

Notes on clavarioid fungi. XVII.

Clavulinopsis taxa in southeastern Australia

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Abstract. As the third in a series, this paper distributes into *Clavaria* and *Ramariopsis*, Australian specimens formerly placed in *Clavulinopsis*, summarizes the taxa found in southeastern Australia, and provides keys to portions of these genera not formerly treated. One new taxon, *Clavaria aurantia* var. *macrospora* PET. is proposed.

In two previous papers (PETERSEN, 1978a, b) I tried to summarize the taxa of *Clavaria* and *Ramariopsis* in southeastern Australia, based on some fresh collections, the herbaria at the Biological and Chemical Research Institute, Rydalmere (DAR: John WALKER, Curator), the University of Melbourne (MELU: Gretna WESTE, Curator), and the Waite Agricultural Institute, Adelaide (ADW: P. H. B. TALBOT, Curator), and the literature. This paper is a continuation of that effort. Originally, it was intended to treat *Clavulinopsis*, but as I suggested earlier (PETERSEN, 1978b: 425), all three genera required revision. I have attempted that revision (PETERSEN, 1978c), but one result is that the taxa destined for *Clavulinopsis* must be divided between *Clavaria* and *Ramariopsis*. The keys below reflect this arrangement, and treat those portions of the genera not previously summarized.

The number of specimens from the sources above are remarkably few, showing the sporadic interest in these fungi chiefly by CLELAND (1931, 1935), CLELAND & CHEEL (1916) and FAWCETT (1939a, b). Several names were proposed during the period of exploration of the empire, when specimens were brought to England from the Australian colony and Tasmania. The flora, as expected, contains several taxa from other Pacific landmasses and only one new taxon is required here. Another may be proposed later to represent the tan or beige state of *C. corniculata*, if it is not *C. alcornis* (q. v.).

The taxa reported here may be sorted into three groups according to spore morphology and as discussed in greater detail elsewhere (PETERSEN, 1978c). If the flora of southeastern Australia is compared to that of eastern North America, several parallels would be identified. *Ramariopsis depokensis* replaces *R. laeticolor*, for example, *R. corni-*

culata var. *simplex* replaces *R. fusiformis*, *Clavaria fusispora* and *C. corallino-rosea* replace *C. gracillima*, and *C. amoena* appears in both areas (but see discussion under that taxon). It is not coincidental, therefore, that Australian authors were tempted into assigning names originated for European taxa to their fungi. The names coined for Australian taxa were largely overlooked by later Australian authors, I suspect, because European books and journals in which they were named were not readily available, the literature was scattered, descriptions were scanty, and type specimens unavailable for examination.

Colors in quotes are from RIDGWAY (1912), which was also used by FAWCETT and by CLELAND. My sincere thanks are extended to the curators named above for their generosity and hospitality.

Key to the taxa

Clavaria

1. Clamp connections absent from all hyphae subg. *Clavaria* *)
 *) Treated in former papers of this series (PETERSEN, 1978a, b).
- 1*. Clamp connections present on tramal hyphae and/or basidia . . . 2
2. Clamp connections on basidia and subbasidial hyphae, but not on tramal hyphae subg. *Holocoryne* *)
- 2*. Clamp connections on basidia and tramal hyphae (subg. *Clavulinopsis*) 3
3. Spores globose to subglobose 4
- 3*. Spores ellipsoid to ovoid 5
4. Fruitbodies white, fasciculate 10. *C. spiralis*
- 4*. Fruitbodies yellow to egg-yellow 2. *C. amoena*
5. Fruitbodies bright yellow-orange to orange 6
- 5*. Fruitbodies bright pink, coral red to pinkish orange. 7
6. Spores $7-9.5 \times 4 \mu\text{m}$; sterigmata 4. . 4. *C. aurantia* var. *macrospora*
- 6*. Spores $5.5-7 \times 3.3-4.8 \mu\text{m}$; sterigmata 2-(4) . . . 3. *C. aurantia*
7. Fruitbodies coral red, pinkish orange, simple; spores $5.5-7.7 \times 3.5-4.5 \mu\text{m}$, ellipsoid 5. *C. corallino-rosea*
- 7*. Fruitbodies flame pink, red to orange-crimson, simple to branched; spores $6.5-10 \times 3.7-4.8 \mu\text{m}$, broadly fusiform to limoniiform 9. *C. fusispora*

Ramariopsis

1. Spores smooth (Subg. *Donkella*) 2
- 1*. Spores echinulate to verruculose subg. *Ramariopsis* *).
2. Fruitbodies regularly branched 3
- 2*. Fruitbodies simple 4

*) Treated in former papers of this series (PETERSEN, 1978a, b).

3. Fruitbodies very slender, up to 12 mm high, white; spores 4—
4.5 × 3 μm *Ramariopsis* cf. *minutula* *)
- 3*. Fruitbodies beige, sand color to pinkish buff; apices often rosy;
spores 5—7 × 4.8—6.8 μm 1. [*C. alcicornis*]
4. Fruitbodies beige, sand color to pinkish buff; spores 5—7 ×
4.8—6.8 μm 1. [*C. alcicornis*]
- 4*. Fruitbodies of brighter colors 5
5. Fruitbodies bright yellow; spores subglobose, 5.5—6.5 μm
diameter 6. *R. corniculata* var. *simplex*
- 5*. Fruitbodies orange-red; spores ellipsoid, 5.7—6.5 × 4.3—5.0 μm
..... 7. *R. depokensis*

Description of species

1. [*CLAVARIA ALCICORNIS* ZOLLINGER & MORITZI sensu CORNER]

I can find no specimens which match this concept exactly, but FAWCETT (1939) described branched fruitbodies under *Clavaria muscoides* which were “cinnamon buff” at the tips, shading to ‘clay color’ at the base.” Such colors suggest *C. alcicornis*, although there was no mention of the brighter cream-rose to flesh color apices as described and figured by van OVEREEM (1923: taf. 4, fig. 2). CORNER indicated that the species fruited rarely. Branched specimens at MELU under *C. muscoides* must be consulted, but now are almost indistinguishable from *C. corniculata*.

Sometime ago I described what I considered to be the type of *C. alcicornis* (herb. PATOUILLARD at FH) which bore no spores. I question now whether this specimen really is the type, and until this issue can be settled, I will not transfer the name to *Ramariopsis*, where it would belong under the generic revision published recently (PETERSEN, 1978c).

2. *CLAVARIA* cf. *AMOENA* ZOLL. & MOR. 1844. — Nat. Geneesk. Arch. Neerl. Indien 1: 380

Fruitbodies up to 11 cm high, up to 1 cm broad, simple, solitary, gregarious or loosely fascicled in groups up to 10, often longitudinally lined or grooved, often gnarled and/or misshapen; stipe rounded at base, involving no mycelial pad, not distinct from hymenial surface, buffy yellow to salmon (“light orange yellow”, “light salmon orange”); hymenial surface appearing waxy, smooth, pinkish orange to buffy yellow orange (“bittersweet pink”, “capucine yellow”, “deep chrome”); flesh more brightly colored than hymenium (“grenadine pink”, “deep chrome”); apex tapering upward, narrowly to broadly rounded,

*) Treated in former papers of this series (PETERSEN, 1978a, b).

sometimes slightly more orange than hymenial surface. Taste and odor none.

Tramal hyphae clamped, loosely parallel, thin-walled, of two widths: a) up to 14 μ m diam, inflated, and b) up to 2 μ m diam, interwoven with inflated hyphae. Basidia 55—70 \times 7.5—8.5 μ m, clavate, clamped; contents homogeneous when young, multiguttulate at maturity; sterigmata (2—3—)4, stout, straight, divergent.

Spores 5.0—7.8 \times 5.0—6.4 μ m, subglobose to very broadly ovate, smooth, thin-walled, hyaline microscopically; contents uniguttulate, the guttule virtually filling the lumen; apiculus small, papillate.

Observations: CORNER's (1950) treatment of *C. amoena* (under *Clavulinopsis*) and its relatives was vague (i. e., the synonymy listed under this name), and his later summary (CORNER, 1970), while highly critical of my work, was nonetheless still less than adequate. The inclusion of pinkish salmon fruitbodies under the same name as bright yellow would seem incongruous. Over the years, however, I have come to sympathize with the problems in the group, especially when dried material is the sole authority. It would seem possible, however, to use aquarelles (i. e., those of van OVEREEM), and accurate color notes (i. e., those of FAWCETT, CLELAND, IMAI, PETERSEN) to arrive at a summary. Unfortunately, microscopic characters are almost useless, for tramal hyphal construction varies only insignificantly, and basidial and spore characters are nearly identical.

For some years I have collected in the southern Appalachian mountains. At first, I divided the fungi of this immediate group into three taxa, *C. miniata*, *C. amoena* and *C. aurantio-cinnabarina* (cf. PETERSEN, 1968), the first on location of pigment, the latter on fruitbody color. After CORNER's (1970) criticism, I changed my taxonomy somewhat (PETERSEN, 1971), and within the past several years, I have become aware of the segregations within/among populations. The coloration most commonly found (perhaps 90% of all sightings) consists of cinnabar orange stipe and light salmon club — without a doubt *C. aurantio-cinnabarina* SCHWEINITZ. But when a large population of such fruitbodies is found, almost invariably here and there occur bright orange-yellow individuals, which I have placed under *C. amoena*, and uniformly cinnabar red individuals/fascicles, which I have placed under *C. miniata*. In addition to these segregants within populations, occasional collections of each type can be gathered without either of the other in sight, and rarely even paler (bright golden yellow) or darker (orange red to scarlet) collections can be found. I have concluded that several carotene pigments are deposited, ranging from lemon yellow to deep red, and that the loss or inhibition of one or more of these pigments results in variation from the "norm" (*C. aurantio-cinnabarina*) toward the red (loss of yellow pigment) and toward the yellow (loss of red pigment).

Moreover, it would appear logical that both a quantitative and a qualitative loss could occur so that the total range of coloration within the group would become large and bewilderingly subtle.

If such mutants (or the results of physiological response to micro-environmental conditions) can occur within, say, 5 m² to produce at least three "taxa", such phenomena would surely also be expected on a world-wide basis. For example, a parallel situation seems to occur in the Pacific tropics, where the aquarelles by van OVEREEM (1923, and originals at BO [!]) and plates by CORNER (1950) support the written color descriptions. Some variants are as follows:

Blood red to crimson: *C. miniata* var. *sanguinea* CORNER 1950, pl. 7, fig. 3 (? = *Clavaria sanguineo-acuta* van OVEREEM).

Deep orange red with pale stipe: *C. miniata* CORNER 1950, pl. 7, fig. 7.

Golden orange to orange: *C. subaurantiaca* HENN. & NYMAN ss. van OVEREEM 1923, taf. 3, fig. 1.

Salmon pink: *Clavulinopsis sulcata* van OVEREEM 1923, taf. 2, fig. 3.

Pink with golden brown stipe: *C. rosacea* van OVEREEM 1923, taf. 3, fig. 3.

Pale yellow to rich yellow: *Clavulinopsis amoena* CORNER 1950, pl. 9, lower row.

White: *C. spiralis* CORNER 1950, pl. 10, fig. 7.

If the conclusion above, based on observations in the southern Appalachian Mountains, can be projected likewise to the Pacific Tropics, then the frequent segregation of more-or-less pigmented fruitbodies than "normal" is far too local to consider similar color forms from very widespread locations contaxic. In other words, if *C. subaustralis* PET. (pink club, golden yellow stipe) segregates from the local "norm" of *C. aurantiocinnabarina* (coral salmon club, cinnabar red stipe) by the local loss of red pigments, then to suggest that it is contaxic with *C. rosacea* van OVEREEM (pink club, golden brown stipe), described from Java, is to propose a taxon based on characters (color) which go against more detailed observations on segregations within local populations.

Thus it would appear unwise to synonymize *C. miniata* BERKELEY from Africa with *C. sulcata* from Java (despite color differences as well). *Clavaria miyabeana* ss. FAWCETT (1939) appears to be analogous to that taxon in Japan (IMAI, 1930), but may well represent a strain indigenous to Australia. Likewise, the Australian strain here reported as *C. amoena* may not be contaxic with the original "taxon" but may also be indigenous.

At the same time, given only fragmentary, albeit definite, evidence of the segregation of local strains, there would seem no set means by which to deal nomenclaturally with such situations. My own thinking

has resulted in selections of "normal" strain (that is, statistically most commonly collected: for the southern Appalachians, *C. aurantio-cinnabarina*) and to treat the others as segregants (i. e., *C. aurantio-cinnabarina* and its yellow segregant — formerly referred to as *C. amoena*). To apply nomenclatural terms, such as "physiological strain" (usually reserved for parasitic fungi) or "nothomorph" (reserved for hybrids) would be very premature.

This problem seems not restricted to this group. Unless I am wrong, the same situation may pertain to *Cantharellus* taxa, where, perhaps not coincidentally, carotene pigments also are involved. It would not be surprising if fruitbody variability in the *Clavulina* "*cristata*" complex were not found also to be a series of geographical-ecological microvariants rather than ubiquitous "taxa".

Presumably *C. archeri* belongs here as an orange variant of the *C. sulcata* complex. The collections reported by CLELAND & CHEEL (1916) under *C. inaequalis* are of "*C. amoena*". A specimen labelled *C. inaequalis* from Wakefield, received by CLELAND in 1924, showed a different concept, and *C. inaequalis* was not reported from Australia subsequently.

Specimens examined: NEW SOUTH WALES: Hawksbury River, 29. ix. 14, coll. CLELAND, ADW no. 16104; same location, 17. vii. 16, ADW no. 16103; Narrabeen, 1. i. 15, ADW no. 16102; SOUTH AUSTRALIA: Mt. Lofty, vii. 42, coll. CLELAND ("pale pinkish buff"), ADW no. 8289; TASMANIA: National Park, 19. i. 28, coll. CLELAND ("coral red" becoming more pink-buff when drying to brick red"), ADW no. 16026.

3. *CLAVARIA AURANTIA* COOKE & MASSEE in COOKE 1887. — Grevillea 16: 33

= *Clavaria luteo-tenerrima* VAN OVEREEM 1923. — Bull. Jard. Bot. Buitenzorg III 5 (4): 269.

= *Clavulinopsis luteo-tenerrima* (VAN OVER.) CORNER 1950. — Ann. Bot. Mem. 1: 377.

Fruitbodies up to 7 cm high, up to 4 mm thick, simple, clavate to stalked-fusiform, solitary to caespitose in groups of 2—3 (but not fascicled), bright yellow-orange ("deep chrome", "cadmium yellow", "capucine yellow") to bright red orange ("scarlet") or even deep red ("nopal red") drying in the field to bright salmon ("peach red"); stipe up to 3 cm long, up to 3 mm thick, more or less equal, light yellow ("light cadmium", "light orange yellow"), drying somewhat darker than club, often becoming hollow in age, inserted by a minute, off-white pad; club terete to laterally compressed, smooth but not waxy; flesh bright red ("scarlet").

Tramal hyphae hyaline microscopically, clamped, thin-walled, generally parallel, 1.5—12 µm diam (diameters intergrading), some-

times slightly constricted at septa. Subhymenium extensive, of discrete, densely interwoven hyphae. Basidia $50-60 \times 6-7 \mu\text{m}$, stalked-clavate; sterigmata 2(—4), stout, often unequal in length and often not exclusively apical on the basidium.

Spores $5.6-7.0 \times 3.3-4.8 \mu\text{m}$ ($E = 1.46-1.90$; $E^m = 1.72$; $L^m = 6.34 \mu\text{m}$, *) broadly ellipsoid to ellipsoid; wall thin; contents uniguttulate, often homogeneous and appearing empty; apiculus thick but not long, papillate.

Observations: I have seen only a few specimens in addition to the type. Form *macrospora* (cf. below) may be distinguished, however, by its larger spores which are quite refringent under phase contrast, and apparently exclusively 4-sterigmate basidia.

The hymenium appears to exhibit many hyphal ends protruding laxly up to $15 \mu\text{m}$. Upon closer examination, some can be seen as overgrown sterigmata, and even closer observation reveals that only rarely do all (both) sterigmata develop equally. One almost always extends unusually far, and this is sometimes matched by sterigmata which arise subterminally on the basidium, much as observed by van OVEREEM (1923) on the type specimen of *Clavulinopsis sulcata*.

The hymenium also includes copious basidiospores (with characteristic apiculus) of small size and amorphous contents. It is my opinion that they are aborted from the aberrant sterigmata and become embedded in the thickening hymenium. I have avoided them in calculating spore dimensions.

The large-spored taxon below is far more common than this.

Having examined the types of *C. aurantia* and *C. luteo-tenerrima*, there is nothing to separate them but fruitbody color (orange for *C. aurantia*, orange-red for *C. luteo-tenerrima*). Spore measurements on the types (for *C. luteo-tenerrima*, $5.3-6.7 \times 3.9-4.6 \mu\text{m}$) are virtually identical.

4. *CLAVARIA AURANTIA* var. *MACROSPORA* PETERSEN, var. nov.

Ut typus, sed: 1) sterigmatibus 4; 2) sporae $8.0-9.3 \times 3.7-5.3 \mu\text{m}$.

Holotypus: AUSTRALIA, NSW, Royal Nat. Park, 8. vi. 77, DAR no. 28762.

Fruitbodies up to 7 cm high, up to 4 mm thick, simple to twicebranched, solitary to gregarious; stipe up to 3 cm long, 2—3 mm thick, more or less equal, inserted by a minute pale yellowish ("maize yellow") pad, light yellow ("light cadmium", "apricot yellow"), distinct from club by color and texture; club (and/or branches) smooth, not waxy, sometimes somewhat laterally compressed, bright orange to

*) E = length: width; E^m = median E ; L^m = median length.

bright pinkish orange ("orange", "deep chrome", "light orange yellow", "cadmium yellow"), the tips turning darker orange in age ("mars yellow"); branching abruptly dichotomous, with lunate axils; apex (or apices) rarely acute, usually rounded to subobtus. Taste and odor none.

Club trama "apricot yellow" when fresh; tramal hyphae pale yellow to hyaline microscopically, clamped, thin-walled, loosely parallel, of two widths; a) up to 10 μm diam, inflated somewhat, and b) up to 2 μm diam, long-celled, interwoven with inflated hyphae. Hymenium thickening; basidia 65—70 \times 7—8 μm , clavate, clamped, multiguttulate when mature but not refringent, easily collapsed after spore discharge; sterigmata 4.

Spores 8.0—9.3 \times 3.7—5.2 μm ($E = 1.57$ —2.40; $E^m = 1.87$; $L^m = 8.51 \mu\text{m}$), ellipsoid, thin-walled, smooth; contents with one large refringent guttulae almost filling the spore lumen; apiculus small, papillate.

Macrochemical reactions: hymenium+ferrie salts = 0; same+ferrie salts+alcohol = 0; same+ferrie chloride = slowly deep copper.

Observations: This is not the same as the type variety. First; fruitbodies are usually smaller than those of ADW 2123 (which I accept as representative of the type variety; the type specimen consists of two small fruitbodies only). From accurate color notes on the type variety the two can be shown to be quite similar in color. Second; spores of this variety are larger than typical, and appear rather refringent under phase contrast. Third; sterigmata in var. *macrospora* are consistently four per basidium, and are coronately terminal on the basidium, unlike the conditions described for the type variety.

The taxon described by FAWCETT (1939) under *C. aurantia* has subglobose spores and represents *C. amoena* or *C. archeri* (if the two are separate). Conversely, specimens at MELU under *Clavaria pulchra* Pk. represent this taxon. The description of *C. pulchra* by FAWCETT is much more like *R. depokensis* (q. v.). So far as I know, *Ramariopsis laeticolor* (= *C. pulchra*) does not occur in Australia.

I have also seen fruitbodies from Malawi (TENN 39617, sent to me by Dr. Leif RYVARDEN) which bear spores intermediate between the typical variety and the large-spored. Spore dimensions in that specimen are 5.2—7.0 \times 4.4—5.2 μm ($E = 1.00$ —1.58; $L^m = 6.18 \mu\text{m}$), and the apiculus, while stout, is short, not long and tapering. There are indications, therefore, that the bright golden orange relatives around *C. aurantia* will require careful scrutiny in the future.

Specimens examined: NEW SOUTH WALES: Royal National Park, Upper Causeway, 8. vi. 77, coll. RHP (with notes), DAR 28762 (type); same location, vic. Bola Creek, 8. vi. 77, coll. RHP (with notes), DAR 28764; National Park, 15. vii. 16, coll. CLELAND, ADW

no. 16049; SOUTH AUSTRALIA; National Park, 21. vi. 77, coll. RHP, TENN no. 41227; National Park, 24. v. 19, coll. CLELAND, ADW no. 15922; VICTORIA: Cockatoo, 11. v. 35, coll. FAWCETT (as *C. pulchra*), MELU no. 7122 F; Kallista, iv. 35, (as *C. pulchra*) MELU no. 7121 F.

5. *CLAVARIA CORALLINO-ROSACEA* CLELAND 1931. — Trans. Roy. Soc. South Australia 55: 159

Fruitbodies up to 5 cm high, up to 3 mm thick, simple to rarely branched (perhaps when apical portion of club is excised), solitary to caespitose in two's, coral pink drying to buffy orange („capucine buff” with pink tint, teste CLELAND). Stipe up to 2 cm long, 1.5–2.5 mm thick, more or less equal, inserted by a small, off-white mycelial pad, not clearly distinct from club. Club cylindrical, terete to somewhat laterally compressed, smooth; apex rounded.

Contextual hyphae of two widths, 3.5–5.4 μ m diam, 1.4–2.4 μ m diam, tightly packed, largely agglutinated, usually clamped, very thin-walled, subhyaline; wider hyphae parallel, narrower interwoven. Subhymenial hyphae 1.4–2.4 μ m diam, hyaline, subparallel, crushed in the lower hymenial region, clamped; subhymenium about 25 μ m thick in thickest part. Basidia 35–50 \times 5.0–6.0 μ m, clavate, attenuate below, clamped or bifurcate, thin-walled, hyaline, agglutinated, in a slightly thickening hymenium, 4-sterigmate; sterigmata spindly, slightly divergent when young, often becoming agglutinated after spore discharge.

Spores 5.6–7.7 \times 3.5–4.5 μ m, ovoid, with the adaxial side slightly flattened, thin-walled, granular in content, smooth, hyaline; apiculus noticeable but not prominent, eccentric.

Observations: PETERSEN & OLEXIA (1969) described the type of the taxon. I have seen one fresh specimen, and additional specimens are at MELU. FAWCETT (1939) correctly treated the species. ADW no. 16011, mentioned by CLELAND, represents *Clavaria amoena*.

Specimens examined: NEW SOUTH WALES: Mosman, Sydney, vi. 15, coll. CLELAND (as “*C. rosea*”), ADW no. 7083; Mosman, 20. vi. 15, ADW no. 16012 (type); Mosman, 13. vi. 15, ADW no. 16014; Mt. Wilson, below waterfall, 9. vi. 77, coll. RHP, DAR no. 28773.

6. *RAMARIOPSIS CORNICULATA* var. *SIMPLEX* (DONK) PETERSEN, comb. nov.

Basionym: *Clavaria corniculata* var. *simplex* DONK 1933. — Mededeel. Bot. Mus. Utrecht 9: 88.

Fruitbodies up to 5 cm high, up to 4 mm thick, simple to (rarely) fascicled (and when fascicled, then gnarled and stunted), elongate-clavate, bright yellow (“deep chrome”, “lemon chrome”,

“empire yellow”), somewhat paler upward before maturity (“light cadmium”). Stipe up to 3 cm long, 1.5–2.5 mm thick, more or less equal, not expanded at base, not with mycelial pad. Club smooth but not waxy, rounded at apex.

Tramal generative hyphae hyaline to pale yellow microscopically, generally thin-walled, clamped, of two widths: a) up to 15 μm diam, and b) up to 2.5 μm diam; generative hyphae occasionally exhibiting gloeoplerous contents not bounded by septa. Hymenium significantly thickening; basidia $75-85 \times 7.5-8.5$ μm , elongate-clavate, crowded, appearing quite short in squashed hymenium but arising in a thick, densely interwoven hymenopodium, multiguttulate to granular when young, abruptly becoming refringent (under phase contrast) with 1-several large distal guttules before spore discharge; sterigmata (3–)4, stout, divergent, hardly cornute.

Spores $5.9-7.0 \times 5.2-6.3$ μm ($E = 1.00-1.14$; $E^m = 1.10$; $L^m = 6.51$ μm), globose to subglobose, smooth, deep golden under phase contrast; contents uniguttulate, the guttule refringent and nearly filling the spore lumen; apiculus very prominent, up to 2 μm long, tapering.

Observations: FAWCETT (1939) treated this under *Clavaria fusiformis* “Fr. ex Sow.”, to which it seems closely related. Fruitbodies are not fusiform, however, nor are they often fascicled, and when so, they are stunted, gnarled and very blunt in outline. I have not seen type material of DONK’s variety, but so far as I can tell, the taxon is, in fact, a simple form of *C. corniculata*.

Specimens examined: NEW SOUTH WALES: Mt. Wilson, vic. waterfall, 9. vi. 77, coll. RHP, DAR no. 28767; VICTORIA: specimens in herb. MELU under *Clavaria fusiformis*; Ararat, 26. vii. 15, ADW no. 16094; SOUTH AUSTRALIA: National Park, 9. vii. 32, coll. CLELAND (as *C. aurantia*), ADW no. 16054; Mt. Lofty, 1. vii. 22, ADW no. 15923; Mt. Lofty, 27. vi. 21, ADW no. 15926; Mt. Lofty, 23. vi. 28, with notes, ADW no. 15927; Mt. Lofty, 9. vii. 21, ADW no. 15924; Greenhill Rd., vi. 54, coll. E. BURNS, ADW no. 3976; Mt. Lofty, 20. vii. 52, as *C. amoena*, ADW no. 2489; Mt. Lofty, 13. vii. 52, ADW no. 2156; Mt. Lofty, 22. vi. 52, coll. WARCUP, ADW no. 2228; Mt. Lofty, 29. vi. 52, coll. WARCUP, ident. WOMERSLEY (as *C. amoena*), ADW no. 2172; Mt. Lofty, 16. vi. 17, coll. CLELAND (as *C. (persimilis) aurantia*), ADW no. 15925; National Park, 22. vi. 46 (as *C. aurantia*), ADW no. 15589.

7. *RAMARIOPSIS DEPOKENSIS* (van OVEREEM) PETERSEN
1978. — *Mycologia* 70: 668

≡ *Clavaria depokensis* VAN OVEREEM 1923. — Bull. Jard. Bot. Buitenzorg III 5 (4): 271.

= *Clavulinopsis depokensis* (VAN OVER.) CORNER 1950. — Ann. Bot. Mem. 1: 364.

Fruitbodies up to 5 cm high, up to 3 mm thick, simple, narrowly clavate to narrowly fusiform, deep bright orange ("cadmium orange", "orange", "light cadmium") to bright orange red; stipe more or less equal, light yellow ("light cadmium"), inserted in soil by a small yellow to orange mycelial pad, more or less distinct from the fertile portion by texture; club appearing waxy, smooth, sometimes somewhat laterally compressed, rounded at apex.

Tramal hyphae yellowish in mass, subhyaline microscopically, clamped, loosely parallel, of two widths: a) up to 14 μ m diam, inflated, and b) up to 2 μ m diam, interwoven with inflated hyphae. Basidia 45–50 \times 5.2–6.7 μ m, clavate, clamped, yellowish in mass; contents multiguttulate when mature.

Spores 5.5–6.5 \times 3.8–5.0 μ m, ellipsoid to ovate, smooth, thin-walled; contents homogeneous or with a single large guttule; apiculus very prominent, up to 1.5 μ m long, tapering.

Observations: The type specimen of this name has been described elsewhere (PETERSEN, 1979). The taxon is very close to *R. laeticolor* (BERK.) PET., from which it differs by slightly smaller spores and deeper coloration.

Specimens of this have been accessioned under *Clavaria fusiformis* Sow. ex Fr., which seems not to occur in southeastern Australia, and under *C. aurantia*, from which it differs by much more prominent spore apiculus and somewhat smaller spores.

Specimens examined: VICTORIA: Powelltown, vi. 35, MELU no. 7107 F; Mt. Evelyn, 6. vi. 37, MELU no. 7106 F; Apollo Bay, v. 35, MELU nos. 7046 F, 7108 F; Jehosophat Valley, 22. v. 46, as *Clavaria luteo-stirpata*, MELU no. 7114 F.

8. *CLAVULINOPSIS DICHOTOMA* (GODEY) CORNER 1950. — Ann. Bot. Mem. 1: 365

= *Clavaria dichotoma* GODEY 1878. — Gill. Champ. p. 766.

Fruitbodies up to 4 cm high, up to 2 cm broad, branched; branching dichotomously throughout. Stipe up to 2 cm long, up to 2 mm thick, equal or tapering slightly downward, white, supple, not brittle; subiculum white, spreading up to 1.5 mm from stipe base, effuse. Branches up to 1.5 mm thick, ascending, bone white, terete; axils narrowly angled below, acutely angled to rounded in ultimate rank, often decurrent by a depressed line; apices swollen, irregularly lobed or cusped to subturbinate, up to 2 mm broad. Taste and odor not recorded. On humus-soil under tree ferns and *Eucalyptus*.

Tramal hyphae 1.8–5.2 μ m diam, parallel, clamped, tightly packed, hyaline, thin-walled; gloeoplerous hyphae not observed. Basidia 60–90 \times 7–9 μ m, clavate, clamped, often sinuate; contents

divergent, subcoronate; sclerified basidia occasional, thick-walled minutely granular or with several refringent guttules; sterigmata four, (wall up to $1.1\ \mu\text{m}$ thick), four-sterigmate, deep orange ochre under phase contrast.

Spores $5.9\text{--}7.4 \times 5.6\text{--}7.0\ \mu\text{m}$ ($E = 1.00\text{--}1.20$; $E^m = 1.09$; $L^m = 6.72\ \mu\text{m}$), globose to very broadly ellipsoid, hyaline, thin- to somewhat thick-walled (wall up to $0.3\ \mu\text{m}$ thick); contents with a single, large, refringent guttule; apiculus prominent, $2\ \mu\text{m}$ long or longer, tapering somewhat.

Observations: I am not enthusiastic about placing this taxon under this name for several reasons. First; no type specimen for *Clavaria dichotoma* GODEY has been described, so the concept remains in doubt, even though CORNER (1950) has reported on "an authentically named specimen" from Herb. BOURDOT. Second; the name was coined for a European taxon, and has been reported (PETERSEN, 1966, 1971) from North America, but not hitherto from Australia, unless FAWCETT's (1939) account of *C. subtilis* refers to it. Third; the spores described above are slightly large for the taxon as understood by CORNER. All in all, however, it is extremely close to what I have considered under this name in the past.

The sclerified basidia seem typical of *Clavulinopsis* sect. Cornicularia, having been reported (PETERSEN, 1971) from *C. laeticolor* and *C. corniculata* in North America.

The specimen below was collected as *Ramariopsis kunzei*, giving even better a concept of its color and stature.

Specimen examined: NEW SOUTH WALES: Royal Nat. Park, Bola Creek, 8. vi. 77, coll. RHP, DAR no. 28752.

9. *CLAVARIA FUSISPORA* (CORNER) PETERSEN, comb. nov.

Basionym: *Clavulinopsis fusispora* CORNER 1967. — Proc. Linnaean Soc. London 178: 95.

Fruitbodies up to 11 cm high, up to 6 mm thick, simple to not uncommonly branched, solitary to cespitose or fascicled in small groups, when simple then more or less cylindrical to elongate-fusiform, often twisted and/or longitudinally grooved, when branched, branches dichotomous, in 1—2 ranks, with lunate axils and blunt apices, bright flame pink ("grenadine") to buffy red-orange ("coral red"), somewhat darker and redder upward (Jasper red", "Nopal red"); stipe more or less equal or tapering slightly downward, whitish where fully protected to buffy orange ("salmon orange", "light salmon orange") where exposed. Taste momentarily pleasant, sweetish, perhaps like carrot; odor none. Club trama more highly pigmented than hymenium.

Basidia $40\text{--}50 \times 5.5\text{--}6.5\ \mu\text{m}$, clavate, clamped; contents more or less homogeneous in youth, abruptly multiguttulate before spore formation; sterigmata 2—4 (teste CORNER).

Spores $6.5-10 \times 3.7-4.8 \mu\text{m}$ ($E = 1.38-1.80$; $E^m = 1.65$), ovate to broadly fusiform or vaguely limoniform, smooth; contents homogeneous, multiguttulate or uniguttulate; apiculus stout but not long, truncate-papillate.

Observations: Both CLELAND and FAWCETT included specimens of this under *C. corallino-rosacea*. In fact, CLELAND's (1931) description includes words taken from notes with the type of *C. corallino-rosacea* and from a "co-type" (ADW no. 16013) which is *C. fusispora*. Some of the collections reported by CLELAND and CHEEL (1916) under *C. rosea* are also this taxon.

CORNER gave a range of colors for fruitbodies and my sole fresh collection was deep coral red, with simple, solitary to fascicled fruitbodies. CLELAND's collections were apparently bright pinkish-red (from his notes, "grenadine"), but all bore the same unique fusiform spores.

Separation of *C. corallino-rosacea* from *C. fusispora* must rely on spore shape, for fruitbodies color probably overlaps. CORNER's (1967: 96) report of very irregular clamps may indicate a hyphal construction atypical of subg. *Clavulinopsis*, and may indicate that the two species are even more closely related. I have not seen enough material, especially of *C. corallino-rosacea*, to comment further.

Specimens examined: NEW SOUTH WALES: Mosman, Sydney, 18. vi. 16, coll. CLELAND (co-type of *C. corallino-rosacea*), ADW no. 16013; Mosman, Sydney, 15. vi. 19, coll. CLELAND, ADW no. 16039; VICTORIA: vic. King Lake West, road to Yea, 12. vi. 77, coll. RHP, TENN no. 41333.

10. *CLAVARIA SPIRALIS* JUNGHUHN 1839. — Verh. Bat. Genootsch. 17: 32

Fruitbodies up to 3 cm high, up to 2.5 mm thick, gregarious, simple, white to off-white; stipe equal, smooth, inserted with a small, minutely villose pad, more or less clearly distinct from club by texture; club appearing waxy, twisted when dry, laterally compressed somewhat, rounded at apex, more or less equal.

Trametal hyphae hyaline, clamped, of two widths: a) up to $13 \mu\text{m}$ diam, inflated, loosely parallel, and b) up to $1.5 \mu\text{m}$ diam, arising from inflated hyphae and parallel to them. Basidia $45-60 \times 5.5-6.0 \mu\text{m}$, clavate, clamped, refringent to foamy at maturity, 4-sterigmate, easily collapsed after spore discharge.

Spores $5.5-7.0 \times 4.5-6.5 \mu\text{m}$, subglobose, hyaline, smooth, collapsing on drying; wall extremely thin; apiculus papillate.

Observations: I have assigned this name following CORNER (1950) where *Clavulinopsis spiralis* (JUNGH.) CORNER was separated from *C. brevipes* CORNER by spore shape and basidial size. The taxon

is another example, along with *Clavaria corallino-rosacea* of a fruitbody constructed like a typical *Clavaria*, but exhibiting clamps on basidia and tramal hyphae.

Specimen examined: NEW SOUTH WALES: Mount Wilson, track below waterfall, 9. vi. 77, coll. RHP, DAR no. 29609.

Species incertae sedis

Clavaria pallidrosea FAWCETT

I can find no type specimen at MELU. FAWCETT did not mark types, and often they are accessioned under the name originally associated with the specimen (the "field name"). The only specimen remotely similar (MELU no. 7039, FAWCETT no. 26, Apollo Bay) was not collected on topotype ground, and represents *C. amoena*. FAWCETT's name suggests an organism near *C. sulcata*.

Clavaria archeri BERKELEY

The type specimen has been described elsewhere (PETERSEN, 1977) and is surely in the *C. sulcata* complex. Without more accurate color notes, however, it is impossible to know if the name represents a distinct taxon or merely a synonym (cf. above under observations following *C. amoena*).

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