Four new genera of soft corals (Coelenterata: Octocorallia), with notes on the classification of some established taxa

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Four new genera, *Rhytisma*, *Klyxum* and *Skamnarium* (family Alcyoniidae) and *Sansibia* (family Xeniidae), are proposed to accommodate a number of species wrongly assigned to some established genera. A large number of the species concerned have been previously included in the genus *Alcyonium*, and remarks are made concerning the heterogenous nature of that genus. The reassignment of *Parerythropodium hicksoni* Utinomi, 1972, to *Erythropodium*, *Alcyonium gracillimum* Kükenthal, 1906, to *Scleronephthya*, and *Clavularia hamra* to *Briareum* is also discussed, and the existence of *Funginus* Tixier-Durivault, 1987, as a replacement name for *Fungulus* Tixier-Durivault, 1970, is highlighted.

Introduction

The purpose of this paper is to reassign a number of soft coral species that have been erroneously placed in several different genera of the families Alcyoniidae and Xeniidae. In order to do this it is necessary to propose the establishment of four new genera to accommodate most of the species concerned.

Systematic part

Order Alcyonacea Verrill, 1865

Family Alcyoniidae Lamouroux, 1812

Rhytisma gen. nov.

Type species: *Litophyton fulvum* Forskål, 1775: 139, here designated.
= *Sympodium fulvum* (new combination); Ehrenberg, 1834: 156.
= *Alcyonium fulvum* (new combination); Kükenthal, 1904: 41-43.
= *Parerythropodium fulvum* (new combination); Kükenthal, 1916: 463.
= *Parerythropodium fulvum fulvum* (new subspecies) Verseveldt, 1969: 7.

Litophyton (part) Forskål, 1775: 139.
Sympodium (part); Ehrenberg, 1834: 156; Klunzinger, 1877: 42; May, 1899: 46-53; Wright & Studer, 1889: 270-271; Thomson & McQueen, 1908: 49; Thomson & Henderson, 1906: 409; Thomson & Dean, 1931: 21.
Alcyonium; Kükenthal, 1904: 41-43; Verseveldt, 1965: 29.
Alcyonium (part); Thomson & Mackinnon, 1919: 173; Kükenthal, 1913: 2.
Alcyonium (*Erythropodium*); Cohn, 1908: 237-238.
Parerythropodium (part) Kükenthal, 1916: 461-464; Stiasny, 1937: 739; Tixier-Durivault, 1966: 101-106; 1972: 19; Verseveldt, 1969: 4-11; Groot & Weinberg, 1982: 303.

Other species that should be included in the new genus, *Rhytisma*, are:

Sympodium fuscum Thomson & Henderson, 1906: 408-409, (= *Parerythropodium fulvum fuscum*, new combination, new subspecies, Verseveldt, 1969: 8).
Parerythropodium rubiginosum Verseveldt, 1969: 8.
Alcyonium monticulum Verseveldt, 1982: 144-145.

Diagnosis.— Thin, encrusting mats of irregular shape, about 2-4 mm thick, occasionally with hillocks where the colony is considerably thickened, overgrowing dead, sometimes live, substrate. The large gastric cavities of the polyps extend right through the colony with only a thin layer of coenenchyme separating them from the substrate. Polyps are monomorphic, and totally retractile into apertures that may be slightly raised on calyx-like mounds. The coenenchyme contains large spindles, up to several mm long, ornamented with small spines. When very long, the spindles can be arranged as a conspicuous honeycomb-like network on the upper surface of the colony with a polyp within each 'cell'. Smaller spindles may be grouped *en chevron* to form eight teeth surrounding each polyp aperture. The polyps contain similar spindles arranged as crown and points, and often have granular scales in the tentacles.

Colour.— Colony colour is variable. The encrusting mat can be greyish-purple, grey-blue, greenish-yellow, cream or pale brown, and the polyps intense greenish-yellow, cream, orange, or greyish-purple. Abundant zooxanthellae.

Distribution.— Very few records: Red Sea, Zanzibar, Madagascar, Paternoster Islands, Papua New Guinea, Great Barrier Reef. It would appear to be generally uncommon, but quite abundant in certain localities.

Etymology.— The generic name is a direct transliteration of the Greek word *Rhytisma*, meaning a patch, and the gender is neuter. The word is used in allusion to the small, flat, membranous colonies as they appear on coral rock.

Remarks.— The establishment of a new genus has been made necessary by the definitive study of Groot and Weinberg (1982), where *Parerythropodium* was made a subjective synonym of *Alcyonium*. *Parerythropodium* was established by Kükenthal (1916), for a number of species with retractile polyps and a membranous growth form. Six of these species (*Gorgonia coralloides* Pallas, 1766, *Sympodium norvegicum* Koren & Danielssen, 1883, *Erythropodium astraeoides* Studer, 1901, *Sympodium punctatum* May, 1899, *Alcyonium* (*Erythropodium*) *membranaceum* Kükenthal, 1906, and *Alcyonium* (*Erythropodium*) *reptans* Kükenthal, 1906) having small sclerites of various forms such as tuberculate capstans, 6-8 radiates, clubs, capstans, crosses and small spindles, and the seventh species, *Lithophyton fulvum,* having sclerites of a considerably different size and form. Since then a number of other species have been added, predominantly with small sclerites of the forms noted above for the first six species.

Kükenthal designated *Gorgonia coralloides* Pallas [=*Sympodium coralloides* (Ehrenberg, 1834), *Masserella coralloides* (Gray, 1869), *Alcyonium coralloides* (v. Koch, 1891)] as the type species of *Parerythropodium*. Weinberg (1975) studied the skeletal variation in various colour forms of encrusting colonies of *P. coralloides*, concluding they all represented the same species, and refuting the claims of earlier authors that the species should be placed in *Alcyonium*. In 1982, however, Groot and Weinberg studied well over 1700 colonies, and extensively examined the biogeography, ecology and internal canal system of the species. They showed that both encrusting and lobate colonies were common, and concluded that the species could justifiably be transferred to *Alcyonium*, and stated, "As a result, *Parerythropodium* will have to be suppressed, since *coralloides* is the type-species of this genus". Although these authors' use of the term "suppressed" was incorrect, ('suppression' of a name requires the use of the plenary power of the Commission for Zoological Nomenclature for a completely different set of circumstances), their intent is obvious.

In their paper, Groot and Weinberg stated that they were preparing a revision of the genus *Parerythropodium*, obviously referring to the current nominal species other than *coralloides,* which by default had become transferred to *Alcyonium*. To date, that work has not eventuated. In the present work I consider just two species, *P. fulvum* and *P. hicksoni* Utinomi, 1972.

P. fulvum, as noted by Groot and Weinberg (p. 303) stands out as being noticeably different from *P.* (=*Alcyonium*) *coralloides*, as indeed it is from virtually all other nominal species of *Parerythropodium*. The tentacles often contain small granular scales, and the sclerites of both the coenenchyme and the crown and points in the polyps are relatively huge; being in excess of 2 mm in the coenenchyme. These sclerites are only of one kind, spindles that are almost smooth or covered with fine prickles, and they are arranged in a distinctive lattice-work on the colony surface between the polyps.

Any suggestion that *P. fulvum* should also be included in *Alcyonium* is a refection on what I consider to be the gross paraphyletic nature of that genus. As presently defined, amongst species of *Alcyonium* can be found most of the colonial forms that are included in the majority of the genera in the family Alcyoniidae, and an equally diverse nature of sclerite architecture. The variety of colonial morphology was recognised by Kükenthal (1906a: 40-42) who proposed to divide the genus into three subgenera. More recently the range of colonial forms have been well summarised by Williams (1988: 19), who had also considered this problem and the relevant taxonomic implications in two earlier papers (1986a: 259-264; 1986b: 61). Unfortunately, over the years not enough consideration has been given to the huge variation in the form of the sclerites together with the in-colony distribution of them that exist across the spectrum of species in the genus. It is truly remarkable that over the years such massive character-creep has occurred as more species have been added to the genus. Williams (1986b: 61) succinctly stated, "The genus *Alcyonium* must presently be considered in a state of taxonomic change, as investigators consider alterations to the definition of the genus and assess what forms should be included or excluded". Subsequently, in his 1992 paper (p. 271), he gave the following diagnosis that attempted to encompass the wide variety of forms to reflect the current status: "Colonial growth form highly variable: colony may be upright, with a definite basal stalk, and with a multi-lobed, digitate, or disc-shaped polyparium; or colony prostrate, without a definite stalk, with a membranous to encrusting or globular polyparium. Polyps monomorphic. Sclerites are often tuberculate spindles; capstans, rods, and needles also common". It is not difficult to see, with such a large number of combinations of characters possible, why it is now easy to justify the inclusion of very diverse forms within the genus. A contracted specimen of *Scleronephthya*, for example, fits the definition quite well, as evidenced by the inclusion of *A. gracillimum* Kükenthal, 1906b, which in fact is a species of *Scleronephthya* (see the colour pictures in Utinomi, 1958: 10; 1976, pl. 1, fig 3). Further, if William's definition had included clubs as a possible sclerite form, which is justifiable, *Sinularia* would also fit the definition. Clubs are present, for example, in *Alcyonium acaule* Marion, 1878 (see Verseveldt, 1964: 157) and *A. haddoni* Wright & Studer, 1889 (see Verseveldt, 1967: 5-7), and were omitted from the definition by an oversight (Williams, pers. comm.)

Alcyonium clearly needs a total revision. Basing the characters of the genus on the type species *A. digitatum* Linnaeus, 1758, together, perhaps, with other cold water species such as, *A. palmatum* Pallas, 1766, *A. acaule* Marion, 1878, *A. antarcticum* Wright & Studer, 1889, and *A. siderium* Verrill, 1922, might produce a stricter and more workable definition of the genus. These species have two layers of sclerites: a surface layer of predominantly clubs and/or capstans, and spiny rods, and in inner layer of small, straight and/or branched spindles or rods. Species with such a colonial architecture are far removed from *P. fulvum* (now *Rhytisma fulvum*) and other shallow water, subtropical and tropical, species such as those previously assigned to *Alcyonium* which are considered later in this paper.

Parerythropodium hicksoni, described by Utinomi (1972: 8-10) from Port Phillip, Australia, is a very common inhabitant of shallow water, sheltered habitats of at least the coasts of Victoria, New South Wales and Tasmania, where it grows on boulders in very large sheets. The sclerites are colourless 6-radiate capstans, and the polyp cavities occupy only the upper layer of the coenenchyme, which is separated from the lower zone by a series of large canals. The species clearly belongs to the genus *Erythropodium*. Some years ago, this information was sent to Dr Graham Edgar for a book that was then in preparation, and the new combination subsequently appeared in his exceptional publication (Edgar, 1997) along with a colour underwater photograph.

Klyxum gen. nov.

Type species: *Lithophyton confertum* Kükenthal, 1903: 116, here designated.

Lithophyton (part); Kükenthal, 1903: 106-109.
Litophyton; Utinomi, 1954: 57-59.
Alcyonium; Tixier-Durivault, 1966: 28-35; Verseveldt, 1971: 5-10; 1974: 97-98.
Alcyonium (part); Lüttschwager, 1922: 520-538; Thomson & Dean, 1931: 42-44; Tixier-Durivault, 1970: 180-184; ?Utinomi, 1976: 193-200.
?*Nidalia*; Tixier-Durivault, 1970: 317-318.

Other species which should be included in the new genus, *Klyxum*, are:
Alcyonium equisetiform Lüttschwager, 1922: 525-526.
Alcyonium molle Thomson & Dean, 1931: 43.
Alcyonium rotundum Thomson & Dean, 1931: 43.
Alcyonium simplex Thomson & Dean, 1931: 43-44.
Litophytum viscidum Utinomi, 1954: 57-59.
Alcyonium flaccidum Tixier-Durivault, 1966: 29-31.
Alcyonium echinatum Tixier-Durivault, 1970: 182.
Alcyonium legitimum Tixier-Durivault, 1970: 184.
Alcyonium flaccidum aberrans Verseveldt, 1971: 6-7.
Alcyonium utinomii Verseveldt, 1971: 7-8.
??*Alcyonium okinawanum* Utinomi, 1976: 196-197.
??*Nidalia tuberculosa* Tixier-Durivault, 1870.

Diagnosis.— Lobate colonies, that, when expanded, generally have rather long lobes that subdivide. Colonies are usually quite small, but at least one species grows to about 50 cm in height, and in my experience they are always soft and fleshy. Polyps are clustered on the lobes, often very densely arranged, and are non-retractile. In preserved specimens, the coenenchyme around the polyps may be raised into a small dome. The sclerites in the coenenchyme are predominantly narrow or plump spindles, with relatively large, rounded, cone-shaped prominences. They are commonly shorter than 0.4 mm, but can be longer than 1 mm. The summit of the cone-shaped prominences may be smooth or papillate, and sometimes ridged. The spindles are usually pointed, their abundance is variable, and in some species they only occur in the basal part of the colony stalk. Also in the coenenchyme, predominantly in the lobes, narrow, smooth, flattened rods and small scale-like forms may be found. These often appear poorly formed, and fibrous, and they may be abundant, sparse, or completely absent. There is no distinct layer of sclerites in the colony surface, but it is not unusual to find the sclerites that are near the surface to be slightly smaller, narrower, and smoother than those that lie deeper within. In the lobes, if the smooth rods and scales are present, they may be denser in the surface zone, and clustered around the polyps where they generally appear white in preserved material. When they are abundant in the lobe surface they commonly continue onto the polyp body, with the smaller forms in the tentacles. It is unusual to find polyps with sclerites if there are none in their vicinity in the lobe surface.

Colour.— Polyps are usually dark brown, while the general colony colour is lighter, such as cream, or pinkish brown. In some species both polyps and colony are brown. Sclerites are always colourless. Abundant zooxanthellae.

Distribution.— From the literature and my own experience, the genus has been found to occur in Madagascar, Maldives, Thailand, Indonesia, Great Barrier Reef, Papua New Guinea, Solomon Islands, New Caledonia, Fiji, Tonga, Palau, Philippines, and Japan. It can be found both in clear, coral reef waters, and turbid coastal regions.

Etymology.— The generic name is a combination of letters with no derivation, and is to be considered neuter.

Remarks.— The arguments given above for delineating the new genus *Rhytisma* from *Alcyonium* apply equally to *Klyxum*. The argument is even slightly stronger as the polyps in species of *Klyxum* are not retractile, as is the case in *Alcyonium digitatum* and closely related species. It is worth remarking that the polyps in species of *Klyxum* are capable of extreme contraction until they are more or less flush with the surface, but I have found no invagination in any of the specimens I have examined.

A. okinawanum appears to have just the smooth flattened rods that occur in other species of *Klyxum*, but the characteristic spindles are missing. In my experience, the abundance of the two sclerite forms is very variable, both within and between species. Further material of a similar nature would need to be examined to determine whether the variability can extend to such an extreme as to justify the inclusion of this species in the genus.

Nidalia tuberculosa Tixier-Durivault, 1970: 317-318, has many features that indicate it could be a species of *Klyxum*. It was described as having some calyces, but the illustration looks like a polyp with scattered sclerites on the body, or at most a coenenchymal mound with scattered, small sclerites as is seen in species of *Klyxum*. The report-ed rigidity of the New Caledonian specimen could be due to some treatment suffered by the colony after it was collected, as also could the slight orange colour of some of the sclerites in the surface of the stalk. The specimens need to be re-examined, but it appears to have little resemblance to a species of *Nidalia*.

Skamnarium gen. nov.

Alcyonium (part); Verseveldt, 1977: 176-179.

Type species: *Alcyonium complanatum* Verseveldt, 1977: 176-177.

Diagnosis.— Small colonies with a pedestal or stump-like growth form, the summit of which is flat but becomes dished when the colonies are tightly contracted; a feature exaggerated by fixation and preservation in alcohol. The polyps are small, retractile, crowded, and confined to the colony summit. The coenenchyme around the octoradiate apertures of retracted polyps may be raised into a small mound. The only sclerites are rod-shaped, up to 4 mm long, with one or both ends irregularly rounded, or occasionally branched, and densely covered with complex, jagged tubercles. They are arranged longitudinally in the coenenchyme and are colourless. There is no separate layer of surface sclerites in any region of the colony, and there are no sclerites in the polyps.

Colour.— When alive, the summit is blue-grey and the stalk has a greenish or brownish hue. Abundant zooxanthellae

Distribution.— Only known from Parakee and Rottnest Islands, off the southern coast west of Western Australia, and from a depth of 3 – 13 m.

Etymology.— The generic name is derived from *skamnari*, which is a transliteration of the Greek word for a foot-stool. It elludes to the colony shape, and the gender is neuter.

Remarks.— The same argument as given above applies equally here to justify the removal of *A. complanatum* from the genus *Alcyonium*. The species does not fit into any of the nominal alcyoniid genera, so a new genus is proposed.

The only alcyoniid species that bears much resemblance to *Skamnarium complanatum* is *A. planiceps* Williams, 1986(b), and that author compared the two species in that paper. When preserved material alone is considered, the two species do have many morphological similarities. There are, however, major differences: the sclerites in *A. planiceps* are mostly confined to the surface layer of the stalk (and sometimes the summit), the polyps are few (<20) and very large (reminiscent of the difference between *Anthomastus* and *Sarcophyton*), and the stalk has a thin, but well defined, cuticular layer. Further, Williams, (1992: fig 1F) excellent colour picture of the species demonstrates how valuable observations of live specimens can be. In life *A. planiceps* expands to form a brightly coloured, pedestal-like colonial form, with summit and polyp bases magenta, polyp bodies white, and tentacles golden yellow. Most importantly, the species clearly appears to be azooxanthellate (which is perhaps compensated for by the possession of the extremely large polyps that may be capable of catching large planktonic organisms). The presence and absence of zooxanthellae in soft corals represents a major point (or points) of evolutionary divergence, and is certainly a character that must be considered of generic level significance.

Williams (2000, in press) is proposing a new genus-group taxon to accommodate *A. planiceps*.

Family Xeniidae Wright & Studer, 1889

Sansibia gen. nov.

Type species: *Clavularia flava* May, 1899: 43, here designated.
= *Anthelia flava* (new combination); Thomson & Mackinnon, 1910: 171.

?*Sarcothelia* Verrill, 1928: 5.
Clavularia; Cohn, 1908: 243.
Clavularia (part); May, 1899: 40-46; Thomson & Henderson, 1906: 399-407.
Anthelia; Thomson & Mackinnon, 1910: 171.
Anthelia (part); Molander: 1921: 3; Roxas, 1933: 59-68; Gohar, 1940a: 86-93; 1940b: 19-20; Utinomi, 1950: 81-83; 1958: 98-100; Tixier-Durivault, 1966: 348-352; 1970: 322; Bayer, 1981; 905.

Other species that should be included in the new genus *Sansibia*, are:
Anthelia boquetei Roxas, 1933: 63-64.
Anthelia formosana Utinomi, 1950: 82-83.
?*Anthelia lineata* Stimpson, 1855.

Diagnosis.— Xeniids with numerous, tall, slender, non-retractile autozooid arising from a thin membranous or ribbon-like basal expansion. Sclerites are minute corpuscle-like platelets or spheroids constructed from close fitting, more or less radially arranged, dendritic to worm-like rods of calcite. No siphonozooids.

Colour.— Brown, with areas of iridescent colours, usually green and/or blue, predominantly in the tentacles. Abundant zooxanthellae.

Distribution.— Scattered records from warm, subtropical and tropical waters of the Indian and Pacific Oceans, and associated seas, from the coast of Africa across to Hawaii in the west, and from Taiwan south to the coast of northern New South Wales in Australia.

Etymology.— The name is derived from the German name "Sansibar" for Zanzibar, used by May for the collection locality for the type species, and is feminine.

Remarks.— The genus *Anthelia* was established by Lamarck in 1816 (p. 407) for *A. glauca* from the Red Sea. In later years there was considerable confusion between this genus and *Clavularia* Quoy & Gaimard, 1833, as evidenced by Hickson's (1894: 332-333) revisionary discourse on the genera of the Stolonifera where he proposed to abandon *Anthelia* and transferred the relevant species to *Clavularia. Anthelia* was subsequently re-validated by Kükenthal in 1906a (pp. 10-11), unfortunately still retaining in it many species that it would have been more appropriate to leave in *Clavularia.* The understanding of the genus was further refined by Molander (1921: 1-8), Roxas (1933: 59-68), Gohar (1940a: 86-93; 1940b: 19-20), and it was Gohar (1939: 32; 1940a: 87), who placed the genus in the family Xeniidae. It had earlier been placed in Cornulariinae by Milne Edwards & Haime (1857: 108) and in Antheliadae by Gray (1869: 118-119); the latter proposal never being adopted by later authors.

As it stands at present the genus includes nominal species both with and without sclerites. In the absence of any comprehensive revision involving the examination of type specimens, Tixier-Durivault (1966: 348; 1970:322) continued to include discs, rods, dumbbells and tuberculate sclerite forms amongst the characteristics of the genus. Bayer (1981: 905) restricted the sclerite form to simple discs and rods, and Reinicke (1995: 21; 1997: 24) defined the genus, apparently solely with reference to the several Red Sea species, as having just rod-shaped sclerites, making no mention of the species with disc-like forms and those without sclerites at all.

The original description given by Lamarck of the type species *A. glauca* lacked much detail, but was based on excellent drawings in a manuscript of Savigny (1817). Gohar (1940a: 88-91) gave the first comprehensive description of what he proposed to be *A. glauca* and gave a drawing of a sclerite with a periphery comprised of radially arranged processes. He described the sclerites as, “the surfaces are beset with densely packed teeth like the teeth of a comb”. Reinicke gave scanning electron microscope (SEM) pictures of sclerites from specimens that he attributed to *A. glauca* in 1995 (fig. 6a-d) and confirmed the most probable identity of the species in 1997 (pp. 24-27) showing more SEM images of sclerites, and a copy of Savigny’s illustrations. The sclerites are flattened rods, up to 0.1 mm long and 0.27 mm broad, the surface of which is formed from euhedral calcite (presumably) with the main axes of crystal growth apparently at an angle to the long axis of the sclerite.

May’s *Clavularia flava*, from Zanzibar, was described as having oval sclerites 0.02 × 0.012 mm. Hickson proposed its inclusion in the Xeniidae in 1931 (p. 75), but this was not followed by Roxas in 1933 (p. 63). Thomson & Mackinnon (1910: 171), Molander (1921: 2-4) and Roxas placed *Clavularia flava* in *Anthelia*, but still retained it in the Cornulariidae. Tixier-Durivault (1966: 348-349) gave a description of the species using specimens from Madagascar, Benayahu (1993: 14-15) presented material from northern Natal, and Williams (1992: fig 1D) and Gosliner et al (1996: 46) provided an underwater photograph of a colony also from Natal. In Benayahu’s publication, there are SEM images of several sclerites showing their typical platelet form and cat’s-tongue-like surface. As a result of a large, ongoing study on xeniid sclerite structure, commenced in 1996, I am able to say that this sclerite structural form is common among species of the family Xeniidae. The papillate surface is formed by the tips of the radial, dendritic, anhedral, calcite rods that make up the bulk of the sclerite, and an excellent SEM image of this type of sclerite architecture was given by Bayer (1992: fig. 50d). My research shows that this sclerite structure should be considered as a generic level character, and is therefore justification to propose an alternative genus to accommodate the nominal species of *Anthelia* that posses this trait, and the as yet undescribed species that are in the collection of the Museum and Art Gallery of the Northern Territory (MAGNT). The evidence is very strong that *A. glauca*, the type species of *Anthelia*, has sclerites that are rods with a coarse crystalline surface structure, no *Anthelia*-like species with platelets as described above ever being recorded from the Red Sea.

In the wild, there are three features that may assist in distinguishing species of *Sansibia* from species of *Anthelia*. First, the polyp bodies and the tentacles of the latter are commonly much stouter that those of *Sansibia*. Second, in those species of *Anthelia* that possess sclerites, the sclerites can be extremely densely arranged compared to species of *Sansibia*; so dense in fact that the colony may appear completely white or pale blue (when contracted), or heavily dusted in those colours (when expanded). Third, the nature of the different sclerite structures causes light to be reflected and refracted in different ways. The disc-like sclerites of species of *Sansibia,* like those in *Xenia* Lamarck, 1816, would appear to have zones of aligned micro-crystals that produce an iridescent effect like that seen in precious opal. The tentacles in particular appear as brilliant, metallic blues and greens. In contrast, the coarse crystal structure of the rods of *Anthelia* appears to scatter the light so the polyps often appear white or pale blue where the sclerites are clustered. The sclerites of *Anthelia* do not produce an iridescent effect.

The colour of the tentacles of *Anthelia lineata* Stimpson, 1855, are described as being bright blue, so it has been included in the list above as a possible species of *Sansibia*. However, the type specimen is no longer in existence (Verrill, 1928: 7).

Amongst the species of *Sansibia* that I have examined are some with very few sclerites. On the other hand, species of *Anthelia* nearly always have abundant or superabundant sclerites. It would seem more probable that the nominal *Anthelia* species without sclerites (for examples see Roxas, 1933: 62-63) may prove to be species of *Sansibia* rather than *Anthelia*: although they could represent an entirely different genus.

In the context of the generic identity of those species with sclerites in the form of platelets, some consideration has to be given to *Sarcothelia* Verrill, 1928. The genus was proposed for *S. edmondsoni* from Hawaii, a species whose description would appear to place it alongside those nominal species of *Anthelia* without sclerites, and Utinomi proposed its inclusion in this genus in 1950 (p. 81). *Sansibia* does occur in Hawaii as evidenced by material sent to me by Charles Delbeek. The specimens contain numerous sclerites, but the number and arrangement of the pinnules is not so different from Verrill's specimens as to be outside the boundaries of acceptable variability. Verrill states that his specimens were from Professor Edmondson's aquarium, and from my own work with Alf Nilsen (unpublished) it is apparent that sclerite shape and abundance in soft corals can alter quite rapidly under conditions of aquarium husbandry. Julian Sprung (pers.comm.) has observed that pinnule number and arrangement can change in aquarium raised individuals, and Charles Delbeek (pers. comm.) says that it is not totally beyond the bounds of probability that low pH, low alkalinity and several other factors probably present in aquaria circa 1928 could have resulted in minute sclerites dissolving or being resorbed in such octocorals. It is unlikely it will ever be known how long Edmondson's specimens were in his aquarium, and whether the characters that Verrill recorded had been affected by captivity, but uncertainty remains. Verrill also states that all parts of the polyp body ("column") contain nematocysts and, importantly, there are no zooxanthellae in the specimens. These comments are at odds with what we know of shallow water xeniids, further pointing to the effect that any argument for attributing *Anthelia*-like species with platelet sclerites to *Sarcothelia* would not have a solid foundation. It therefore seems preferable to establish a new genus for these animals.

Gohar transferred *Anthelia* to the Xeniidae for a number of reasons; most importantly because the asulcal pair of mesenterial filaments are absent in the polyps. Until my research on xeniid sclerites and their taxonomic value has been completed, I will reserve any comment on the position of the genus in the family.

Funginus Tixier-Durivault, 1987

Fungulus Tixier-Durivault, 1970: 324.

Remarks.— The genus *Fungulus* was established by Tixier-Durivault for *Fungulus heimi*, a species from New Caledonia. Colonies with the features of the genus are rarely encountered. The last record was by Imahara (1991: 62) from the Ryukyu Islands, and there is single specimen in the collections of the MAGNT from the central Great Barrier Reef. The generic name was actually preoccupied by *Fungulus* Herdman, 1888, a tunicate. It is not well known that the replacement name *Funginus* was proposed by Tixier-Durivault (1987: 159) in volume 3 of Traité de Zoologie.

Family Briareidae Gray, 1859

Briareum Blainville, 1830

Briareum hamrum (Gohar, 1948) comb. nov.

Clavularia hamra Gohar, 1948: 4-11, figs. 1-5.

Some well preserved colonies from Eilat, identified as *Clavularia hamra* Gohar, were kindly sent to me many years ago by Dr Benayahu, at my request. They conform very well with the description of Gohar. The colony form, the arrangement of the sclerites into a basal magenta layer and an upper colourless layer, and the nature of the sclerites (see Gohar's fig. 5), clearly place the species in the genus *Briareum*. Dr Benayahu stated (pers. comm.) that this is the only species of this form that he has seen in the Red Sea during many years of research, which has implications for the possible synonymy of *Alcyonium* (*Erythropodium*) *contortum* Kükenthal, 1906a (= *Solenopodium contortum*, new combination, Kükenthal, 1919: 41) and *Solenopodium violaceum* Broch & Horridge, 1956, both from the Red Sea. *Solenopodium* was proposed as a junior synonym of *Briareum* by Bayer (1961: 61-62).

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References

Bayer, F.M., 1961. The shallow-water Octocorallia of the West Indian region. A manual for marine biologists: 373 pp. + pls. I-XXVII.— The Hague, Netherlands.

Bayer, F.M., 1981. Key to the genera of Octocorallia exclusive of Pennatulacea (Coelenterata: Anthozoa), with diagnoses of new taxa.— Proc. Biol. Soc. Wash. 94 (3): 901-947, figs. 1-80.

Bayer, F.M., 1992. The helioporacean octocoral *Epiphaxum* Recent and fossil. A monographic iconography.— Studies in Tropical Oceanography 15: i-viii + 1-76, 62 figs.

Benayahu, Y., 1993. Alcyonacea from Sodwana Bay, South Africa.— Oceanogr. Res. Inst. (Durban) Investigational Rept. 67:3-16, figs. 1-14.

Cohn, M., 1908. Alcyonacea von Madagaskar und Ostafrika. Reise in Ostafrika in den Jahren 1903-1905 von Dr. A. Voeltzkow.— Wiss. Ergebn. 2, Syst. Arbeit (3): 207-244, pl. 10.

Edgar, G., 1997. Australian Marine Life, the plants and animals of temperate waters: 544 pp.— Kew, Australia.

Ehrenberg, C.G., 1834. Beiträge zur physiologischen Kenntniss der Corallenthiere im allgemeinen, und besonders des rothen Meeres, nebst einem Versuche zur physiologischen Systematik derselben.— Abhandl. Königl. [preussischen] Akad. Wiss. Berlin. Aus dem Jahre 1832. Erster Theil: 225-380, + 439 (Verbesserungen).

Forskål, P., 1775. Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium; quae in itinere orientali observavit Petrus Forskål, Prof. Havn. Post mortem auctoris edidit Carsten Niebuhr. Havniae, ex Officina Molleri, aulae Typographi: 1-64.

Gohar, H.A.F., 1939. On a new xeniid genus *Efflatounaria*.— Ann. Mag. Nat. Hist. (11) 3: 32-36, pl. 1.

Gohar, H.A.F., 1940a. Studies on the Xeniidae of the Red Sea.— Pub. Marine Biol. Sta. Ghardaqa (Red Sea) 2: 25-118, pls. 1-7.

Gohar, H.A.F., 1940b. A revision of some genera of the Stolonifera (with an emended system of classification and the description of two new Species).— Pub. Marine Biol. Sta. Ghardaqa (Red Sea) 3: 1-25, 1 pl.

Gohar, H.A.F., 1948. A description and some biological studies of a new alcyonarian species *Clavularia hamra* Gohar.— Pub. Marine Biol. Sta. Ghardaqa (Red Sea) 6: 3-33, pls. 1-3.

Gosliner, T.M., Behrens, D.W. & G.C. Williams, 1996. Coral Reef Animals of the Indo-Pacific: 314 pp.— Monteray, USA.

Gray, J.E., 1869. Notes on the fleshy alcyonoid corals (Alcyonium, Linn., or Zoophytaria carnosa).— Ann. Mag. Nat. Hist. (4) 3: 117-131.

Groot, S. & S. Weinberg, 1982. Biogeography, taxonomical status and ecology of *Alcyonium (Parerythropodium) coralloides* (Pallas, 1766).— Pubbl. Staz. Zool. Napoli, Marine Ecology 3(4): 293-312.

Hickson, S.J., 1894. A revision of the genera of the Alcyonaria Stolonifera, with a description of one new genus and several new species.— Trans. Zool. Soc. London 13 (9): 325-347, figs. 1-4, pls. 45-50.

Hickson, S.J., 1931. The alcyonarian family Xeniidae, with a revision of the genera and species.— Great Barrier Reef Exped. 1928-29, Sci. Rept. 4 (5): 137-179, pls. 1-2.

Imahara, Y., 1991. Report on the Octocorallia from the Ryukyu Islands of Japan.— Bull. Inst. Oceanic. Res. & Develop., Tokai Univ. 11/12: 59-94, figs. 1-21, pls. 1-2.

Klunzinger, C.B., 1877. Die Korallthiere des rothen Meeres. Erster Theil: Die Alcyonarien und Malacodermen. Verlag der Gutmann'schen Buchhandlung (Otto Enslin): i-vii + 1-98, pls. 1-8.— Berlin.

Koch, G. von, 1891. Die systematische Stellung von *Sympodium coralloides* Pallas.— Zool. Jahrb. (Syst.) 5: 76-92.

Koren, J. & D.C. Danielssen, 1883. Nye Alcyonider, Gorgonider og Pennatulider tilhorende Norges Fauna. Bergens Museum. Bergen, John Griegs Bogtrykkeri: [i-ii] + I-XVI + 1-38, pls. 1-13.

Kükenthal, W., 1903. Versuch einer Revision der Alcyonarien. 2. Die Familie der Nephthyiden. 1. Theil.— Zool. Jahrb. (Syst.) 19 (1): 99-178, pls. 7-9.

Kükenthal, W., 1904. Über einige Korallentiere des Roten Meeres. In: Festschrift zum siebzigsten Geburtstage von Ernst Haeckel herausgegeben von seinen Schülern und Freunden.— Jenaische Denkschriften 11: 31-58, pls. 4-5.

Kükenthal, W., 1906a. Alcyonacea. Wissensch. Ergebn. deutschen Tiefsee-Exped. "Valdivia" 13 (1) Lieferung 1: 1-111, pls. 1-12.

Kükenthal, W., 1906b. Japanische Alcyonaceen. In: Doflein, F. (Ed.), Beiträge zur Naturgeschichte Ostasiens.— Abhandl. math. phys. Klasse K. Bayer. Akad. Wissensch., Suppl. Bd. 1 (1): 9-86, 5 pls.

Kükenthal, W., 1913. Alcyonaria des Roten Meeres. In: Expeditionen S.M. Schiff "Pola" in das Rote Meer. Zoologische Ergebnisse 29.— Denkschr. math. naturw. Klasse K. Akad. Wissensch. 89: 1-31, pls. 1-3.

Kükenthal, W., 1916. Die Gorgonarien Westindiens. Kap. 1, Die Scleraxonier; 2, Über den Venusfächer; 3, die Gattung *Xiphigorgia* H.M. Edw.— Zool. Jahrb. Suppl. 11 (4): 443-504, pl. 23.

Kükenthal, W., 1919. Gorgonaria. Wissensch. Ergebn. deutschen Tiefsee Exped, "Valdivia" 13 (2): 1-946, pls. 30-89.

Lamarck, J.B.P.A., 1816. Histoire naturelle des animaux sans vertèbres...2: i-iv + 1-568 pp.— Verdière, Paris.

Lüttschwager, J., 1922. Alcyonarien von den Philippinen. 1. Die Gattung *Alcyonium* Linnaeus.— Philipp. J. Sci. 20: 519-542, 1 pl.

Marion, A.F., 1878. Deux jours de draguages dans le golfe d'Alger.— Rev. Sci. Nat., 7 (1): 137-164.

May, W., 1899. Beiträge zur Systematik und Chorologie der Alcyonaceen.— Jenaische Zeitsch. Naturwiss. 33 (Neue Folge 26): 1-180, pls. 1-5.

Milne Edwards, H. & J. Haime, 1857. Histoire naturelle des coralliaires ou polypes proprement dits. Vol. 1: i-xxxiv + 1-326, 8 pls. numbered Al-6, Bl-2.— Paris, a la Librairie Encyclopédique de Roret.

Molander, A.R. 1921. Alcyonarien von Madagaskar.— Ark. Zool. 14 (2): 1-13.

Pallas, P.S., 1766. Elenchus zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis.— Hagae Comitum. [i] - xvi +[17]-28 + 1-451.

Quoy J.R.C. & P. Gaimard, 1833. Zoophytes. In: Voyage de découvertes de l'Astrolabe executé par ordre du Roi, pendant les années 1826-1827-1828-1829, sous le commandement de M.J. Dumont d'Urville.— Zoologie 4: 1-390, pls. 1-26.

Reinicke, G.B., 1995. Xeniidae des Roten Meeres (Octocorallia, Alcyonacea). Beiträge zur Systematik und Ökologie : 1-193.— Essener Ökologische Schriften 6, Magdeburg.

Reinicke, G.B., 1997. Xeniidae (Coelenterata: Octocorallia) of the Red Sea with descriptions of 6 new species of *Xenia*.— Fauna of Saudi Arabia 16: 5-62.

Roxas, H.A., 1933. Philippine Alcyonaria. The families Cornulariidae and Xeniidae.— Philipp. J. Sci. 50 (1): 49-110, pls. 1-4.

Savigny, J.C., 1809-1817. Description de l'Egypte ou recueil des observations et des recherches qui ont été faites en Egypte pendant l'expédition de l'Armée Française. Atlas, natural history, 244 plates.

Stiasny, G., 1937. *Parerythropodium maris-tenebrosi* n. sp., eine neue Alcyonarie von der Küste Nordwest-Afrikas.— Proc. Roy. Acad. Amsterdam 40 (8): 735-744, pl. 1.

Stimpson, W., 1855. Descriptions of some of the new marine invertebrata from the Chinese and Japanese Seas.— Proc. Acad. Nat. Sci. Philadelphia 7: 375-384.

Studer, T., 1901. Alcyonaires provenant des campagnes de l'Hirondelle.— Res. Camp. Sci. Monaco 20: 1-64, pls. 1-11.

Thomson, J. H. & W.D. Henderson, 1906. Alcyonaria. In: The marine fauna of Zanzibar British East Africa, from collections made by Cyril Crossland, M.A., B.Sc., F.Z.S., in the years 1901 and 1902.— Proc. Zool. Soc. London 1906 (1): 393-443, pls. 26-31.

Thomson, J.A. & J.L. McQueen, . 1908. Reports on the marine biology of the Sudanese Red Sea. VIII. The Alcyonarians.— J. Linn. Soc. London 31 (204): 48-75, pls. 5-8.

Thomson, J.A. & D. Mackinnon, 1910. Alcyonarians collected on the Percy Sladen Trust Expedition by Mr. J. Stanley Gardiner. Part 2, the Stolonifera, Alcyonacea, Pseudaxonia, and Stelechotokea.— Trans. Linn. Soc. London (2) 13 (2): 165-211, pls. 6-14.

Thomson J.A. & L.M.I. Dean, 1931. The Alcyonacea of the Siboga Expedition with an addendum to the Gorgonacea.— Siboga-Exped. Monogr. 13d: 1-227, pls. 1-28.

Tixier-Durivault, A., 1966. Octocoralliaires.— Faune de Madagascar 21: 1- 456, figs. 1-399.

Tixier-Durivault, A., 1970. Les octocoralliaires de Nouvelle-Calédonie.— L'Expédition française sur les récifs coralliens de la Nouvelle-Calédonie 4:171-350, figs. 1-173.

Tixier-Durivault, A., 1972. Nouvel rapport d'octocoralliaires de Madagascar et des iles avoisinantes.— Tethys Suppl. 3: 11-68.

Tixier-Durivault, A., 1987. Sous-Classe Des Octocorallieres (Octocorallia Haeckel, 1866; Octactinia Ehrenberg, 1828; ….. In: Doumenc, D. (ed.), Traité de Zoologie, Tome 3, Fasc. 3, Cnidaires, Anthozoaires.— Paris, France.

Utinomi, H., 1950. Some xeniid alcyonarians from Japan and adjacent localities.— Publ. Seto Marine Biol. Lab. 1 (3): 81-91, figs. 1-3.

Utinomi H., 1954. Some nephtheid octocorals from Kii coast, middle Japan.— Publ. Seto Marine Biol. Lab. 4 (1): 57-66, figs. 1-6, pl. 2.

Utinomi, H., 1958. On some octocorals from deep waters of Prov. Tosa, Sikoku.— Publ. Seto Marine Biol. Lab. 7 (1): 89-110, figs. 1-8, pls. 5-6.

Utinomi, H., 1958. Coloured illustrations of sea shore animals of Japan:167 pp.— Osaka, Japan.

Utinomi, H., 1972. Port Phillip Bay Survey 2. Octocorallia.— Mem. Nat. Mus. Vic. 32: 7-18, figs. 1-6, pl. 7, chart.

Utinomi, H., 1976. A review of the Japanese species of *Alcyonium*, with descriptions of two new species and an almost forgotten rare species (Octocorallia, Alcyonacea).— Publ. Seto Marine Biol. Lab. 23 (3/5): 191- 204, figs. 1-5, pls. 1-2.

Verrill, A.E., 1922. Alcyonaria and Actinaria.— Rept. Canadian Arctic Exped. 8 (G): 1-164, pls. 1-31.

Verrill, A.E., 1928. Hawaiian shallow water Anthozoa.— Bernice P. Bishop Mus. Bull. 49:1-30, pls. 1-5.

Verseveldt, J., 1964. Notes on Mediterranean *Alcyonium* species (Coelenterata: Octocorallia).— Zool. Med. Leiden 39: 153-167, figs 1-7, pls. 11- 12.

Verseveldt, J., 1965. Report on the Octocorallia (Stolonifera and Alcyonacea) of the Isreal south Red Sea Expedition 1962, with notes on other collections from the Red Sea.— Sea Fish Res. Sta. Haifa, Bull. 40: 28- 48,pls. 1-3.

Verseveldt, J., 1967. The Octocorallia collected by R/V "Vema" in the Atlantic Ocean.— Amer. Mus. Novitates 2282: 1-19, figs. 1-7.

Verseveldt, J., 1969. 1969. Octocorallia from north-western Madagascar (Part I).— Zool. Verh. Leiden 106: 1-38, pls. 1-7.

Verseveldt, J., 1971. Octocorallia from north-western Madagascar (Part II).— Zool. Verh. Leiden 117: 1-73, pls. 1-15.

Verseveldt, J., 1974. Octocorallia from New Caledonia.— Zool. Med. Leiden 4 (12): 95-122, pls. 1-5.

Verseveldt, J., 1977. Australian Octocorallia (Coelenterata).— Aust. J. Mar. Freshwater Res. 28: 171-240, figs. 1-49.

Verseveldt, J., 1982. New species of Alcyonacea (Octocorallia) from the Great Barrier Reef, South-East Asia, and the Red Sea.— Zool. Med. Leiden 56(12): 143-151, figs. 1-4, pls. 1-2.

Weinberg, S., 1975. Contribution à la connaissance de *Parerythropodium coralloides* (Pallas, 1766) (Octocorallia: Alcyonacea).— Beaufortia 23 (298): 53-73, pls. 1-9.

Williams, G.C, 1986a. Morphology, systematics, and variability of the southern African soft coral *Alcyonium variabile* (J. Stuart Thomson, 1921) (Octocorallia, Alcyoniidae).— Ann. S. Afr. Mus. 96 (6): 240-270, figs. 1-15.

Williams G.C., 1986b. A new species of the octocorallian genus *Alcyonium* (Anthozoa: Alcyonacea) from southern Africa, with a revised diagnosis of the genus.— J. nat. Hist. 20: 53-63, figs1-7.

Williams, G.C., 1988. Four new species of southern African octocorals (Cnidaria: Alcyonacea), with a further diagnostic revision of the genus *Alcyonium* Linnaeus, 1758.— Zool. J. Linn. Soc. 92: 1-26, figs. 1-19.

Williams, G.C., 1992. The Alcyonacea of Southern Africa. Stoloniferous octocorals and soft corals (Coelenterata, Anthozoa).— Ann. S. Afr. Mus. 100 (3): 248-358, figs. 1-45, tab. 1.

Williams, G.C., 2000. Two new genera of South African soft corals (Anthozoa: Alcyoniidae), with a discussion of diversity and endemism in the southern African octocorallian fauna.— Proc. Calif. Acad. Sci. In press.

Wright E.P. & T. Studer, 1889. Report on the Alcyonaria collected by H.M.S. Challenger during the years 1873-1876.— Rept. Sci. Res. Challenger, Zool. 31: i-lxxvii + 1-314, 43 pls.

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