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Family Uncinateridae fam. nov.

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Uncinateridae fam. nov. (Hexactinellida, Hexasterophora, Aulocalycoida) is formed from *Uncinatera* Topsent, a genus never accorded a secure position within the various hexactinosidan families, and the troublesome, and usually avoided *Tretopleura* Ijima, variously regarded as an aulocalycid or euretid. Review of original descriptions and type specimens has shown both genera have dictyonal frameworks characterized as a variant of the revised aulocalycoid pattern – here designated as paraulocalycoid. The pattern differs from aulocalycoid in having multiaxial longitudinal strands and no synapticula. The family presently consists of three species in two genera which are restricted in distribution to two distinct regions, Antarctica S of Chile, and tropical W Pacific Ocean.
Keywords: Porifera; Hexactinellida; Hexasterophora, Aulocalycoida; Uncinateridae; fam. nov.; *Tretopleura*; *Uncinatera*.

UNCINATERIDAE FAM. NOV.

Restricted synonymy

Aulocalycidae (in part) Ijima, 1927.

List of valid genera

Tretopleura Ijima, 1927. *Uncinatera* Topsent, 1901a.

Definition

Basiphytous Aulocalycoida with conspicuous longitudinal dictyonal strands being multiaxial, formed by direct addition of dictyonal centra onto surface of existing strands, and alignment and fusion of one axis of each such added dictyonalium with strand; connecting framework elements as uniaxial rays of hexactine dictyonalia fusing tip-to-ray or tip-to-tip; synapticula absent.

Diagnosis

Body form as small cup with pleated wall to flat branching or unbranching fan; channelization as sparse passages through entire wall (diarhyses?) or as epirhyses and aporhyses; dermalia as large pentactins or hexactins; atrialia absent or hexactins with some pentactins; choanosomal megascleres are pentactins and hexactins; uncinates present; scopules present or absent; free microscleres only as discohexasters, either spherical or stellate; small oxyhexactins occur attached to framework.

Remarks

Review of type material or literature descriptions has shown two hexactinellid genera, never considered closely related, share a common dictyonal construction, and are here brought together in formation of a new family within the order Aulocalycoida. Topsent (1901a, d) described *Uncinatera* as representative of a new group of Schulze's tribe Uncinateria, distinct from Clavularia and Scopularia, but offered no family assignment for it. Schulze later (1904) hesitantly assigned the genus to Tretocalycidae, Schulze & Kirkpatrick (1911) synonymized it to *Chonelasma* in Coscinoporidae (a treatment retained recently by Barthel & Tendal, 1994), and Ijima (1927) retained the synonymy, but as questionable, with assignment of *Chonelasma* and its junior synonym to Euretidae. The genus has been avoided by all recent workers – Reid (all publications); Mehl, 1992; Tabachnick & Reiswig, 2000. The other concerned genus, *Tretopleura*, was assigned by its original author, Ijima (1927) to Aulocalycidae. It has either been ignored (Reid, all publications; Mehl, 1992), left in Aulocalycidae pending review (Reiswig & Tsurumi, 1996), or most recently redirected to Euretidae without specific placement (Tabachnick & Reiswig, 2000). Review of specimens (where available) and original descriptions indicate that both of these genera have paraulocalycoid frameworks (see Aulocalycidae Fig. 1) and, on this basis, are considered close relatives. They are similar to aulocalycids, but cannot be included within the Aulocalycidae by virtue of the multiaxial condition of their longitudinal strands and absence of synapticula as important framework connecting elements. The new family Uncinateridae contains three species in the two genera, each genus being regionally restricted – Antarctic shelf S of Chile, or tropical W Pacific, ranging between 430–2080 m depths.

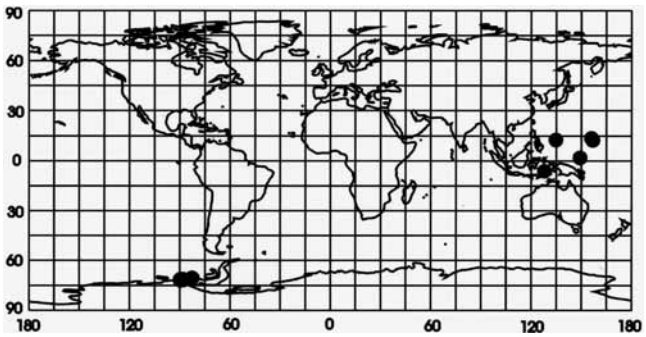

Fig. 1. Distribution of Uncinateridae.

KEY TO GENERA

(1) Body is a small cup with pleated wall; wall with sparse diarhyses ..... ***Uncinatera***
Body is a fan or plate from unknown form; with epirhyses and aporhyses ..... ***Tretopleura***

TRETOPLEURA IJIMA, 1927

Synonymy

Tretopleura Ijima, 1927: 280.

Type species

Tretopleura candelabrum Ijima, 1927 (by monotypy).

Definition

Uncinateridae of unknown (plate fragments) or blade-like body form, body wall thin to moderately thick; with primary dictyonal wall composed of longitudinal strands formed by serial dictyonalia; primary wall traversed entirely or in part by narrow epirhyses; aporhyses penetrate only secondary wall of irregularly fused dictyonalia; small rough hexactins attached to framework in profusion.

Diagnosis

Dermal spurs may be hypersilicified or not; loose spicules are either unknown (type species) or include mainly hexactins with some pentactins as dermalia, perhaps atrialia (uncertain) and parenchymalia, scopules on both surfaces, uncinates and discohexasters present.

Remarks

The genus was erected by Ijima (1927) for a series of macerated, curved plate-form fragments. Since spicules were unavailable, he based the generic characters on details of wall structure (channelization) and dictyonal arrangements. He assigned the then monospecific genus to Aulocalycidae due to the irregularity of its dictyonal framework, presence of longitudinal strands and the absence of primary channelization in his interpretation of the primary dictyonal wall layer. The present author disagrees with Ijima's restriction of the primary wall to only that unchanellized central layer supported by conspicuous longitudinal strands and excluding the channelized dermal layer also supported by longitudinal strands. All wall layers bearing strands are here considered primary wall, thereby rendering epirhyses to be in large part intradictyonal, rather than extradictyonal as Ijima's interpretation. Reid (1964) considered *Tretopleura*, along with *Fieldingia* and *Euryplegma*, to have euretoid framework with haphazardly-formed connecting beams, but offered no formal transfer or placement of these in Euretidae. Mehl (1992) considered Aulocalycidae to be artificial and polyphyletic, and suggested recognition of *Tretopleura*, *Aulocalyx* and *Fieldingia* as Hexactinosida *incertae sedis*. Tabachnick & Reiswig (2000) noted that the framework of *Tretopleura* did not concur with the basic aulocalycoid pattern defined by Reiswig & Tsurumi (1996), and suggested again that it be referred to Euretidae. Review of Ijima's description and figures of *T. candelabrum*, the framework of its congener, *T. styloformis* Tabachnick, and *Uncinatera plicata* Topsent, has shown nothing suggestive of the euretoid pattern in any of these. Instead they all have a similar set of aulocalycoid-like features, with significant departure from that pattern in formation of strands, here multiaxial, and lack of synapticulae as outlined above – a pattern designated as paraulocalycoid. The genus is here firmly positioned in the new family Uncinateridae. It contains two species, *T. candelabrum* Ijima and *T. styloformis* Tabachnick. These may be conspecific, as suggested by Tabachnick (1988), but until a spicule-bearing specimen with swollen dermal spurs and thickened wall (candelabrum characters) is found, such decision must be delayed. The genus is distributed over a small region of the tropical western Pacific Ocean at depths of 1500–2080 m.

Description of type species

Tretopleura candelabrum Ijima (Fig. 2).

Synonymy. *Tretopleura candelabrum* Ijima, 1927: 280, pl. 21, figs 8–12, pl. 22, figs 1–4.

Material examined. None. Holotype unknown – type series assumed to be at TIU but unverifiable and unavailable.

Description (from literature). Known only as several completely macerated fragments – moderately thick-walled curved plates to 70 × 90 mm, 5–8 mm thick, from a specimen of unknown, but most likely a blade-like, body form; both surfaces pitted by non-overlapping channels penetrating vertically; dermal and atrial surfaces inferred by thickened spurs and smaller channels on concave side assumed as dermal; angular epirhyses elongate longitudinally, less than 1 mm diameter, separated by thin dictyonal septa, occur in close-spaced longitudinal series curving toward free margins; ovoid aporhyses 1–3 mm diameter more widely spaced and separated by broader septa, in no regular arrangement; aporhyses bifurcate into smaller channels internally; dermal surface smooth and granular due to thickening of dermal dictyonal spurs; atrial surface hispid due to thin form of vertically directed dictyonal spurs; framework divisible into primary middle layer delimited by longitudinal, somewhat sinuous, thick, dictyonal strands composed of serially attached and aligned hexactins and secondary peripheral layers on both dermal and atrial sides lacking longitudinal strands and composed of irregularly connected hexactins with rays often strongly curved; longitudinal strands also run in septa between lines of epirhyses, qualifying most of the channelized dermal framework and the unchannelized central stratum as primary wall; epirhyses thus mainly intradictyonal; longitudinal strands are joined and supported by (1) irregularly-spaced transverse rays of their constituent dictyonalia, forming ladder-like connections of single rays, and (2) irregularly appended hexactine dictyonalia which are joined by ray tips fused to strands at any angle, but never or rarely connected to hexactine centers; synapticula are not significant support elements; thick atrial and thin dermal peripheral layers without longitudinal strands consist of hexactine dictyonalia joined irregularly by tip-to-ray fusion at any angle, with rays never fused in parallel; beams 50–110 μm thick, smooth except very

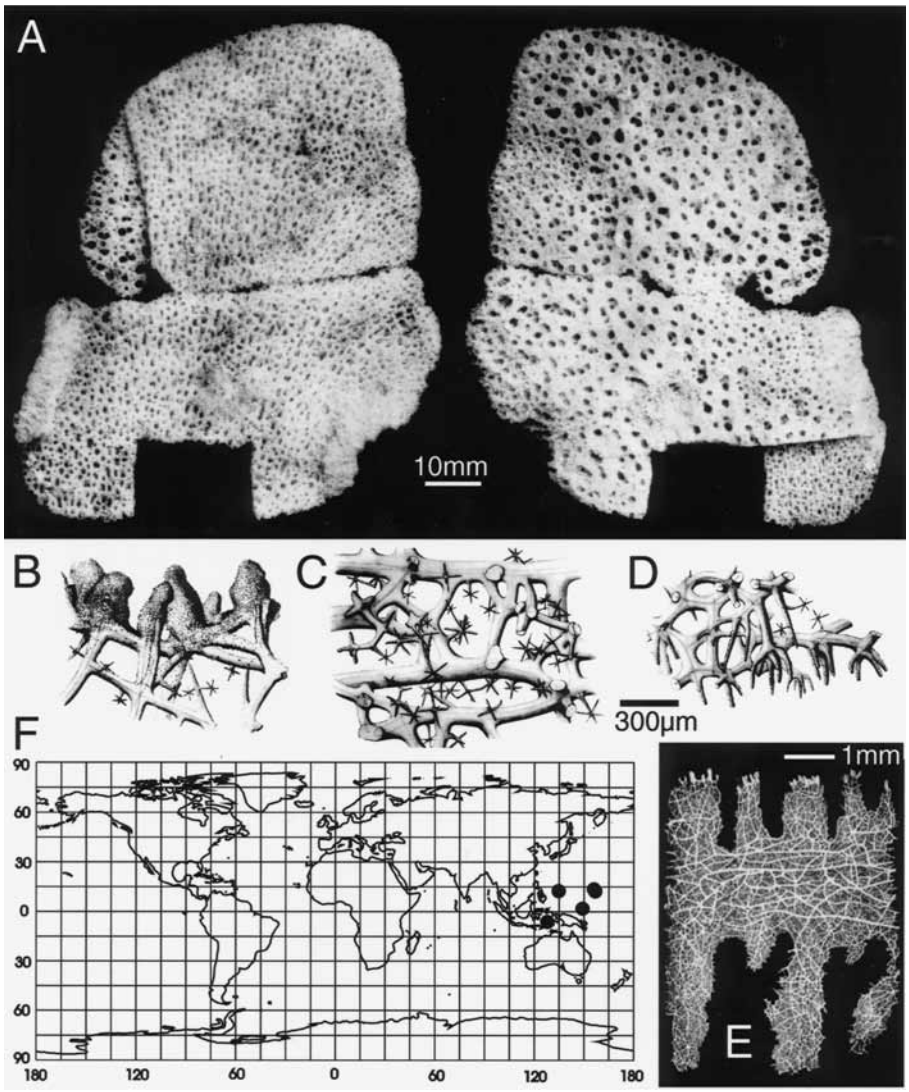

Fig. 2. *Tretopleura candelabrum* and distribution of *Tretopleura*. A, type and largest fragment of the type series in dermal (left) and atrial (right) views. B–D, drawings of dermal, choanosomal, and atrial frameworks, respectively, at same scale, dermal surface upwards. E, drawing of vertical-longitudinal wall section, dermal side up. F, distribution of *Tretopleura*. (A–E, from Ijima, 1927, pl. XXI, figs 8–9, pl. XXII, figs 1–4.)

superficial beams rough; dermal spurs thickened and elongate to 200×385 µm, often fused as compound clubs; atrial spurs thin and rough, 2–5 free rays of each superficial dictyonalium curve to project candelabra-like outwards on atrial surface; rough microhexactins with rays to 175 µm long attached in profusion throughout most of framework, often in nests; few pinular hexactins associated with macerated frame fragments could be proper or foreign; known only from type location between Schildpad and Lucipara Islands, Banda Sea, from 1595 m depth.

Remarks. Some important features of the dictyonal framework which are critical to placement within the Uncinateridae, remain unknown for the type species. These details of longitudinal strand structure and nature of none-strand beams, cannot be satisfactorily determined from Ijima's (1927) original description and must be resolved from the fragments themselves. Although the type material remains unavailable, these details have been verified in congeneric *T. styloformis* Tabachnick, thereby providing some confidence that they will be confirmed in the type species. Since loose spiculation of *T. candelabrum* remains unknown, determination of these important generic characters and the relationship of *T. styloformis* to the type species must await collection and analysis of new material from near the type locality.

UNCINATERA TOPSENT, 1901

Synonymy

Uncinatera Topsent, 1901a: xii; Topsent, 1901d: 40.

Type species

Uncinatera plicata Topsent, 1901a (by monotypy).

Definition

Uncinateridae with body form of thin-walled, plicate funnel or cup attached by basal disc to hard substrate; deep longitudinal

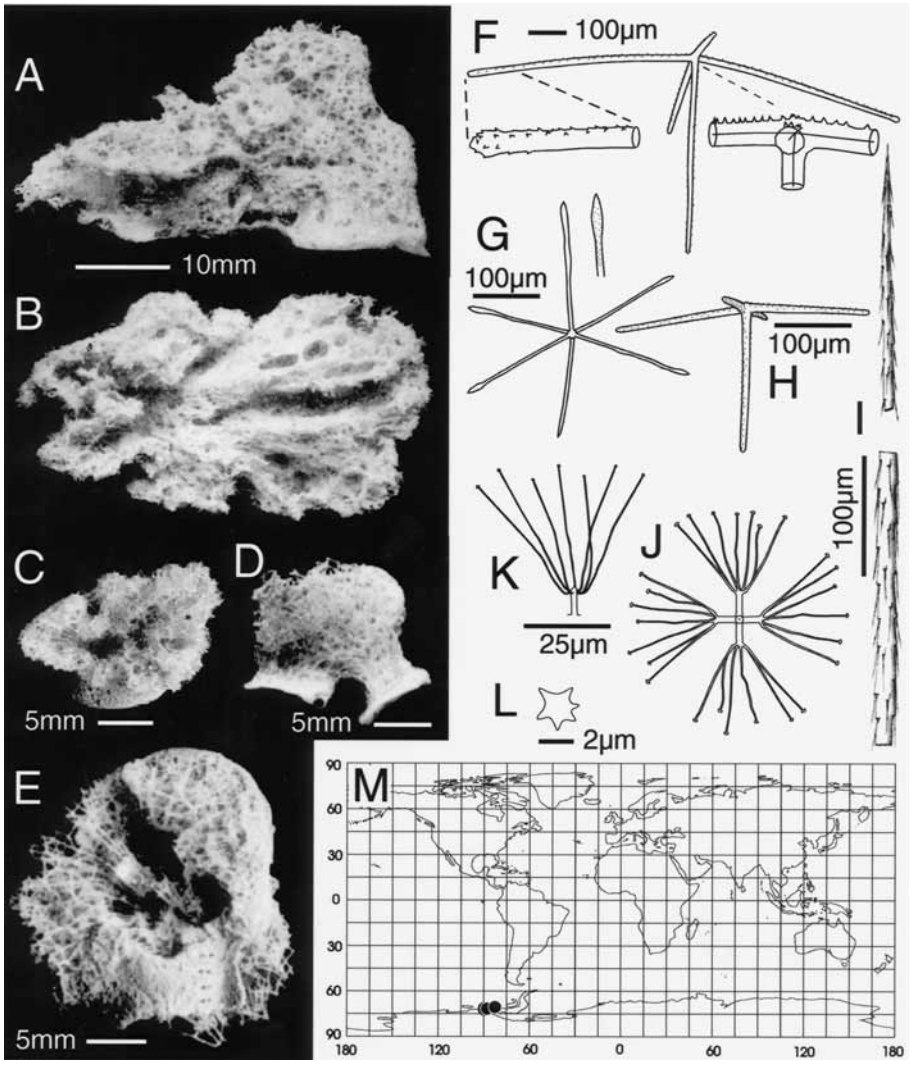

Fig. 3. *Uncinatera plicata*. A–B, the lectotype RIB Por 008 in side (A) and top (atrial, B) views. C–E, paralectotypes RIB Por 012 atrial view, Por 011 side view, Por 010 oblique atrial view. F, large pentactin with enlargements of ray tip and spicule center. G, rough hexactin. H, small spined pentactin. I, segments of uncinate. J, medium-size hexaster (axis perpendicular to page omitted for clarity). K, one section of larger hexaster. L, hexaster disc in facial view. M, distribution of *Uncinatera*. (A–E, I, from Topsent, 1901d, pls 2, 6.)

grooves on both surfaces connected by simple channels through the entire wall (diarhyses); wall constructed of plumose fans of dictyonal strands leaving grooves and channels between plumes; longitudinal rays of dictyonalia continue far beyond next hexactin center, forming multiaxial strands; dictyonal meshes irregular; spiculation includes large dermal pentactins over 1 mm in diameter, smaller pentactins and hexactins, uncinates, and microdiscohexasters; atrialia and scopules absent.

Diagnosis

Monospecific. See type species description.

Remarks

Refer to Remarks on type species.

Description of type species

Uncinatera plicata Topsent (Fig. 3).

Synonymy. *Uncinatera plicata* Topsent, 1901a: xii; Topsent, 1901d: 41, pl. 2, figs 7, 10–12, pl. 6, figs 1–10. *Chonelasma lamella choanoides*; Schulze & Kirkpatrick, 1910: 51. *Chonelasma lamella*; Barthel & Tendal, 1994: 61.

Material examined. Lectotype (here designated): RIB Por 008 – Bellingshausen Sea, Antarctica. Paralectotypes (here designated): RIB Por 009 to 014 (total 9 specimens) – same locality.

Description (measurements given as mean ± st. dev. (range), from lectotype). Small, thin-wall (2 mm), plicate cups or funnels to 40 mm diameter by 25 mm tall attached to hard substrate by small basal disc directly or by short peduncle; both surfaces with deep longitudinal grooves, occasionally branching, and communicating by simple trans-wall channels; outer grooves and intervening irregular surface covered by dermal 0.7–0.8 mm mesh lattice of very large pentactins but atrial surface without free spicule cover; framework hard-compact basally but soft, flexible, and frayed (broken) distally; framework constructed of hexactine dictyonalia with longitudinal ray projecting well beyond next fused hexactin in chain, so longitudinal strands contain 3+ axial canals from overlapping longitudinal rays of hexactin series; addition of hexactins to existing

frame haphazard, resulting in coarse irregular meshes to 2 mm longitudinally and 0.8 mm transversely; no transverse alignment of dictyonalia (no lamellae); large proportion of intersections as false nodes; strands radiate distally and curve out to end as projections of coarse hispid outer surface; wall channels result from spaces between plumose bundles of radiating strands rather than interruptions in a continuous 3-dimensional frame; beams 30–100 μm thick are smooth or profusely spined; spurs long and variable in form, digitate to clavate, always heavily spined; megascleres: dermalia as large pentactins with thin cylindrical rays, tangential rays 576 ± 144 (251–881) μm long by 23 ± 5 (15–33) μm wide, spined only on outer surface and all around slightly swollen or bluntly acute tips, proximal ray 436 ± 100 (240–583) μm long, sparsely spined all around; small stout pentactins of unknown location with rays 155 ± 18 (114–198) μm long by 13 ± 2 (9–18) μm wide, entirely spined; thin microspined hexactins free or soldered to framework basally, rays 152 ± 30 (91–223) μm long by 4 ± 1 (2–8) μm wide, acute tips tapered or slightly swollen; uncinate 3.3 ± 0.6 (2.1–4.7) mm long by 19 ± 4 (10–30) μm wide; microscleres: spherical discohexasters 46 ± 11 (46–93) μm diameter with short smooth primary rays 9 ± 2 (4–16) μm long bearing 4–7–10 rough, often crooked secondary rays 24 ± 5 (14–38) μm long ending in small, button-like discs with 4–6 teeth; few oxyhexasters are of questionable origin; atrialia and sceptrules are absent; known only from the Bellingshausen Sea, Antarctica at depths of 430–500 m.

Remarks. Topsent (1901a, d) gave an excellent original description of the species wherein he described two irregular scopules as possibly coming from one specimen. He discounted these in his attempt to place his new species, noting that the absence of both scopules and clavules suggested formation of a third tribe for it within Schulze's Uncinataria – he refrained from offering a name for the group. Schulze (1904) hesitantly included *Uncinatera* in his Tretocalycidae (to become Tretodictyidae) on the basis of its dictyonal structure (definitely not euretoid), but speculated that it might deserve being separated in its own family due to its lack of scopules. In reviewing the "Gauss" collections, Schulze and Kirkpatrick (1910), never having seen Topsent's 'Belgica' material, incorrectly decided that two small specimens among a large number *of Chonelasma lamella choanoides* agreed with Topsent's description of *U. plicata*, and placed the latter in synonymy with *C. lamella choanoides* in the family Coscinoporidae. Although the body forms of small damaged specimens of *U. plicata* and *C. lamella choanoides* can be grossly similar, the irregular and coarse *U. plicata* framework cannot be confused with the euretoid, lamellar frame of *C. lamella*. Subsequent authors have used either the hesistant suggestion of Schulze (1904), e.g., de Laubenfels (1936a), or the incorrect action of Schulze and Kirkpatrick (1910), e.g., Barthel & Tendal (1994), to list the genus in either the Tretodictyidae or Euretidae (as junior synonym of *Chonelasma*). The genus and species are here resurrected as valid taxa having no relationship with *C. lamella*. Body form, lack of sceptrules and dictyonal framework construction, i.e., dictyonal strand formation by extension of single dictyonal rays, link them with the Aulocalycidae, but possession of uncinates and incorporation of additional hexactins to longitudinal dictyonal strands by parallel ray fusion sets *Uncinatera* apart from the main members of the family. The most parsimonious solution to placement of this species, and its close relative, *Tretopleura*, with similar framework construction, is erection of the long-needed family Uncinateridae within the Aulocalycoida, with *Uncinatera* designated as type genus.