

THE GENUS «LYCOGALOPSIS»

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RESUMEN

El género «Lycogalopsis». — Este interesante género de gasteromicetes se ha recogido escasamente de varias localidades de la zona trópica de ambos hemisferios ; en el Nuevo Mundo, en Martinica y en Puerto Rico. El ha sido ubicado por lo menos en cuatro familias diferentes. Del estudio de varias colecciones de Panamá, el autor considera las formas americanas como idénticas con *L. Solmsii* E. Fischer, originalmente descriptas para Java, y considera el género como incluido en las *Lycoperdaceae*.

The genus *Lycogalopsis* was established by E. Fischer (*Ber. deut. bot. Gesell.* 4: 192-197. 1886) on specimens collected in Java, with *L. Solmsii* as the type and only species. The fungus has been collected in Java several times since Fischer described it. Two such collections are mentioned and illustrated by Lloyd (*Myc. Writ.* 3: 482, f. 376. 1910 and 7: 1198, f. 2451, 2452. 1923). Four other species have been named from the Old World. *L. africana* Har. & Pat. is from the Congo, and *L. zeylanica* Petch is from Ceylon (See Saccardo, *Syll. Fung.* 21: 494 and 23: 599). Both of these species are obviously very close to *L. Solmsii* and it is possible that they are not distinct from it. *L. reticulata* ⁽¹⁾ Lloyd (*l. c.*, 7: 1198, f. 2450. 1923 and 1244, f. 2650. 1924) was described from Japan and *L. subiculosa* Lloyd (*l. c.*, 7: 1244, f.

(¹) Lloyd used the masculine form for his specific names ; Overholts the neuter. Since a generic name employing the suffix derived from $\epsilon\psi\epsilon$ becomes feminine, I have written the specific names accordingly.

2649. 1924) from Java. The last name Lloyd later applied to a collection from Puerto Rico, as recorded by Overholts (Sci. Survey P. R. 8 (1): 180. 1926). Lloyd's species are based mainly on external appearance and their characters are well brought out in his splendid photographs. He himself suggests, however, that *L. subiculosa* may not be distinct from *L. Solmsii*.

The only species described as new from the New World is *L. Dussii* Pat. (*Bull. Soc. Myc. France*, 18: 175. 1902) from Martinique. According to Patouillard, *Dussii* differs from *Solmsii* in its larger size (8-15 mm. in diameter as compared with 4-5 mm. in Fischer's species), in its scaly peridium and in the more abundant capillitium. In his description he notes further that the basidia bear four sterigmata and the rough, globose spores are 2μ in diameter, whereas Fischer states that the basidia of *L. Solmsii* are mostly 6-7-spored, and the spores, which are globose, elongated or somewhat irregular in shape are 3-4 μ in diameter or occasionally larger. None of these differences seems to be of great importance.

During the very wet summer of 1935 a species of *Lycogalopsis* was extremely abundant in the grounds of the Missouri Botanical Garden Tropical Station at Balboa, in the Panamá Canal Zone, where it was growing about the bases of the large royal palms along the path in front of the building. During the much drier summer of 1937 it was completely absent from this locality. Smaller collections on very rotten wood were gathered on Barro Colorado Island during both summers. The 1937 collection was entirely in formol-acetic alcohol, the dried portion of the same collection and of another collection probably representing the same species having been destroyed by fire. A portion of the Balboa collection was sent to doctor David H. Linder, who compared it with the type of *Lycogalopsis Dussii*, now in the Farlow Herbarium, and pronounced it identical. Doctor Linder has been kind enough to send me a slide of the type of *Dussii* and one of a collection of *Solmsii* from Java in the Patouillard herbarium and I do not find that the spores are significantly different. Those of *Solmsii* (Text fig. 1 *f.*) are mostly globose, 3-3.5 μ in diameter, with a few elliptical or ovate ones interspersed; those of *Dussii* (text fig. 1 *g*) are uniformly

spherical and slightly smaller, mostly 2,5-3 μ in diameter. Individual differences of this order of magnitude are not ordinarily regarded as significant in gasteromycetes. The spores of my collections (text fig. 1 *d*) are globose or ovate, 2,5-3,5 μ in diameter; those of all collections are distinctly but rather sparsely warted, with suggestion of a faint reticulation connecting the warts.

I am unable to determine the number of spores to a basidium in the preparations received from doctor Linder, but the basi-

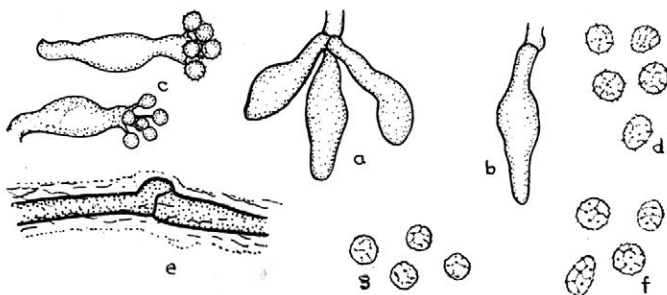


Fig. 1. — All drawings made with aid of camera lucida at a magnification of $\times 2400$ and reduced to $\times 1200$ in reproduction. a-e, G. W. M., n $^{\circ}$ 2896, Balboa; a, cluster of three immature basidia; b, single immature basidium with clamp connection at base; c, two basidia, each with six spores; d, five spores; e, portion of thick-walled capillitial thread showing clamp connection and remnants of gelatinized hyphae; f, four spores from a collection of *L. Solmsii* from Java in the Patouillard herbarium; g, four spores, from the type collection of *L. Dussii* from Martinique in the Patouillard herbarium.

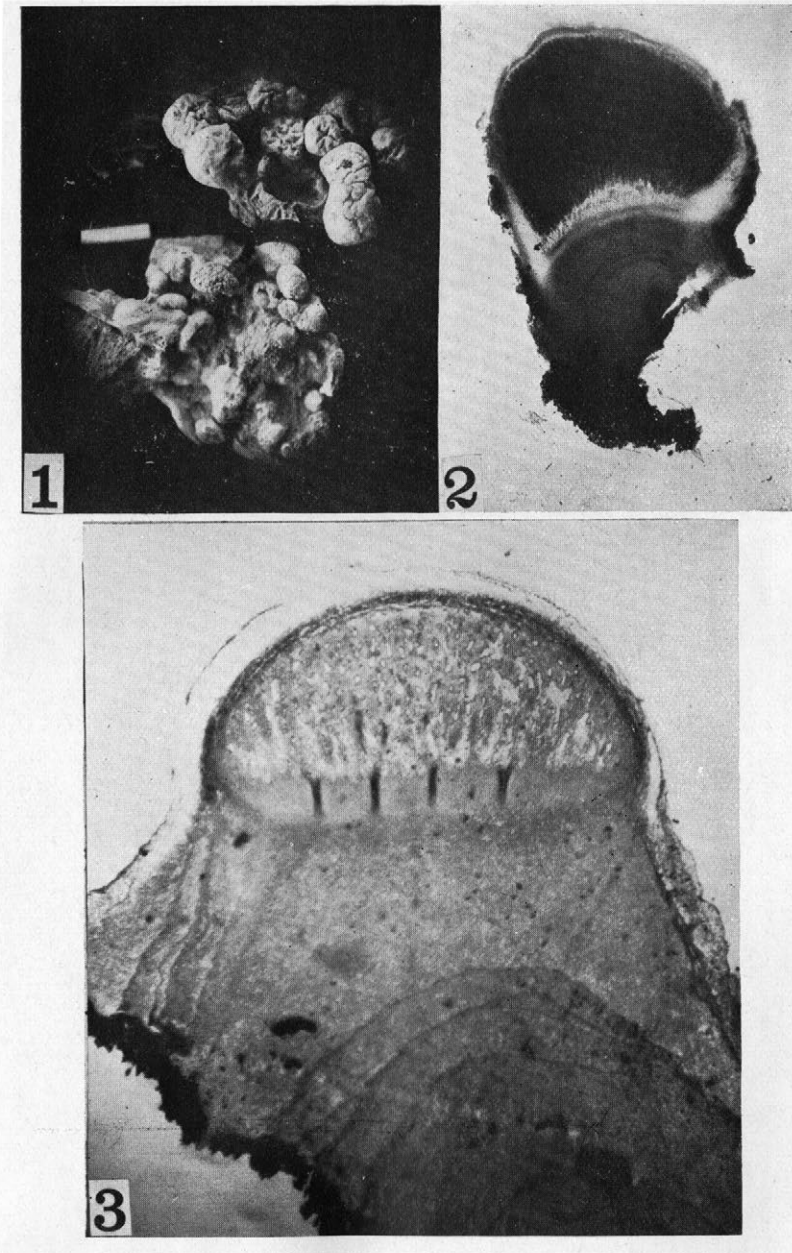
dia of the Panamá specimens bear from four to seven spores, 6-spored basidia being most numerous (text fig. 1 *c*). The younger and smaller specimens tend to be smooth; the older and larger ones more or less scaly. Figure 4 of Fischer's original account of *Solmsii* shows a nearly mature fructification with an outer covering which may well break up into scales. The variation in the stromatic base was one of the features stressed by Lloyd in distinguishing the several species he recognized. Doctor Linder informs me that the fructifications of the type collection of *L. Dussii* are globose and practically free, while the specimens of *Solmsii* are smaller and the fructifications are practically imbedded in the stroma. The photograph of two

groups of fructifications from the Balboa collection (pl. I, fig. 1) shows both conditions. Under the circumstances, it seems justifiable to refer the Panama collections to *L. Solmsii* and to regard *L. Dussii* as a synonym.

The curious basidia, with swollen centers and constricted apices bearing a crown of divergent sterigmata at the top (text fig. 1, *a-c*) are somewhat suggestive of those of certain species of *Rhizopogon* as illustrated by Coker and Couch (*Gasteromycetes*, pl. 106, fig. 8; pl. 107, fig. 10) or of *Geastrum rufescens* as drawn by Tulasne and reproduced in Engler and Prantl; still more so of the urniform basidia of *Corticium coronilla*, *Grandinia Brinkmannii* and similar forms. In older specimens, the pale capillitium, surrounded by the gelatinized remnants of other hyphae, often more or less spirally arranged (text fig. 1 *e*), is a distinctive feature. These threads, visible to the naked eye and conspicuous under a lens, are the central, thick-walled hyphae of mycelial strands radiating in a brush-like tuft from the base of the gleba. The radial arrangement is apparent in free-hand sections (pl. I, fig. 2); less so in the thinner microtome sections (pl. I, fig. 3). The latter figure brings out an additional feature, not previously noted, namely, the presence of numerous stalk-like or pillar-like structures extending from the top of the stroma, through the sterile gleba base to the fertile portion. What they represent would have to be determined by a study of younger stages than are available.

In his first publication, Fischer did not commit himself to an opinion as to just where in the gasteromycetes *Lycogalopsis* should be placed. Patouillard states that the genus is very close to *Lycoperdon* and implies that it should be included in the Lycoperdaceae, where, indeed, its appearance when mature suggests that it belongs. In the first edition of Engler and Prantl (I. 1 **: 312. 1899) Fischer placed it in the family *Hymenogastreae* of his suborder *Hymenogastreae* where it would certainly be difficult to locate it by means of the keys. Gäumann (*Vergl. Morph.* 547. 1926) includes it in the family *Lycoperdaceae*, there very broadly interpreted, but in Gäumann and Dodge (*Comp. Morph.*, 486. 1928) it is put in the *Hydnangiaceae*. Zeller and Dodge include it in their key to that family (*Ann. Missouri*

Bot. Gard., 23: 565. 1936) but do not discuss it for lack of available material for study. In the second edition of Engler and Prantl (7a: 41. 1933) Fischer places the genus in the family *Sclerodermataceae* of his suborder *Sclerodermatineae*, listing it, however, with the genera whose position is not established. He would exclude it from the *Lycoperdaceae* by reason of the method of origin of the hymenial chambers. These are formed by nests of large vesicular cells which push apart the nearly parallel hyphae at the base of the chamber, as shown in figure 5 of his original publication. Our specimens show almost identical stages. It is possible, however, to regard this as nothing more than an elaboration of the ordinary development of members of the *Lycoperdaceae*, and since all other characters permit the inclusion of *Lycogalopsis* in that family, it would seem that such disposition, as made by Patouillard and by Gäumann, is decidedly the best, at least until our knowledge of the ontogeny of the Gasteromycete fructification is much more complete and definite than it is at present. *L. Solmsii* Fischer occurs in both hemispheres; *L. Dussii* Pat. and probably *L. subiculosa* Lloyd are synonyms; it is not improbable that some of the other species will prove to be the same.



1. Two clusters of basidiocarps of n° 2896, Balboa. Basidiocarps in upper group nearly free from stroma; those in lower group largely immersed in it. $\times 2$; 2. Freehand section of basidiocarp of n° 2896, showing radial arrangement of gleba and scanty stromatic base. $\times 11$; 3. Microtome section of basidiocarp of n° 4533, Barro Colorado Island, showing massive stroma and pillar-like structures in subgleba. $\times 32$.