TASMANIAN *HYMENOGASTRACEÆ*.

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(Read 6th November, 1923.)

In the year 1911 I had the honour of reading to the Society a paper of a similar title. Since then, there have arisen reasons for additions and alterations. Our list of these forms is now so large that there appears little prospect that new species will come to light, wherefore the present appears to be a suitable time to revise the family.

The *Hymenogasters* are small underground tubers which produce their spores on basidia, generally 2, sometimes 4 on each basidium. The characteristic of the family is that the gleba *does not break down into a mass of spores and fibres* as in allied tubers, such as *Mesophellia, Scleroderma, Diploderma, Lycoperdon*, and *Geaster*, but remains as a series of contorted tubes or spaces without change at maturity, till broken up by decay or eaten by an animal. The genus *Secotium*, however, is intermediate between the *Hymenogasters* and the *Agarics*. Formed underground it tends to emerge at maturity, and has a more or less developed sterile portion, often piercing through the gleba to the apex, and the tramal plates approach the appearance of distorted gills. Some plants may equally well be placed in one group or the other.

Of the *Hymenogastraceæ*, we have in Tasmania six genera of more or less artificial grouping. Three of these have spores longer than broad, namely:—

Hymenogaster, with a fleshy gleba and rooting at the base.

Rhizopogon, with a fleshy gleba and strands of mycelium marking the surface.

Hysterangium, with a gelatinous gleba, and thick peeling peridium.

The other three have spherical spores:—

Octaviana, an apparent peridium, and a sterile base.

Hydnangium, an apparent peridium, and no sterile base.

Gymnomyces, no appreciable peridium, nor sterile base

HYMENOGASTER, TULASNE.

Members of this genus are of a dry fleshy character. Peridium from thin and continuous with the trama to thick and almost gelatinous. Gleba fleshy, the hymenial cavities small and very convoluted, trama thin, formed of elongated cells. Not floccose, nor gelatinous. Spores generally elliptic or fusiform, generally rough, papillate or sulcate, rarely smooth. Sterile base present sometimes, piercing the greater part of the gleba.

The following are specific distinctions:—

albellus, spores ellipsoid, pale, rough.
maideni, spores ellipsoid, pale, smooth.
aureus, spores fusiform, allantoid, smooth.
fulvus, spores brown, obtuse, 6 x 3 μ.
violaceous, surface gelatinous, violet. Spores brown, rough, 9 x 7 μ.
nanus, peridium thick, brown.
rodwayi, spores ribbed, gleba dark.
albidus, spores ribbed, gleba pale.

Hymenogaster albellus, *Mass. et Rod.* Irregularly globose, 1-3 cm., gray. Peridium nearly white, membranous. Gleba brown to ochraceous-brown, canals small, very tortuous. Spores ellipsoid, dark brown, one or both ends rather acute, exospore thick, often inflated into small warts, or into few large warts, or again into small wing-like expansions, 15-18 x 6-7 μ

Common throughout Tasmania. Collected by Dr. Cleland in New South Wales.

Hymenogaster maideni, *Rod.* Irregularly globose, 1-2 cm. Peridium white, very thin. Gleba white, becoming pale ochre when dry, tough, canals minute, very tortuous. Spores ellipsoid, one or both ends sub-acute, pale brown, smooth, 10-12 x 6 μ.

Rare. Near Hobart. Differing from *H. albellus*, chiefly in paler gleba and spores.

Hymenogaster aureus, *n.s.* Irregularly subglobose, mostly 1-2 cm., bright golden yellow, surface rugose. Peridium tough, yellow, about 0.5 mm., thick. Gleba compact, pale brown, canals small, numerous, contorted. Spores elliptico-fusiform, quite smooth, allantoid, pale yellow, 15-21 x 6

Differs from *H. albellus* in colour, thickness of peridium, and glabrous, allantoid spores.

Mt. Wellington, 3,000 feet.

Hymenogaster fulvus, Rod. Irregularly globose, 1-4 cm. diameter, pale gray, becoming black with age. Peridium very thin, membranaceous. Gleba dense ochre, becoming dark brown. Canals numerous, tortuous. Spores oblong, brown, obtuse, 6-7 x 3-3.5μ.

West Coast and about Hobart Collected in South Australia by Dr. Cleland.

Hymenogaster violaceus, Mass. et Rod. Globose violet and white, with a viscid surface. Peridium thin, but distinct. Sterile base from obsolete to piercing to the apex, and broken into limbs. Gleba dense, the tortuous canals small, pale, becoming dark brown. Spores broadly ellipsoid, obtuse, brown, verruculose, 9 x 7μ.

Fairly common.

Hymenogaster nanus, Mass. et Rod. Irregularly globose. Often 2-3 cm. diameter. Outer layer of peridium of a firm gelatinous consistency, 1-2 mm. thick, inner layer membranous. Sterile base usually well developed. Gleba fleshy, dark brown, cells wide. Spores dark brown, ellipsoid, minutely verruculose, 15 x 7μ.

Unfortunately the first specimens sent to Massee were very small, hence the inapplicable name.

Cascades, Hobart.

Hymenogaster rodwayi, Mass. Irregularly globose, 1-3 cm. diameter, colour gray-white. Peridium fleshy, about 1 mm. thick. Gleba compact, dull dark brown, sterile base from obsolete to spreading in strands nearly to the surface. Spores ellipsoid, longitudinally furrowed, usually both ends acute. Ochraceous when young, then brown, 18-20 x 9μ.

Fairly common in Tasmania. Collected in New South Wales by Dr. Cleland.

Hymenogaster albidus, Mass. et Rod. Irregularly globose, 1-2 cm., usually clothed with floccose mycelium; white. Peridium membranous, very thin. Sterile base, slight or none. Gleba at first pinkish-white, becoming ochre-brown with age. Cells small, very tortuous. Spores ellipsoid, obtuse, yellowish-brown, longitudinally carinate, 20-25 x 15μ.

Cascades, Hobart. Rare.

RHIZOPOGON, TULASNE.

Peridium thick and persistent or thin and disappearing with strands of mycelium traversing its surface. Cavities distinct at first empty, spores smooth.

rubescens, red externally.
luteolus, white, then brownish-olive.

Rhizopogon luteolus, Tulasne. Irregularly globose, 2-6 cm. diameter; peridium ochre-yellow, very thin. Gleba rather dense, at first pale, smoky, then dark ochre-brown, or greenish. Tubes contorted up to 300μ diameter. Spores oblong, obtuse, smooth, pale olive, 8 x 2μ

Sandy Bay, beneath Pines. Snug Falls track, with no conifers near. Collected in Victoria. Common in Northern Hemisphere.

Rhizopogon rufescens, Tulasne. Subglobose, 2-4 cm. diameter, red-brown; peridium thin, marked with mycelial strands. Gleba white, becoming yellowish with age, sometimes brown when very old, dense, canals minute. Spores narrow oblong, hyaline, or slightly tinted, 11 x 4μ.

Common under Pines. Cosmopolitan.

HYSTERANGIUM, VITTADINI.

Peridium distinct, separable; gleba at first mucilaginous, becoming gelatinous, cavities at first empty; spores smooth.

affine, gleba greenish-blue
barbarianum, gleba brownish-green.
pumilum, dwarf gleba ochraceous.
viscidum, surface red-brown, viscid.
atratum, surface pale purple, viscid.
neglectum, peridium thick, fleshy brown, not viscid
obtusum, peridium thick, violet, not viscid.
clathroides, waxy consistency throughout.
inflatum, exospore inflated.
membranaceum, delicate white to pale brown, turning indigo where bruised.
fusisporium, white, drying ochre, spores fusiform, shining.

Hysterangium affine, Mass. et Rod. Globose, seldom exceeding 1 cm. diameter. White to pale brown; peridium white, leathery, 1 mm. thick, readily separating from the

gleba. Gleba dense, greenish or bluish, gelatinous. Canals small, not crowded, tortuous. Spores ellipsoid to fusiform, obtuse to sub-acute, smooth, slightly tinted, 11-13 x 5-6 μ.

Common in Tasmania.

Hysterangium barbarianum, Rod. Globose, 1-2 cm. diameter, pale brown; peridium leathery, easily separating, 1 mm. thick. Gleba gelatinous, pale brownish-green, canals numerous, convoluted, walls thin. Spores oblong, smooth, obtuse, 5 x 3μ

Differs from *H. affine* by paler gleba, and the smaller obtuse spores.

Collected near Launceston.

Hysterangium pumilum, Rod. Globose, pale ochre, cæspitose, 2-3 mm. diameter. Peridium thin, dark, horny. Gleba gelatinous ochre. Canals relatively large, not crowded, little convoluted. Spores smooth, hyaline, fusiform, 12 x 4μ.

Differs from small specimens of *H. affine* in small size, cæspitose habit, pale gleba, and broader canals.

In heathy soil. Tasman's Peninsula.

Hysterangium viscidum, Mass. et Rod. An irregularly globose tuber, mostly 2-3 cm. diameter, viscid, chestnut-brown; peridium rather thick, tough, readily separating from the gleba. Gleba at first pale, but dotted by the minute brown canals, becoming dark brown with age. Spores broadly oblong, very obtuse, dark brown minutely papillate, 12-14 x 8-10μ

In gullies near Hobart.

Also collected in South Australia by Dr. C eland.

Hysterangium fusisporum, Mass. et Rod. Irregularly globose, mostly 2 cm. broad, white to cream coloured, becoming darker with age, surface very rugose. Peridium very thin, papery, white. Gleba soft dense, but not as gelatinous as that of most members of the genus, white, drying pale yellow, canals small, very convoluted. Spores ellipsoid to fusiform, mostly acute at one or both ends, hyaline, shining, smooth, 20-22 x 8μ.

Fairly common throughout Tasmania.

Hysterangium clathroides, Vittadini. Very irregular in shape, about 2 cm. in diameter; peridium thin, floccose continuous with the surrounding mycelium. Gleba gray-hyaline,

soft, almost waxy. Canals free, little tortuous, narrow, pale brown. Spores ellipsoid, acute at both ends, smooth, pale brown, 10 x 5 μ.

Knocklofty, Hobart. Rare.

Hysterangium neglectum, Mass. et Rod. An irregular tuber, 2-3 cm. diameter, ochre coloured; peridium thick, fleshy, not viscid, not readily separating from the gleba. Gleba dark, rich brown, sub-gelatinous, canals minute tortuous. Spores ellipsoid, light yellow-brown, rather obtuse, smooth, 12-8μ.

Very near *H. viscidum*, only different colour, not viscid, more gelatinous gleba, and distinct spores.

Found in many parts of Tasmania.

Hysterangium inflatum, Rod. Globose, reddish-brown, smooth, about 1 cm. diameter; peridium fleshy, about 1 mm. thick, readily peeling from gleba. Gleba blue-black, very gelatinous, canals not crowded, but very tortuous. Spores almost fusiform, very pale, smooth, 12 x 4μ, enclosed in a dilated exospore, much inflated above, reducing towards the base.

With a darker gleba than in *H. affine* it has distinct spore structure.

Rare. Mt. Wellington.

Hysterangium atratum, Rod. Subglobose, 1.5-2 cm. diameter, pale purple, smooth, viscid, becoming dark brown when old; peridium thin, gelatinous, readily peeling. Gleba clay-coloured, changing to dark brown, canals small, but numerous. Spores very dark brown, minutely rough, nearly spherical, mostly 11.5-11μ

Near *H. viscidum*. It differs besides general features by the rounder and even darker spores.

Mt. Nelson.

Hysterangium obtusum, Rod. Irregularly subglobose, pale pink-violet, becoming ochraceous when dry, mostly 2 cm.; peridium thick, deep violet. Gleba pale slatey olive. Spores ellipsoid, very obtuse, smooth, hyaline, 9 x 4μ.

Differing from *H. affine* by the thick violet peridium and smaller and more obtuse spores.

Mt. Nelson.

Hysterangium membranaceum, Vittadini. Irregularly globose, 1-2 cm., delicate, white, becoming blotched with indigo. Peridium very thin, dry, subtomentose. Gleba white or tinted with indigo, ochraceous with age. Spores ellipsoid, smooth, pale brown, 12 x 6μ.

Not common, but cosmopolitan.

OCTAVIANA, VITTADINI.

Peridium cottony. Sterile base distinct. Trama byssoid. Canals small contorted. Spores spherical.

carnea, pink, spores finely echinulate.
australiense, brownish, spores verruculose.
levispora, pale to light brown, spores glabrous.

Octaviana australiense, Berk et Br. Subglobose, mostly 2 cm. diameter, smooth, cream coloured to chestnut-brown, according to age. Peridium thin, tough. Gleba cream-coloured, then pink-brown, pierced below more or less by arms from the sterile base, canals about 1 mm., very contorted. Spores globose, with an irregular surface, or smooth, pale yellow, 9-12μ.

When young it will exude white milky fluid when cut.

Common in Tasmania. Widely spread in Australia.

Octaviana carnea, Wallr. Irregularly subglobose, 1-3 cm., smooth, pale-pink. Peridium thin, papery, or cottony, hardly appreciable. Gleba pink and white, cells very numerous and contorted, walls thin, sterile base, well developed. Spores globose, finely echinulate, white, 9-10μ.

Cosmopolitan.

Octaviana levispora, nom. nov. Irregularly globose, 2-3 cm., white, then gray or very pale brown. Peridium thin floccose. Sterile base, sometimes well developed, sometimes obsolete. Gleba white, then pale brown, dense, the canals small and tortuous. Spores spherical, pale brown, smooth, 9-10 μ. Peridium much thinner than in *Octaviana australiense*, and the canals smaller, but the spores similar.

Tasman's Peninsula.

HYDNANGIUM, WALLROTH.

Peridium fleshy or thin, smooth or silky, sterile base absent; cavities minute irregular, or occasionally larger and not contorted. Spores globose or subglobose, seldom smooth.

The genus may readily be divided into two sections:—

Contorta, in which the canals are very small, much contorted and empty.

Compacta, in which the sporogenous cavities are roughly iso-diametric, and crammed with spores.

Of the *Contorta*:—

brisbanensis, yellow, spores verruculose.
hinsbyi, ochre-brown, spores sub-echinulate.
glabrum, spores hyaline, smooth.

Of the *Compacta*:—

Sporogenous cavities about 1 mm. diameter.

tasmanicum, spores 11μ., brown, echinulate.
clelandi, spores 11μ., black verrucose.
mc'alpinei, spores 21μ., yellow verrucose.

Sporogenous cavities much under 1 mm.

alveolatum, spores alveolate.
microsporium, spores 5-6μ., verrucose.
densum, spores brown, echinulate.

Hydnangium brisbanensis, Berk. et Br. Irregularly globose, yellow, becoming brown when old, no sterile base, 1-3 cm., surface rugose. Peridium under 1 mm. but tough. Gleba ochre to ochre-brown, tubes numerous, small, very contorted, mostly 0.3 mm. Spores globose, pale-ochre, obscurely verruculose or minutely echinulate, 7-8μ. diameter.

North-East Tasmania. Reported from Queensland and Victoria. Many collections in New South Wales by Dr. Cleland.

Hydnangium hinsbyi, n.s. Irregularly globose, rugose, ochre-brown, 1-3 cm. diameter. Peridium thin, hardly apparent. Gleba rather dense, no sterile base, umber, canals small, numerous, contorted. Spores globose, light brown, densely covered with small erect, obtuse asperities, appearing echinulate under a low power, 9-12μ.

West Coast of Tasmania.

Hydnangium glabrum, Rod. Irregularly globose to oblong, mostly about 1 cm. diameter, surface smooth, dull chestnut-

brown. Peridium thin and continuous with the trama. No sterile base. Gleba at first pale, then brown, tubes convolute very irregular in size. Spores globose, smooth hyaline 6 μ. diameter. Often the exospore dilated and making the spore 8μ., with a double contour.

Distinguished from *H. australiense* by the dense gleba and small hyaline spores.

Cascades, Hobart. Collected in South Australia by Dr. Cleland.

Hydnangium tasmanicum, Kalchbr. Globose, gray, becoming dark with age, 1-2 cm. diameter. Peridium thin, tough, continuous with the pale trama; canals 1-2 mm. diameter, irregular, but little contorted, stuffed full of brown spores, giving the surface a marbled appearance. Spores globose, coarsely echinulate, dark brown, 10-12μ. diameter.

Found occasionally in Tasmania.

Hydnangium mc'alpinei, Rod. Irregularly globose, ochre-coloured, surface rough, 1-3 cm. diameter. Peridium tough, about 0.5 mm., thick, continuous with white trama. Gleba dense, canaliculate spaces, 1-2 mm. broad, not at all contorted, black with dense masses of spores. Spores globose, dark brown to black, rough, with small dark warts, 9-12μ. diameter.

Mt. Nelson, Hobart. Also collected in South Australia by D. McAlpine.

Hydnangium clelandi, Rod. Irregularly globose, whitish ochre, 1-2 cm. diameter. Peridium thin, membranous, white, continuous with the trama. Gleba dull brown-clay to umber, becoming browner with age, cavities about 1 mm., not contorted, but densely crowded with spores. Spores pale yellow, globose, smooth, becoming obscurely verrucose, 20-22 μ. diameter.

Cascade Valley, Hobart.

Hydnangium alveolatum, Cke. et Mass. Globose, 1-1.5 cm., whitish ochre. Peridium distinct, continuous with the trama, becoming dark. Gleba soft, waxy, solid, trama pale, becoming dark, cavities minute, pale, not contorted. Spores globose, hyaline to pale brown, minutely alveolate, 10-12 μ. diameter.

Cascades, Hobart. Also in Victoria.

Hydnangium microsporium, Rod. Globose, white to pale ochre. Peridium rather thick and tough. Gleba dense, orange to raw sienna; cavities round about 0.5 mm. diameter, not contorted, full of spores. Spores hyaline, globose, armed with short spines or warts, 5-6μ. diameter.

Mt. Nelson.

Hydnangium densum, Rod. Globose, 5-8 mm., ochraceous. Peridium 0.5 mm., thick, leathery. Gleba marbled with black from the spore masses; trama white. Canals round, not convoluted, 0.3 mm. diameter, densely packed with spores, black. Spores globose, brown, minutely echinulate. 12μ. diameter.

Mt. Nelson.

In one specimen the base had few small canals, giving the appearance of a sterile base.

GYMNOMYCES, MASS. ET ROD.

Peridium none or rudimentary. Gleba fleshy; hymenial spaces numerous, not much contorted, trama thin. Sterile base absent, except in a few isolated tubers. Spores hyaline, globose, rough or echinulate.

pallidus, white, spores verruculose.

seminudus, white, spores echinulate.

flavus, yellow, spores echinulate.

Gymnomyces pallidus, Mass. et Rod. Subglobose, 2-3 cm. diameter, white, becoming light ochre when old. Peridium obsolete. Gleba dense, fragile white, canals small, very contorted, tramal plates white, very thin. Spores globose, hyaline, verruculose, 9-10μ diameter.

Cascades, Hobart.

Gymnomyces seminudus, Mass. et Rod. Globose white, then tinted with ochre, 2-4 cm. Peridium very thin, continuous with the trama. Gleba white, tougher than in *G. pallidus*, canals minute, very contorted, irregular, tramal plates white, rather firm. Spores hyaline, globose, strongly echinulate, 11-12μ. diameter.

Cascades, Hobart.

Gymnomyces flavus, Rod. Subglobose, but very irregular in shape and size, mostly from 5 to 10 mm. diameter, dull canary yellow when fresh, ochraceous when dry. No peridium; the surface floccose and marked by protruding hymenial canals. Gleba fragile, canals broad, numerous contorted, trama thin, fleshy. Spores globose, hyaline, 10-11 μ. diameter, armed with broad, short spines.

Common in Southern Tasmania.

Gathered in New South Wales by Dr. Cleland.

f. tetraspora. Gleba less compact. Spores armed with longer spines and adhering in fours.

Cascades, Hobart.

The following described species are here suppressed:—

Hymenogaster barnardi, too near *Hys. fusisporum*
Octaviana archeri, no sufficient description.
Gymnomyces solidus, too near *G. pallidus.*
Hymenogaster levisporus, referred to *Octaviana.*