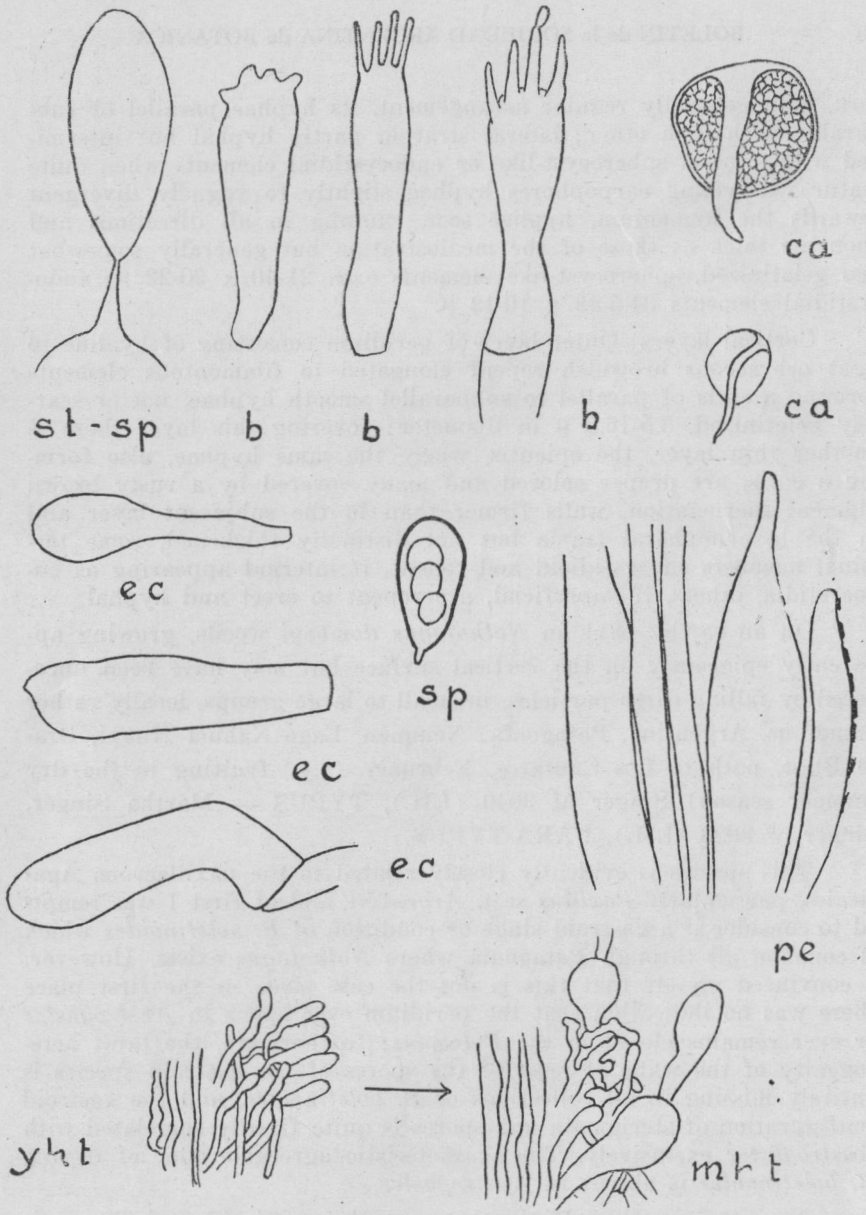
and tapering upwards but always continuous with peridium above and below, up to 4 mm broad, vertical or oblique, continued into the stipe; stipe concolorous with the peridium, short and thin but always well developed, tapering into an acute base which continues into white rhizomorphs, 5-11 x 1-4 mm (at apex).

Context of tramal plates, inner portion of paridium, columella, and stipe fleshy, yellow, becoming at first whitish pallid or sordid pallid when bruised and after a few minutes, livid. Odor none or weak, even on drying.

Spores (11.3)-12-14.5 x 5.7-6.5 µ ellipsoid, orthotropic or suborthotropic, without a callus or germ pore, with centrally attached small hilar appendage (straight or slightly oblique), at first hyaline and smooth, then in young specimens dull melleous and at full maturity most spores assuming a bright golden melleous color, eventually somewhat thick-walled, almost or quite smooth and remaining so, some with homogeneous wall even at maturity but some with heterogeneous wall (this is the majority of the mature spores) i.e. its outermost layer (episporium) perforated in the manner of *Crepidotus* spores and finely punctulate when the surface is focussed upon and the surface appearing very slightly roughened in some spores, smooth in others; in cresyl blue mounts not metachromatic and ornamentation rather less distinct, appearing divided in a thin but distinct episporium which is deep colored (also in iodine solutions), and a hyaline, slightly thicker endosporium, weakly pseudoamyloid when seen in the Melzer reagent (light rusty cinnamon), which may be a reaction of the episporium only.

Hymenium: Basidia 27-39 x 8-10.5 µ clavate to subcylindric, rarely thickened at the base, at times with a slight central constriction, hyaline, inamyloid, with straight sterigmata, sometimes with one or two, rarely all four sterigmata half-sickle-shaped, curved (spore at sterigma at frist globose and mostly symmetrically attached), 4-spored but some 2-spored basidia always present, at first forming a palisade, later basidia in irregular arrangement. Cystidia and pseudocystidia, none.

Hyphae with some clamp connections, inamyloid, or some of the elements of the lateral stratum at times slightly pseudoamyloid. Subhymenium scarcely differentiated from the lateral stratum of the hymenophoral trama, consisting of hyphal elements. Hymenophoral trama consisting of a mediostratum and a lateral stratum; the former distinctly gelatinized although hyphae not very widely spaced, spiralling elements intermixed with straight hyphae and with some oleiferous hyphae, its elements long-filamentous, mostly hyaline, few ochraceous, moderately broad (at first 2.5-4.2 µ diam., then 3.5-6.2 µ diam.), becoming often swollen and broader where the tramal plates



AUSTROGASTER MARTHAE Sing., anatomical details:

st-sp. = sterigma-spore attachment, x 4000; b = three basidia in different stages of development, x 1200; ca = sections through two mature carpophores, x 1; ec = endocystidia of the lateral stratum of the hymenophoral trama, x 1000; sp = spore, in optical section, x 1900; pe = structure of the peridium (outermost layer at the right side), x 1000; yht = young hymenophoral trama, mht = mature hymenophoral trama, both at about 500 x magnification.

fork, with generally regular arrangement, its hyphae parallel or subparallel with each other; lateral stratum partly hyphal but intermixed with swollen spherocyst-like or endocystidial elements when quite mature, in young carpophores hyphae slightly to vaguely divergent towards the hymenium, hyphae soon running in all directions and about as thick as those of the mediostratum but generally somewhat less gelatinized, spherocyst-like elements e.gr. 21-40 x 20-22 μ; endocystidial elements 31.5-49 x 10-13 μ.

Cortical layers: Outer layer of peridium consisting of hyaline to light ochraceous brownish repent elongated to filamentous elements forming a cutis of parallel to subparallel smooth hyphae, not or scarcely gelatinized, 3.5-16.5 μ in diameter; covering this layer there is another thin layer, the epicutis, where the same hyphae, also forming a cutis, are deeper colored and many covered by a rusty brown pigment incrustation, walls firmer than in the subjacent layer and in the hymenophoral trama but not distinctly thickened, some terminal members subcystidioid and repent, if internal appearing as endocystidia, others, if superficial, are repent to erect and hyphal.

On an earthy bank in *Nothofagus dombeyi* woods, growing apparently epigeously on the vertical surface but may have been uncovered by falling earth particles, in small to large groups, locally rather numerous. Argentina, Patagonia: Neuquén, Lago Nahuel Huapí, Brazo Blest, path to Los Cántaros, February (i.e. fruiting in the dry summer season) Singer M 3040 (LIL), TYPUS — Martha Singer, Singer nº 3023 (LIL), PARA-TYPUS.

This species is evidently closely related to the paxillaceous Agaricales, particularly *Paxillus* sect. *Argentini*, and at first I was tempted to consider it a gastroid stage or condition of *P. boletinoides* which is common all through Patagonia where *Nothofagus* exists. However, I convinced myself that this is not the case since in the first place there was no indication that the peridium ever opens in *Austrogaster* or ever remains closed in the *Boletinus;* furthermore, the faint heterogenity of the walls of most of the spores of the gastroid species is entirely missing in all collections of *B. boletinoides,* and the gastroid configuration of sterigmata and spores is quite fixedly correlated with *Austrogaster* exclusively. The characteristic agreeable odor of drying *B. boletinoides* is absent in *Austrogaster.*

Nevertheless, the affinity between the agaricoid and the secotioid group is undeniable. The spore ornamentation in *Austrogaster* may indicate a possible relation with the Crepidotaceae also but this cannot be substantiated by other observations.

The species is named for my wife who first collected it at the type locality.

GALEROPSIDACEAE Sing. fam. nov.

Sporis levibus vel parietibus heterogeneis (perforatis) gaudentibus, elongatis, interdum poro germinativo instructis, pigmentatis, haud vel vix pseudoamyloideis, ornamentatione exosporiali carentibus; epicute frequenter epithelio formata, vel sphaerocystibus isolatis obtecta, sed in aliis ex hyphis repentibus formata; tramate hymenophorali regulari, fibulis praesentibus. Typus genericus: GALEROPSIS *Vel. & Dvor.*

KEY TO THE SOUTH AMERICAN AND GENERA SPECIES

A. Carpophores with strongly vertically elongate gastrocarps; spores large (longer than 10 μ); peridium never spadiceous, green, red or bluing, but buffy brownish-ochraceous, leather brown, etc., never covered by a pellicle ..... **Galeropsis**

B. Spores 16.4-21.3 x 9.8-14.7 μ, gastrocarps acute. Patagonia .... 1. **Galeropsis allospora**

B. Spores 11.5-16.8 (-18) x 7-10 μ; gastrocarp generally obtuse. Peruvian Andes ..... 2. **Galeropsis** spec.

A. Carpophores (at least in South America) not strongly vertically elongated and not acute; spores in South American species under 10 μ long, not brownish melleous in alkalis unless carpophores in center depressed and spores quite small (to 8.3 μ); peridium spadiceous, green, red or bluing, sometimes covered by a pellicle ..... **Weraroa**

C. Peridium purple red; spores 9.3-9.7 x 4.5-4.8 μ dusky deep melleous to badious; pellicle distinct ..... 3. **Weraroa patagonica**

C. Peridium spadiceous; spores ochraceous melleous (NH_4OH), 5.5-8.3 x 3.5-5.5 μ; peridium without a distinct pellicle . 4. **Weraroa spadicea**

GALEROPSIS Velen. & Dvorak apud Velen. Mycologia 7:106. 1950.

1. **GALEROPSIS ALLOSPORA** Sing., Lilloa 23:239. 1950 (1951).

Galera paradoxa Speg. An. Mus. Nac. B.A. 24:180. 1913, repr. from An. Soc. Cient. Arg. 1899, p. 274. 1899.

Gastrocarp cylindric, 20-40 mm long, 5-7 mm broad above distinctly attenuate and projecting into a rostriform conic-cylindric mucro (4-6 x 1-1.5 mm), below tapering to a narrow margin and there slightly plicate; appressed to the stipe, straight (not incurved); peridium chestnutrusty-brownish, finely and minutely fibrillose-silky, somewhat shiny, fibrils spirally and longitudinally arranged.

Gleba lamellar, tramal plates (lamellae) close, narrow, 1 mm broad, thin-membranous, with entire edge, on both sides acuminate, acute, free from the columella above, ferruginous.

Stipe columella concolorous with pileus, terete, somewhat rigid, fistulose, smooth, scarcely fibrillose, 60-100 x 1.3-5 mm.

Spores 16.4-23.3 x 9.8-14.7 μ thick-walled, consisting of an endo- and an episporium, smooth, melleous-ferruginous, without a germ pore, but scarcely pigmented at distal tip.

Hymenium: Basidia with acrogeneous spores, these symmetrically attached to the sterigmata. Cheilocystidia and cystidia, none seen.

On sandy, dry, grassy places near the Rio Chubut, Patagonia. Argentina: typus seen (LPS).

2. **GALEROPSIS** spec.

This species differs from the preceding one in the characters indicated in the key and will be described as a new species from material collected by Ruiz Leal in Mendoza.

It was collected by Pearce at Puna, Perú, in the Andes at 10-14.000 ft. (3.300-4.700 m) on wet places (in very dry region!), February 1864, and sent to Kew where it is still preserved under the name *Bolbitius mitraeformis* (det. Berkeley). This determination is rather close, since *B. mitraeformis* is in reality a *Galeropsis* but I believe these two species to be different since the spores of *G. mitraeformis* have a broad truncate germ pore.

WERAROA Sing., Lloydia 21:46. 1958.

3. **WERAROA PATAGONICA** Sing. & Wright, Darwiniana 11:607. 1959.

Gastrocarp semiglobose, later flattened above or even depressed, deeply sinuate at the point of stipe insertion and strongly convex around it, approximately 25-35 mm broad when dried, and 15-20 mm high.

Peridium rather thin, mahogany red, kettledrum (M&P 7-1-10), not a bright cinnabar red, covering the gleba all over like a shell and consisting of two layers, an outer thinner one which is gelatinized when wet and a fleshy internal one, rather persistent all over.

Gleba consisting of small chambers, not lamellate, tobacco brown and reminding one of *W. novaezelandiae* in color, completely covered by the peridium, at least at early maturity.

Stipe broadly fusoid-bulbous, broadest in middle, color difficult to observe since the surface is completely covered by detritus, inserted centrally in the sinus in the lower surface of the gasrocarp, about 22x14 mm, continued into a short columella which obviously reaches the peridium.

Context of peridium paler chrome yellow, of stipe deeper chrome yellow, fleshy and firm.

Spores 9.3-9.7x4.5-4.8 μ, dusky deep melleous to deep badious (in NH_4OH), smooth, fusiform, with a distinct germ pore, with com-

plex rather thick wall. Basidia ventricose below, with a cylindric or "clavate" "neck" which shows four apical sterigmata, "neck" almost epibasidium-like, 4.7-7 μ thick, entire basidium 18-23x6.7-9 μ; sterigmata relatively small, slightly curved-spinose. Cheilocystidia and pleurocystidia (chrysocystidia), none seen. Hymenophoral trama hyaline with few elements with resinous yellow incrustation intermixed, regular. Subhymenium very broad, consisting of rather large spherocysts which become gradually smaller as they approach the trama and are globose or somewhat cystidiole-like in the hymenial layer where they form continuous pseudoparaphyses, occasionally interrupted by the basidia and basidioles. Peridium with an external epicuticular layer which is thin but well formed and strongly gelatinized, its hyphae repent and loosely arranged, thin-filamentous, many with brown incrustations (apparently soluble in alkali solutions and dyeing the preparation reddish), other hyphae with a lemon yellow incrustation.

Hyphae of the trama of the peridium less incrusted and not imbedded in a gelatinous mass, otherwise similar to those of the epicuticular outer layer. Hyphae with clamp connections.

Chemical reaction: NH_4OH with trama of peridium (inner fleshy part), red.

In small group underneath the trees of a *Nothofagus*-wood, at the base of *Nothofagus pumilio,* not hypogaeous, but the stipe covered with detritus, fruiting in summer.

Argentina: Prov. Neuquén (Patagonia): Nahuel-Huapí National Park, Lago Traful; leg. R. Andreis, 19-II-1958, comm. J. E. Wright (BAFC 20.080, holotype).

4. **WERAROA SPADICEA** Sing., Persoonia 1:389. 1960.

Description and illustrations see l. c.

THAXTEROGASTRACEAE Sing. fam. nov.

Sporis ornamentatione exosporiali verrucosa pigmentifera praeditis, plus minusve elongatis, juventute angularibus vel teretibus; tramate hymenophorali regulari; columella percurrente tramate carnoso, gleba haud pulveracea. Genus typicum: THAXTEROGASTER *Sing., Mycologia 43:216. 1951.*

Only one genus, *Thaxterogaster.*

KEY TO THE SOUTH AMERICAN SPECIES

A. Clamp connections absent (no species known in South America).

A. Clamp connections present
   B. Gastrocarp violet, dry

C. Stipe well developed; spores 13-15.8 x 8.2-9.7 μ; in *Nothofagus-dombeyi-Saxegothea* -woods ..... 1. **T. dombeyi**

C. Stipe not developed or poorly developed; spores 14.3-18 x 8.5-9.7 μ in *Nothofagus-pumilio*- woods. ..... 2. **T. violaceum**

B. Gastrocarp sordid pallid to grayish white, often discoloring rusty buff.

D. Spores small with snout-like apical mucro, 10-13 x 6-8.5 μ

E. Spores almost smooth; stipe-columella solid 3. **T. subalbidum**

E. Spores with distinct warty ornamentation; base chambered; columella hollow ..... 4. **T. fragile**

D. Spores 13-18.5 x 8.8-16.7 μ

F. Spores ellipsoid, 13-17.5 x 8.8-12 μ ... 5. **T. magellanicum**

F. Spores subglobose, 16.5-18.5 x 13.7-16.7 μ .....
6. **T.brevisporum**

1. **THAXTEROGASTER DOMBEYI** Sing., Persoonia 1:385. 1960.

See description and illustrations l. c.

2. **THAXTEROGASTER VIOLACEUM** Sing., Mycologia 43:216. 1951.

See description and illustrations l. c., and in Brittonia 10:207. 1958.

3. **THAXTEROGASTER SUBALBIDUM** A. H. Smith

See original diagnosis (in press).

4. **THAXTEROGASTER FRAGILE** (Zeller & Dodge in Dodge and Zeller) A. H. Smith comb. nov.
Hymenogaster fragilis Zeller & Dodge in Dodge & Zeller, Ann. Missouri Bot. Gard. 21:646. 1934.

See original description, l. c.

5. **THAXTEROGASTER MAGELLANICUM** Sing., Mycologia 43:219. 1951.

See description and illustration l. c., and in Brittonia 10:208. 1958.

6. **THAXTEROGASTER BREVISPORUM** Sing., Persoonia 1:386. 1960.

See original description and illustrations l. c.

SECOTIACEAE (Tul.) Fischer (1900)

We understand this family in a restricted sense, excluding the other families here indicated, and confining the limits of the family

to those genera which have pseudoamyloid spores with thick wall, and eventually pulverulent-powdery gleba. The type genus is *Secotium* sensu stricto (*S. gueinzii*). In South America, there is only one genus known: *Endoptychum.*

ENDOPTYCHUM, Czerniaiev, Bull. Soc. Nat. Moscou 18(2):146. 1845.

KEY TO THE SOUTH AMERICAN SPECIES

A. Spores brownish sepia, not visibly pseupdoamyloid 1. **Endoptychum** spec.

A. Spores hyaline to slightly melleous hyaline; strongly pseudoamyloid ..... 2. **Endoptychum arizonicum**

Sect. SECOTINIUM (Zobel in Corda) Sing. & Smith.

1. **ENDOPTYCHUM** spec.

The species we refer to here is the one mentioned by Rick (see Lilloa 22: 1949, 1951) from Rio Grande do Sul, Brazil, which we interpret as being of the type of *Ceriomyces romagnoli* = *Boletus romagnolii* and *Endoptychum* sect. *Secotinium* (Zobel in Corda) Sing. & Sm. This may be identical with the former or with one or the other species of the latter.

Sect. ENDOPTYCHUM.

2. **ENDOPTYCHUM ARIZONICUM** (Shear & Griffith) Smith & Sing. in Sing & Smith, Brittonia 10:221. 1958.

Secotiur arizonicum Shear & Griffiht, Bull. Torr. Bot. C. 29:450. 1902.

Gastrocarp somewhat poriform-saccate, 20-45 mm high, 15-30 mm broad, poorly stipitate below; peridium pallid, often squamose, dry; gleba olive yellow to olive brown, somewhat marbled, columella poorly developed; context white or whitish, unchanging, inodorous.

Spores 10.5-12x9.7-10.8 μ, subglobose or globose, thick (2.2 μ) walled, hyaline in ammonia, sometimes somewhat melleous-hyaline, smooth, pseudoamyloid, in cresyl blue showing a metachromatic pink endosporium, a broad hyaline episporium (1.5 μ diam.) and a narrow subhyaline exosporium, covered with a purplish lilac perisporium, at times the entire contents of the spore deep blue or violet in cresyl blue mounts, sterigmatal appendage slightly oblique, wall five-layered when studied in the Melzer reagent.

Hymenium: Basidia (31) 34.5x10.8-11 μ, 4-spored, with rather straight, narrowly-conical apical sterigmata. Cystidia, none seen.

Hyphae without clamp connections, those of the subhymenium interwoven irregularly and small.

Peridium consisting of filamentous smooth hyphae, in the outermost layer of the young specimens often melleous from a membranal pigment, loosely interwoven, running in all directions, not gelatinized anywhere.

On lawns, from Arizona to Northern Argentina, here in Tucumán: Marcos Paz, 19-III-1949. Singer T 232 (LIL).

This material was first determined by Dr. J. E. Wright.

BRAUNIELLACEAE Sing, fam. nov.

Sporis melleo-stramineis, levibus, pariete subcrassa, homogenea, levi, inamyloidea instructis, elongatis et eis Volvariellae cnemidophorae simillimis; pigmento subnullo stipite columellaque praesentibus; volva praesente. Typus genericus: BRAUNIELLA *Rick ex Sing.*

BRAUNIELLA Rick ex Sing. Mycologia 47:776. 1955.

Brauniella alba (Rick) Rick ex Sing., Mycologia l.c.

Braunia alba Rick, Egatea 19:112. 1934; Singer, Lilloa 16:102. 1953.

Gastrocarp 30-40 mm broad, conical, below with its margin appressed to the stipe-columella.

Peridium white, woolly, hairy, underneath the outer layer gray; gleba lacunose but loculi in sublamellar arrangement, flesh colored, dried pinkish stramineous, attached-concrescent with the columella.

Stipe-columella white-fibrous, almost smooth, often longitudinally cracked but young free portion minute and inconspicuous, old strongly elongated 40-100x5-8 mm; volva thin-membranous, basal, white, white rhizomorphs present.

Context white, fleshy, dried rather brittle, unchanging.

Spores 15-7-20x9.3-12.3 μ, ellipsoid-subfusoid, inamyloid, smooth, stramineous, later ligth melleous stramineous, suborthotropic to a variable degree, with firm, slightly thickened wall, with intimately agglutinated endo- and episporium, but separating spontaneously at the hilar end, the latter in youngs spores often knob-shaped or mucronate, or just verruciform, in older spores occasionally tooth-shaped, without apical germ pore or callus.

Hymenium: Basidia 30-39-(41)x11.7-16-(19) μ, clavate-turbinate, hyaline, with somewhat distant straight or half-sickle-shaped sterigmata, 4-spored. Cystidia according to Rick visible with a handlens, 80x40 μ, in the type material only "empty" basidiomorphous elements seen, probably easily collapsing. Hymenium continuous.

Hyphae: inamyloid, some septa seen without clamp connections, and the latter probably absent in all tissues. Hymenophoral trama consisting of hyphae in what at certain places appeared to be inverse arrangement (?), intermixed with some oleiferous hyphae, ordinary hyphae hyaline, not thick-walled anywhere, not gelatinized, generally thin-filamentous but hyphal ends often broadened, cylindric, with few septa.

Cortical layers: Interwoven hyphal elements on outer layer of peridium, poorly differentiated (no discernible epicutis present).

On sandy earth. São Leopoldo and Cacequí, Rio Grande do Sul, Brazil; also in Uruguay.

Material studied: São Leopoldo, leg. Braun, herb. Nº 12543-4 (TYPUS & PARA-TYPUS) — Cacequí (young specimen but with mature spores), authentic (all conserved at the herbarium of Colegio Anchieta, Pôrto Alegre).

This genus and species is closely related to *Volvariella*, as *Thaxterogaster* is to *Cortinarius*. On the other hand, there seems to be some affinity to *Torrendia* also, just as *Neosecotium* is at the same time related with the Agaricaceae, Leucocoprineae, and with the Lycoperdaceae. This shows that any attempt to separate an agaricoid (supposedly "degraded") group of Gasteromycetes from another group without agaricoid relationships, as assumed by Malençon, is untenable and artificial.