

***Codium apiculatum* (Codiaceae, Chlorophyta), a new species from southern and southwestern Australia**

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Abstract – A new species of *Codium*, *C. apiculatum* P.C. Silva, M.E. Chacana et H.B.S. Womersley, is described on the basis of several subtidal collections from southern and southwestern Australia. It is characterized by its utricles, which are stout, subcylindrical to slightly clavate, bearing several hairs (or hair scars) very close to the apex, and by the branch tips, which are apiculate.

***Codium* / Bryopsidales / morphology**

Résumé – Une nouvelle espèce de *Codium*, *C. apiculatum* P.C. Silva, M.E. Chacana et H.B.S. Womersley, est décrite sur la base de quelques spécimens subtidaux du sud et sud-ouest d'Australie. Elle est caractérisée par ses utricules, qui sont robustes, sous-cylindriques ou plutôt claviformes, portant plusieurs cheveux ou cicatrices de cheveux auprès du sommet, et par les bouts des rameaux, qui sont apiculés.

***Codium* / Bryopsidales / morphologie**

INTRODUCTION

In 1998 Dr. John Huisman (Murdoch University, Perth) kindly sent us for study numerous specimens of *Codium* that he had collected in Western Australia. Of these, 36 were from the Houtman Abrolhos Islands, 8 of which he had previously identified and cited in his account of the marine benthic algae of that archipelago (Huisman, 1997). These records extended the known range slightly northward for *C. laminarioides* Harvey and *C. lucasii* Setchell, for both of which the previously reported northernmost locality was Port Denison, just south of Dongara (Womersley, 1984). In addition, Huisman cited collections of the pantropical-subtropical *C. spongiosum* Harvey and the ubiquitous Indo-Pacific *C. geppiorum* O.C. Schmidt. An additional 23 specimens were from Rottnest Island and nearby coasts. These specimens proved referable to *C. duthieae* P.C. Silva, *C. galeatum* J. Agardh, *C. laminarioides* Harvey, *C. muelleri* Kützinger, *C. pomoides* J. Agardh, *C. spinescens* P.C. Silva et H.B.S. Womersley, and *C. spongiosum* Harvey, all previously known members of the marine benthic flora of southern and southwestern Australia. Several specimens had not been identified to species, three of which turned out to represent an undescribed species. The habit of these specimens is unique within the genus in that the branches have

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sharply pointed tips. The utricles are unlike those of any known Australian species, being broadly clavate with flattened apices, similar to those of *C. isthmocladum* Vickers (1905), a native of the warm waters of the Atlantic Ocean.

In 2002 and 2003, the late Prof. H.B.S. Womersley (University of Adelaide) kindly sent us for study a small group of specimens from South Australia that he considered to represent an undescribed species of *Codium*. Most of the specimens had been collected by Robert N. Baldock from the Isles of St Francis, Nuyts Archipelago, west coast of the Eyre Peninsula, and were reported as *Codium nuytsianum* sp. nov. by Womersley & Baldock (2003), but without a description. The Baldock collections from South Australia are clearly conspecific with the Huisman collections from Western Australia, increasing our confidence in recognizing the new species. Because its range extends far beyond the Nuyts Archipelago, we have changed the epithet to *apiculatum* with reference to the sharply pointed branch tips.

MATERIAL

The following collections were examined and determined to be referable to the undescribed species:

Western Australia: Five Fathom Bank, offshore from Penguin I. near Perth, *J.M. Huisman* 946, 6.ii.1992 (PERTH); Hamelin Bay, *J.M. Huisman* 1150, 23.iii.1991 (PERTH); Cosy Corner, near Hamelin lighthouse, *J.M. Huisman* 1152, 14.xii.1991 (PERTH).

South Australia: Nuyts Archipelago: Isles of St Francis: 100 m west of Smooth Island, 24-25 m depth, in sand, *R.N. Baldock*, 24.ii.2002 (AD A69496); northwest corner, West Island, 17-21 m depth, *R.N. Baldock*, 19.ii.2002 (AD A69307); East Point, St Francis Island, 10-15 m depth, *R.N. Baldock*, 18.ii.2002 (AD A69283). Topgallant Island, off west coast of Eyre Peninsula, 20-25 m depth, *S.A. Shepherd*, 8.xi.1980 (AD A51873). Off Crag Point, northern Spencer Gulf, 13 m depth, *S.A. Shepherd*, 8.xi.1974 (AD A46043). Edge of Tapley Shoal, St. Vincent Gulf, 50' (15 m) deep, *F.J. Mitchell*, v.1961 (AD A28088).

RESULTS

***Codium apiculatum* P.C. Silva, M.E. Chacana et H.B.S. Womersley, sp. nov.**

Figs 1-5

Diagnosis

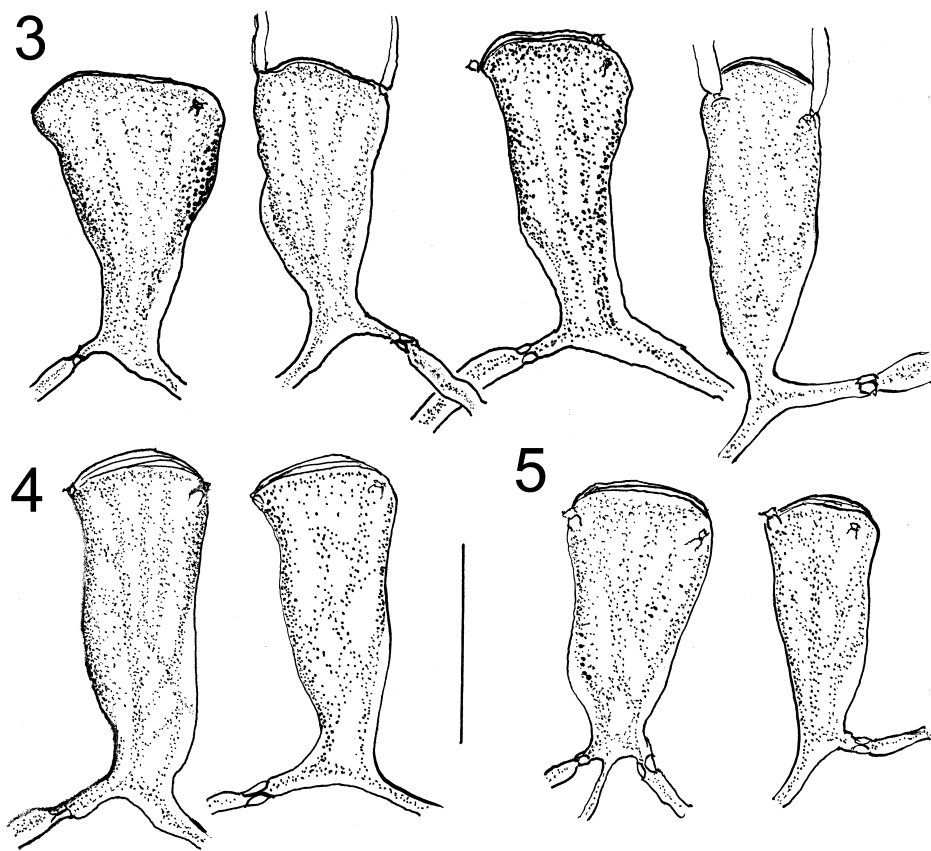
Thallus erectus, atroviridis ad olivaceos, mollis, velutinus, ad 30 cm alt., ad 6(-9 ordines dichotome ramosus, rami teretes, 6 mm diam. ad basim, 4-5 mm in medio, ad apices acuminati. Utriculi crassi, subcylindrici ad clavatos, ad apicem latissimi (250-) 375-475 um diam., 600-850 (-950) um long., apices complanati, membrana apicalis incrassata moderate (< 20 um crass.) lamellata. Pili (aut pilorum cicatrices) abundi, aliquot per utriculum, ad apicem proximissimi portati (60-120 um infra). Filamenta medullaria plerumque 30-55 um diam., obturaculo sito juxta locum originis ex utriculo, prope basim utriculi vel distantia e basim 80-140 um. Gametangia ignota.



Fig. 1. Habit of holotype of *Codium apiculatum* sp. nov.



Fig. 2. Habit of a paratype of *Codium apiculatum* sp. nov. (Cosy Corner, Western Australia, *Huisman 1152*, 14.xii.1991).



Figs 3-5. Utricles from three different collections of *Codium apiculatum* sp. nov. Figs 3 & 4 showing plug of outgoing intertricular filament at a perceptible distance from the base of the utricle, Fig. 5 showing plug close to the base of the utricle (3. Holotype. 4. Spencer Gulf, South Australia, S.A. Shepherd, 8.xi.1974; 5. Five Fathom Bank, Western Australia, Huisman 946, 6.ii.1992). Scale bar = 500 μ m.

Thallus erect, dark green to olive green, soft, velvety, to 30 cm high, dichotomously branched to 6 (-9) orders; branches terete, 6 mm diam. basally, 4-5 mm medially, with terminal segments tapering to a point. Utricles stout, subcylindrical to clavate, broadest at apex, (250-) 375-475 μ m diam., 600-850 (-950) μ m long, apices flattened, apical wall moderately thickened (less than 20 μ m thick), lamellate. Hairs (or hair scars) abundant, several per utricle, borne very close (within 60-120 μ m) to the apex. Medullary filaments mostly 30-55 μ m diam., with plug on outgoing side close to base of utricle or at a distance of 80-140 μ m from base. Gametangia unknown.

Holotype: 100 m west of Smooth Island, Nuyts Archipelago, west coast of Eyre Peninsula, South Australia, 24-25 m depth, in sand, R.N. Baldock, 24.ii.2002 (AD A69496). Isotype: UC 1966691.

DISCUSSION

When Prof. Womersley sent the first Baldock collection, he determined it as "*Codium australicum* but utricles rather atypical". Placement in *C. australicum* P.C. Silva (in Silva & Womersley, 1956) was suggested by the noticeable distance between the base of a utricle and the plug of an outgoing interutricular filament, a key character of that species. The utricles, however, are indeed atypical for *C. australicum*. In that species the utricles are slender, cylindrical or slightly clavate, with hairs arising a conspicuous distance (65-130 μm) below the rounded apices. By contrast, the utricles of the Baldock collection are stoutly sub-cylindrical or clavate with hairs arising just below the flattened apices. In their general form they resemble the utricles found in many populations of *C. isthmocladum* in the warm waters of the Western Atlantic (see Silva 1960, pl. 110), but are unique within the Australian flora.

During our study, we made the unsettling discovery that the formation of a plug by an outgoing interutricular filament at a conspicuous distance from the base of the utricle was not a consistent character among those specimens that otherwise grouped together on the basis of the shape and size of their utricles and their apiculate branch tips. This anatomical feature, which is characteristic of both *C. australicum* and *C. muelleri* (see Silva & Womersley, 1956), was found in the holotype and the collection from St. Francis Island (both sites part of the Nuyts Archipelago) but absent in the collection from West Island (also in the Nuyts Archipelago). In addition, this feature was found in the collection from Spencer Gulf. It was notably absent in the three collections from Western Australia. This inconsistency was discussed by Silva & Womersley (1956, p. 282) in the context of possible introgression between *C. harveyi* P.C. Silva (in Silva & Womersley, 1956), in which a plug is formed near the point of departure from a utricle, and the two Australian species (*C. australicum* and *C. muelleri*) in which a plug is formed at a conspicuous distance from the point of departure. The genetic basis for this inconsistency in that instance and in the present instance is unknown. DNA sequence data will be needed to confirm the morphology-based circumscription of the new species, *Codium apiculatum*, and to assess its phylogenetic relationship.

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