SOME TROPICAL AMERICAN « CLAVARIAS »

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RESUMEN

Algunas Clavarias de la América tropical. — El género *Clavaria,* según se lo interpreta comúnmente, abarca, además de las típicas formas frágiles y carnosas, cierto número de especies de una fuerte consistencia gelatinosa. Estas últimas son, en particular, características de los trópicos. El presente artículo analiza cinco especies gelatinosas de la América tropical, dos de las cuales se describen como nuevas.

The genus *Clavaria,* as commonly interpreted, embraces, in addition to the typical fleshy-fragile forms, a number of species of tough-gelatinous consistency. The latter are particularly characteristic of the tropics. The present paper discusses five such species from tropical America, two of which are described as new.

Clavaria mucida Pers. ex Fries.

(Figs. 1, 2)

This widely distributed and, in some localities, rather commom species, has been described many times, but has not, so far as I am aware, previously been reported from the American tropics. The early references are well summarized by Burt (*Ann. Missouri Bot. Gard.* **9**: 50. 1922). Atkinson (*Mushrooms,* f. 204. 1901), Hard (*Mushrooms,* f. 398. 1908) and Coker (*Clavarias of U. S.,* pl. 3. 1923) give excellent photo-

graphs. The species seems always to occur on sodden logs covered with a coating of algae. Coker (*Bot. Gaz.* 37: 63. 1904) illustrates the relation of the basal mycelium to the algal clusters and suggests that the species may be on its way toward becoming a lichen.

I have two collections of this species from the mountains of tropical America, one from Chiriquí, in western Panama, at about 1600 m. (n° 2155) and one from the Sierra Nevada de Santa Marta, Colombia, at about 1400 m. (n° 3414). The illustrations cited give the impression that the clubs are erect and I find nothing in the literature to suggest otherwise. Both of my collections were growing downward from the algal-coated lower surface of large sodden logs bridging depressions. The algal growth in both cases was composed of a mixture of several species of unicellular green and blue-green algae and while the association between the algal cells and the fungous hyphae is much as Coker described it, the picture is not that of a lichen but rather of hyphae accomodating themselves to the gelatinous matrix in which the algae are imbedded. As the specific name suggests, the clubs are gelatinous, a feature scarcely adequately stressed in the descriptions. The texture is very nearly that of a *Calocera,* and, when soaked, the fructification assumes its original size and shape exactly as do members of that genus.

Just as the texture and the pendent habit separate the species from typical Clavarias, so do the basidia. They are borne in clusters on short branches and are at first broadly ovate, with a clamp connection at the base of each. Clamp connections are abundant en the internal hyphae as well. As the basidium develops, it sends out a more or less cylindrical extension which finally expands and produces a crown of four sterigmata at the apex. A mature basidium is thus somewhat hour-glass shaped, much as are the basidia of the *Urnigera* section of *Corticium*. The spores are hyaline, elongate, mostly 4,5-6 $\times$ 2,5-3 μ, in reasonably satisfactory agreement with the dimensions given by Burt and Coker. They tend to remain aggregated in groups mostly of four spores but frequently of a greater or less number. Basidia from a North Carolina collec-

tion (Univ. Tenn. herb. 10728) and from a European collection are similar.

Associated with all the collections except that from North Carolina are large, thick-walled, ovate or suballantoid bodies with what suggests an apiculus at one end, measuring 10-13 × 5-6 μ. At first sight these are readily taken for basidiospores, and since basidiospores of this size could not possibly be borne on the basidia associated with them, it might be inferred that they are from some associated basidiomycete. This, I am convinced, is not the case. Not only are they too abundant, and too regularly present in three collections from widely separated localities but they are distinctly more numerous in the older fructifications. Careful examination shows that the apiculus-like protuberance is in reality the remnant of a basal attachment, torn as no apiculus ever is. I conclude, therefore, that they are chlamydospores, formed by direct transformation of the probasidia, which they strongly resemble in size and shape.

It is evident that the inclusion of this and similar species in *Clavaria* is not satisfactory. Maire (*Bull. Soc. Myc. France* 55 : cxx. 1904) proposed the genus *Gliocoryne* to accommodate a similar small, gelatinous species, *C. uncialis* Grev. Through the kindness of Dr. Linder, I have been provided with a mount of *C. uncialis* as distributed by Cooke in Fungi britannici exsiccati n° 512, from the specimen in the Farlow Herbarium. Dr. Seaver generously let me take a fructification from the same set in the New York Botanical Garden. *C. uncialis* is extremely tough and it is not easy to get a good view of the small basidia, but as the drawings (Fig. 3) show, they are very similar to those of *C. mucida,* although less obviously urniform. The character of the basidia, the tough-gelatinous texture and, in *mucida* at least, the pendent habit, all point to the conclusion that it may be wise to recognize *Gliocoryne* as a valid genus, to be retained in the Clavariaceae as a mater of convenience until some better disposition is available. I do not, however, a this time propose a transfer of *C. mucida* to *Gliocoryne,* believing that it should be made, if at all, only after careful comparative studies of a

number of similar species. The following notes on four additional gelatinous or subgelatinous species from tropical America may, it is hoped, be useful in such a comparison.

Clavaria coronilla sp. nov.

(Fig. 4)

Simplex vel furcata, gregaria, fusiformia vel clavata quandoque subpileata, gelatinosa, 2-4 mm alta, 0,2-0,5 mm lata, alba vel pallide ochracea; basidiis primum ovatis dein urniformis, 6-8 sporis: basidiosporis suballantoidiis, 5-7 × 2,5-3 μ.

Fructification simple or forked, gregarious, varying from long fusiform to broadly clavate and subpileate, 2-4 mm tall, 0,2-0,5 mm broad, the sterile stem 1/4 to 2/5 the total height, white to pale watery ochraceous, tough-gelatinous, drying pale brownish ochraceous and horny; basidia at first ovate, 10-12 × 5-6 μ, sending out a thick cylindrical extension which expands somewhat at the apex to bear a crown of six to eight sterigmata, thus becoming elongate urniform; basidiospores suballantoid, 5-7 × 2,5-3 μ.

COLOMBIA: Dept. Magdalena. Hacienda Cincinnati above Santa Marta, 1250-1500 m. August, 1935. On sodden wood coated with blue-green algae. N° 3452 *(Type)*.

The habitat and color of this minute form are strikingly like those of *C. mucida* and the basidia are even more urniform. It differs in the 6-8-spored basidia and the curious variation in shape, illustrated by the sketches. Unfortunately, my notes do not say whether the fructifications were erect or pendent when collected. *C. misella* B. & C. has similar spores, but the growth on moss and the opaque character when dry would seem to eliminate that species. *C. paupercola* B. & C., which is pellucid when dry, also grows on moss. The basidia should be examined.

In external characters, *C. coronilla* exhibits an interesting approach toward some of the small tropical species of *Physalacria*.

Clavaria flavella Berk. & Curt.

(Fig. 5)

A collection growing on the ground in mossy litter in western Panama at 2200 m (n° 4347) is provisionally referred to this species. The specimens agree with the original description, so far as it goes, and whith Burt's comments *(Ann. Missouri Bot. Gard.* **9**: 57. 1922). The simple, gelatinous, egg-yellow, *Colocera*-like clubs were up to 25-30 mm tall, 2-3 mm broad, and somewhat striate. The spores are quite distinctive. They are smooth, subglobose, triangular or three-lobed in outline, whith a pronounced apiculus, mostly 7-7,5 × 5-6 μ. Careful examination seems to indicate that they are in reality bluntly four-lobed.

Clavaria aurantio-cinnabarina Schw.

(Fig. 6)

Two bright orange, *Calocera*-like fructifications, 12 and 20 mm tall respectively, found growing on the ground on Barro Colorado Island (n° 3159), are referred to this species. Overholts (In Chardon and Toro, *Myc. Expl. Venez.* 306. 1934) has previously reported it from Venezuela. The Barro Colorado specimens agree in color, long sterigmata and spore size and shape, the characters stressed by Overholts, with the description of the Venezuelan specimen. The spores are not quite globose, the dimensions, including the prominent apiculus, being 7-7,5 × 5,5-6 μ. The spore wall is faintly tinted, suggesting that in mass the spores might be brownish or perhaps orange. The basidia are four-spored, each with a prominent clamp connection at the base. Many of the basidia present a curious geniculate appearance and the knee is not rarely extended into a beak. I have no suggestion to offer concerning the significance of such a structure, but such basidia are too common to be regarded as aberrant.

Clavaria Calocera sp. nov.

(Fig. 7)

Simplex, gregaria, fusiformia, aurantia, gelatinosa, 10-25 mm alta, 1-2 mm lata; basidiis clavatis, 25-32 × 5-6 μ, tetrasporis; basidiosporis hyalinis, oblongis, 8,5-10 × 4-5 μ.

Fructification simple, gregarious, long fusiform, 10-25 mm tall, 1-2 mm broad in middle, tapering toward base and tip, fertile throughout except for the very short base, bright orange when fresh, tough-gelatinous, with the aspect and consistency of *Calocera,* drying orange-brown and horny; hymenium dense without cystidia, arising from a central axis of coarse longitudinally arranged hyphae 4-8 (-10) μ in diameter characterized by very small clamp connections at the septa; basidia clavate, 4-spored, 25-32 × 5-6 μ; basidio-spores cylindrical to suballantoid, not infrequently slightly constricted in center, 8,5-10 × 4-5 μ.

COLOMBIA: Dept. Magdalena. Hacienda Cincinnati above Santa Marta, 1250-1500 m. August, 1935. Common on moss-covered rocks; less common on mossy earth. Represented by five collections: nos 3199 *(Type),* 3301, 3438, 3480, 3566.

Even more than in *C. mucida,* the gelatinous character of this species is apparent. The basidia, however, while often somewhat tortuous, do not approach the urniform condition. Miss E. M. Wakefield, of Kew, who was kind enough to examine nos 3199 and 3301, believed the species unnamed, but close to *C. clara* B. & C., differing in the large central hyphae. Burt *(Ann. Missouri Bot. Gard.* **9**: 56. 1922) describes the spores of *C. clara* as subglobose, 4-4,5 × 3-3,5 μ. The constant association with moss and particularly the common habit of growth on the thin film of moss and algae covering rather exposed rock surfaces, suggests a parasitic relationship, but no evidence of harm to the moss was observed. When fresh, the golden yellow, gelatinous clubs have exactly the aspect of a large *Calocera.*

PLATE

EXPLANATION OF FIGURES

All microscopic details outlined with aid of camera lucida at a magnification of aproximately × 2400 and reduced in reproduction to × 1000.

Fig. 1 : *Clavaria mucida*, N° 2155, Panamá. Cluster of three young basidia ; nearly mature basidium ; chlamydospore, probably formed by transformation of probasidium ; hypha with clamp connection ; five basidiospores, four in typical cluster.

Fig. 2 : *Clavaria mucida*, N° 3414, Colombia. Three basidia in various stages ; five basidiospores, four in a cluster.

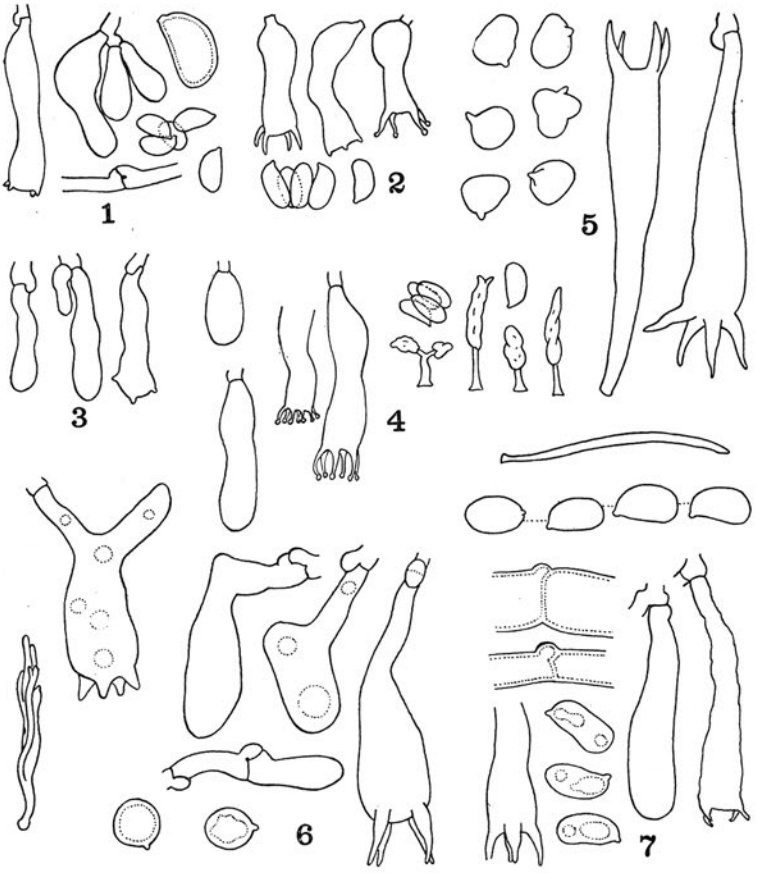
Fig. 3 : *Clavaria uncialis*, from Cooke, *Fungi britannicae exsiccati* N° 512, to show similarity of basidia to those of *C. mucida*.

Fig. 4 : *Clavaria coronilla*, N° 3452, Colombia. At left, probasidium, elongate basidium and two basidia bearing crowns of six and seven sterigmata ; at right, five basidiospores, four clustered, and four habit sketches, × 5, to show variation in shape and size.

Fig. 5 : *Clavaria flavella*, N° 4347, Panamá. Six lobate basidiospores and two basidia.

Fig. 6 : *Clavaria aurantio-cinnabarina*, N° 3159, Panamá. Habit, × 1 ½ ; four basidia, two geniculate and one with beak ; paraphysis, with clamp connections ; two spores.

Fig. 7 : *Clavaria Calocera*, N° 3199, Colombia, and from other collections from type locality. Above, habit, × 2, and four spores ; at right, immature basidium and collapsed basidium ; at left, two large internal hyphae, showing clamp connections ; tip of basidium with sterigmata and three spores from spore print, showing change of shape.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