

ART. VII.—*Additions to Australian Ascomycetes, No. 2¹.*

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(With Plates IV.-VI.)

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The genus *Lamprospora* De-Not., Critt. Ital., 1, 1864.

Syn. *Crouania* Fuckel, Symb. Myc., 320, 1869. Not *Crouania* Agardh, 1842.

Plicaria Fuckel, Symb. Myc., 325, 1869.

Barlaea Sacc., Syll. Fung., 8, 111, 1889. Not *Barlaea* Reich, 1877.

Detonia Sacc., Syll. Fung., 8, 105, 1889.

Plicariella (Sacc.) Lindau, in E. and P. Nat. Pfl. 1, 179, 1897.

Barlaeina Sacc., Syll. Fung., 14, 30, 1899.

Pulvinula Boud., Hist. Class. Discom., 69, 1907.

This is a genus of the Pezizineae containing a number of minute forms which are found growing among moss, or occasionally on damp clay. In 1923 specimens of two species were sent to Dr. F. J. Seaver, of the New York Botanical Gardens, who in reply said, "The occurrence of these species in such a remote place is certainly of very great interest, and I trust that you will follow this work and publish a list of the species of this genus for your continent, with full illustration of the spore characters."

The species so far collected are extremely small in size, and although several occur in Victoria they are not readily distinguishable in the field, as they are for the great part practically identical in their macroscopic characters, only microscopic examination revealing the species. They are usually (exceptions noted below) orange red in colour, sessile, sub-globose, with a lacerated margin bordering the hymenium, which is most characteristically papillose due to the ripe protruding asci (cf. Ascobolaceae). The spores are globose, occasionally smooth, but in the great majority of cases they are sculptured, the variations in the type of sculpturing (tuberculated, reticulated, echinulated) being made the basis of the specific characters.

Seaver (1), who has studied the genus in America, includes in it "the smaller plants of the globose-spored type of operculate Discomycetes, except those which are commonly placed with the Ascobolaceae." The forms collected and studied by us agree for the most part with those found in America, and so establish a wide distribution for this genus, which has been already recorded from Europe, North Africa and America.

(a) *Reticulated spore forms.*

1. LAMPROSPORA CROUANI Cooke.

(Plate IV., Fig. 1.)

Plants sub-globose expanding and becoming plane or with the hymenium slightly concave, surrounded by a frill-like margin, orange red, 1-3 mm. diam. Spores globose, 13-15 μ diameter, having when mature a reticulated surface. The reticulations are shallow, and from 3-6 sided, with meshes of an approximately uniform size, 3-4 μ in diameter (3 is the commoner measurement). On damp soil, among moss.

Localities.—Beaumaris, near Melbourne, and Chewton, near Castlemaine, Victoria, August, 1923.

This, the type species of the genus, was recorded by Cooke (2) for Victoria under the name of *Humaria* (*Crouania*) *miniata* Fuckel, with spore measurements, given as 15-18 μ . The American plants, according to Seaver (loc. cit.) have spores 15-22 μ in diam., usually about 20-22 μ at maturity.

2. LAMPROSPORA AREOLATA Seaver, var. AUSTRALIS McL. and C.

(Plate IV., Fig. 2a,b.)

Plants with typical *Lamprospora* characters. Spores 18-20 μ , including the distinct wing which surrounds the spore; without the wing the spore measures 14 μ diam. The surface of the spore is deeply reticulated, the meshes of the reticulations are wider, and seem rather more irregular than those in *L. Crouani*. The diameter of the areolae varies from 5-6 μ , 5 μ being the commonest measurement, i.e., almost double that for *L. Crouani*. A shallow secondary reticulation is present on the spore-surface, which can be clearly seen by focussing (Plate IV., Fig. 2b). The meshes of this secondary reticulation are about 2 μ in diameter. On damp soil among moss.

Localities.—Recorded in Part I. of this series (3) for Victoria. Collected in August, 1924, in Mount Lofty Ranges, South Australia.

3. LAMPROSPORA FUNIGERA, sp. nov.

(Plate IV., Fig. 3a,b.)

Plantis 1-3 mm. diam. Hymenio aurantiaco, margine in morem fimbriae circumdato. Ascis cylindricis 15-16 μ diam. Sporis globosis 12-13 μ diam. cum fasciis multis et distinctis et ramosis quae inventae inaequales areas superficiei spori includunt.

Plants scattered, globose when young, expanding at maturity until the hymenium becomes plane or slightly concave, with a well-developed fringe-like margin. From 1-3 mm. in diameter, orange red, hymenium roughened by the ripe

protruding asci, finally becoming pitted as a result of their collapse; asci cylindrical, 15-16 μ wide. Spores globose, hyaline, at first smooth, but later characterised by several distinct bands extending across the surface of the spore in various directions, resembling a cord wound about its surface. Entire spore 12-13 μ diam. Paraphyses slender, slightly enlarged at their apices.

On the ground among moss.

Localities.—Ringwood, near Melbourne, and Chewton (E. McLennan), May, 1924.

This species seems to us to be distinct from many of those recorded by Seaver (loc. cit.). It appears to have affinities with *L. lobata* Berk. and Curt., and with *L. ascoboloides* Seaver. It differs from the former in its much smaller size, and in the absence of tubercles on the surface of the spore; and from the latter in the fact that the ridges on the surface constantly meet and overlap, and thus enclose definite areas of the spore surface.

(b) Tuberculated spore forms.

4. LAMPROSPORA TUBERCULATA Seaver.

(Plate V., Fig. 1.)

Plants with typical *Lamprospora* characters; spores when mature coarsely tuberculate, the tubercles are somewhat unequal in size and so often project further in one place than another, giving to the spore an irregular outline. The tubercles on an average are 4 μ wide at their base, and about 12 are placed around the periphery of the spore. Entire spore, 16-18 μ diameter.

On the ground among moss.

Localities.—Ringwood, Beaumaris and Chewton.

Since the record of this species by the writers (loc. cit.), we have had an opportunity of examining specimens of Seaver's type material, and it was found to be identical with the Australian plants. In addition, material of *Barlaea verrucosa* Rod. has been made accessible to us through the courtesy of Mr. Rodway and the spore characters also agree with those of Seaver's plants.²

5. LAMPROSPORA TUBERCULATELLA Seaver.

(Plate V., Fig. 2.)

Plants with typical *Lamprospora* characters. The spores bear approximately 25 small tubercles around their periphery, each tubercle being approximately 1 μ broad at its base.

Entire spore, 17-18 μ in diameter.

2.—Rodway in his Tasmanian Discomycetes (4) retains the genus *Barlaea*. If we accept Seaver's definition of the genus it should now be included in the genus *Lamprospora*. *Barlaea verrucosa* Rod. then becomes *Lamprospora tuberculata* Seaver; *Barlaea minutata* Sacc. becomes *Lamprospora Crouant* Cooke, and *Barlaea echinulata* Rod. does not seem to differ in any essential way from *Lamprospora spinulosa* Seaver.

On ground among moss.

Locality.—Chewton, May, 1924.

This form has not previously been recorded from Australia, our specimens seem to agree in every respect with the description and figures of the American plants.

6. LAMPROSPORA MAIREANA Seaver.

(Plate V., Fig. 3.)

Plants with typical *Lamprospora* characters. Spores with tubercles, about 16 on an average, around the spore circumference. Each tubercle is approximately 2.5μ wide at its base, and bears secondary roughenings, giving to each a minutely tuberculated surface. Entire spore $17-18 \mu$ in diam. On the ground among moss.

Localities.—Ringwood and Castlemaine, September, 1923, 1924.

As regards the size and number of the tubercles, this species is intermediate between *L. tuberculata* and *L. tuberculatella*, but the secondary roughenings make it readily recognizable as a distinct species; not previously recorded from Australia.

(c) *Echinulated spore forms.*

7. LAMPROSPORA CREC'HQUERAULTII Crouan.

(Plate V., Fig. 4.)

Plants gregarious, 2-5 mm. diam., hymenium becoming convex in mature plants, with an indistinct margin, ochraceous orange. Spores echinulate, the spines are irregular in both length, $3-4 \mu$, and breadth, but taper to a very sharp point at the apex. Entire spore $24-26 \mu$, including the spines, spore itself is from $19-20 \mu$ diam. On wet, clayey soil.

Localities.—Ringwood and Chewton, August, 1924.

This is the only species we have met with that differs in its external characters from the other members of the genus. It is therefore possible to identify it with some degree of certainty in the field.

8. PSEUDOPLECTANIA NIGRELLA (Pers.) Fuckel,

Symb. Myc., 1869.

(Plate IV., Figs. 4, 6; Pl. VI., Fig. 2.)

Plants gregarious, substipitate, at first deeply cup-like, later becoming expanded cup-shaped, or nearly plane, $0.5-1.5$ cms. diam., brownish-black, externally completely covered with brown or black twisted, sparingly septated hairs (Pl. IV., Fig. 4), more numerous at the basal end, where they form a definite mycelial

pad, the hyphae of which radiate out into the soil. Hymenium brownish black, smooth and shining. Asci cylindric, about $300\ \mu$ long and $13-14\ \mu$ broad; spores globose, hyaline, uniseriate, $11\ \mu$ in diameter. Paraphyses filiform, occasionally branched, of a brown colour for a great part of their length, about $3\ \mu$ thick. On the ground.

Localities.—Ringwood, Vic., and Mt. Compass, South Australia, August, 1924.

9. PLECTANIA MELASTOMA Fuckel, Symb. Myc., 1869.

(Plate IV., Fig. 5a,b; Pl. VI., Fig. 3.)

Plants gregarious, substipitate, urceolate; externally brownish-black, slightly roughened, 1-2 cms. broad and 0.75-1.5 cms. high, margin unevenly incised, of a brick-red colour. Stalk short sulcate, clothed with dark rooting hairs. Asci cylindric, about $350\ \mu$ long, spores elliptic, smooth, hyaline, $19-20 \times 8-10\ \mu$. Paraphyses branched, filiform, brown at their apices. On dead branches.

Locality.—Ringwood, August, 1924.

Previously recorded by Cooke (2) from Queensland, under the name *Sarcoscypha* (*Plectania*) *melastoma*.

The two preceding species show marked external resemblances to one another, especially in the young stages. They may be distinguished, however, by their spore-shape, and the fact that in *Pseudoplectania nigrella* (5) the external surface of the peridium (Plate IV., Fig. 4), is completely clothed with dark strigose hairs, which in *Plectania melastoma* occur only in the region of the stalk (Plate IV., Fig. 5a).

10. SPIAEROSOMA TRISPIORA, sp. nov.

(Plate V., Figs. 7, 8; Pl. VI., Fig. 1a,b.)

Plantis corpulentis colore atro-fusco 1-3.5 cms. diam. sessilibus cum fundamento lato afficu. Hymenio per peridium limitato. Ascis cylindricis, cum iodino haud caeruleis, $350\ \mu \times 50\ \mu$. Sporis 3 raro globosis bis areolatis, fuscis-atris $37-48\ \mu$ diam. Maculis primi reticuli $6.5-9\ \mu$ ala alta $6-8\ \mu$ in margine spori formata. Maculis secundi reticuli latis $3-4.5\ \mu$.

Plants gregarious or scattered, fleshy, brownish-black, 1-3.5 cms. in diameter, sessile, with a broad basal attachment. Their shape is very varied, often at first being cushion-like, with a convex much convoluted upper surface, and later expanding to form an irregular, slightly concave fruit-body (Plate VI., Fig. 1a). Some of the smaller specimens, however, instead of showing a well-defined pulvinate character, are plano-concave, with a slightly raised margin from an early period (Plate VI., Fig. 1b).

The ascocarp is pale internally, only the outermost portion of the hymenium appearing dark-brown in colour; the hymenium itself is bounded by a distinct peridium.

The asci are broad, cylindrical, operculate, not turning blue with iodine, $350 \mu \times 50 \mu$. Spores 3, rarely 4, globose, areolate, hyaline when young, and situated towards the middle of the ascus, dark brown, uniseriate at the distal end of the ascus at maturity, $37-48 \mu$ diam.

There is a well-developed reticulum on the surface of the spore, the individual meshes of which enclose regular, hexagonal areas $6.5-9 \mu$ diam., and form a distinct wing $6-8 \mu$ deep around the periphery of the spore. A well-defined secondary reticulum of a shallow nature is disclosed when the actual spore surface is focussed, the meshes of which are also regularly hexagonal, but with a diameter of only $3.4-5 \mu$. The areolae, in a perfectly mature spore, become masked by the intense brown colour which is developed.

Paraphyses unbranched, septate, clavate, about 12μ diam., containing brownish granules which, together with the shrivelled asci, afford the brown colouration which obtains in the outer hymenial zone.

On open, damp, clayey soil.

Localities.—Ringwood and Chewton (E. McLennan), May, 1924.

The genus *Sphaerosoma* so far includes three species with echinulate spores, and one, *S. alveolatum* (an Australian form (3)), with reticulate spores. The present species shows affinities with the latter in the type of marking on the spore-wall, and the external form of the plant, but differs, however, in its larger size, the constantly 3-spored ascus, the larger spores, and the presence of a double reticulum.

CORDYCEPS BRITTLEBANKII, sp. nov.

(Plate V., Figs. 5, 6; Pl. VI., Figs. 4, 5.)

Stromate simplici a capite larvarum *Heteronyxis* orto. Stipite gracili, longo 3-5 cms. et lato 1-2 mm., aut simplici aut ramoso, ramis ultimis cum capitulis. Capitulum regione fertili et ovata longa 0.5-1 cm., et lata 2-4 mm. rubra-fusca, et rostro terminato et sterili, longo 4-8 mm. et lato 1-2 mm., constat. Peritheciis cum paraphysibus in capite penitus immersis. Ascis capitatis longis $180-210 \mu$ et latis $7.5-9 \mu$, duobus finibus contractis et sporis octo, fusoid et hyalinis tres-decem dividuis, longis $48-86 \mu$ et latis $4.5-5 \mu$ divisionibus longis $6-25 \mu$.

Stroma single, entomogenous, arising from the head of the larvae of *Heteronyx*, a Cockchafer Beetle. Stem slender, 3-5 cms. long, and 1-2 mm. broad, either simple or branched; when the latter, the arrangement is mainly dichotomous, and the ultimate branches, which in the specimens examined do not exceed 6 (Plate VI., Fig. 4), may be terminated by a fertile capitulum. The greater part of this stem lies beneath the surface of the soil, only a small terminal portion, about 0.5 cms. long, supporting the capitulum, being aerial.

Each capitulum consists of an oval fertile region, 0.5-1 cm. long and 2-4 mm. broad, which is of a dark-red-brown colour, faintly punctate by the slightly raised darker brown ostiola of the perithecia; and a terminal practically sterile beak, rather lighter in colour than the fertile area 4-8 mm. long and 1-2 mm. broad.

The perithecia are flask shaped, deeply immersed in the tissue of the capitulum, about $450\ \mu$ long, and open by a slightly raised dark brown pore on the surface. Each ascus is capitate, $180-210\ \mu$ long, and $7.5-9\ \mu$ wide in its broadest region, narrowing towards both ends, terminating at its base in a tapering pedicel, and contains 8 spores which are arranged in such a way that its very characteristic shape results. The spores lie parallel to one another, each individual spore not extending throughout the length of the ascus, usually one spore only reaches each end, the remaining ones being arranged in a spiral fashion in the wider portion of the ascus (Plate V., Fig. 5).

The spores are hyaline, fusoid, 3-10 septate, the majority being 3 septate $48-86\ \mu$ long, and $4.4-5\ \mu$ broad, the divisions being often unequal and varying from $6-25\ \mu$ in length, according to the degree of septation of the spore (Plate V., Fig. 6). From the shape of the spores themselves, it appears very unlikely that these subdivisions give rise to secondary spores. Paraphyses are present in the perithecia, they are long, colourless and filamentous. On larvae of *Heteronyx*.

Locality.—Ringwood (I. Cookson), April, 1924.

The type of ascus, and ascospores of this form are not those usually found in the species of *Cordyceps*. Petch (6) has recently described a new species from Ceylon, *C. Blattae*, in which the ascus is clavate, non-capitate, with fusoid, multiseptate spores, in a parallel bundle spirally twisted. In noting this unusual feature, he further suggests the probability that *C. unilateralis* may also have similar spores, and notes that *C. rhizoidea* has 8 spores, which are about half as long as the ascus and arranged in an irregular bundle, the spores in this case being continuous.

C. Brittlebankii, in two such important features as the nature of the asci and spores, shows affinities with the above-mentioned forms, but differs from *C. Blattae* in the possession of a capitate ascus and from all three in the generally 3 septate spores.

This species has been named after Mr. C. C. Brittlebank, the well-known Australian Mycologist, to whom we are grateful for his interest and help in our work. To Mr. A. O'Brien, of the Agricultural School, Melbourne University, we are indebted for the photographs of the various forms.

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EXPLANATION OF PLATES.

Detailed drawings have been made with the aid of the camera lucida.

PLATE IV.

- Fig. 1.—Spore of *Lamprospora Crouani*. $\times 625$.
- Fig. 2a,b.—Spores of *L. areolata* var. *australis*. (b) shows the shallow secondary reticulations. $\times 625$.
- Fig. 3a,b.—Spores of *L. funigera*, sp. nov. $\times 625$.
- Fig. 4.—Vertical section through an entire fruit-body of *Pseudoplectania nigrella*, h, hairy external surface. $\times 8$.
- Fig. 5a,b.—*Plectania melastoma*. (a) vertical section through an entire fruit-body, h, hairs which are confined to the stalk-region. $\times 5$. (b) spores. $\times 625$.
- Fig. 6.—Portion of an ascus and paraphysis of *Pseudoplectania nigrella*. $\times 625$.

PLATE V.

- Fig. 1.—Spore of *Lamprospora tuberculata*. $\times 625$.
- Fig. 2.—Spore of *L. tuberculatella*. $\times 625$.
- Fig. 3.—Spore of *L. Maircana*. $\times 625$.
- Fig. 4.—Spore of *L. Crec'hqueraultii*. $\times 625$.
- Fig. 5.—Two entire asci of *Cordyceps Brittlebankii*, sp. nov. $\times 625$.
- Fig. 6.—Spores of *C. Brittlebankii*, showing varying degrees of septation. $\times 625$.
- Fig. 7.—Single spore of *Sphaerosoma trispora*, sp. nov. a, primary reticulum, b, secondary reticulum. $\times 625$.
- Fig. 8.—Portion of an ascus and paraphysis of *S. trispora*. $\times 625$.

PLATE VI.

- Fig. 1a,b.—Plants of *Sphaerosoma trispora*, sp. nov. Nat. size.
- Fig. 2.—Plants of *Pseudoplectania nigrella*, small specimens. Nat. size.
- Fig. 3.—Plants of *Plectania melastoma*. Nat. size.
- Fig. 4.—Branched stroma of *Cordyceps Brittlebankii*, sp. nov. g, ground level. Nat. size.
- Fig. 5.—Simple stroma of *C. Brittlebankii*. g, ground level. Nat. size.