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Taxonomy, Systematics and Biogeography of South African Actinaria and Corallimorpharia

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This thesis is submitted in fulfilment of the degree of Doctor of Philosophy in the
Department of Zoology, Faculty of Science, University of Cape Town.

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Supervisor: Prof. Charles L. Griffiths



Dedicated to the late Valerie Horne Cleland

~ the most loving grandmother and the strongest woman I know ~

University of Cape Town

“Taxonomy (the science of classification) is often undervalued as a glorified form of filing—with each species in its folder, like a stamp in its prescribed place in an album; but taxonomy is a fundamental and dynamic science, dedicated to exploring the causes of relationships and similarities among organisms. Classifications are theories about the basis of natural order, not dull catalogues compiled only to avoid chaos. ”

- Stephen Jay Gould (Wonderful Life 1989)

Plagiarism declaration

This dissertation has been compiled by Megan Clair Laird and the work presented here is a direct result of original research carried out at the Marine Biology Research Centre, Zoology Department, University of Cape Town. This work has not been submitted for a degree at any other university and any assistance I received is fully acknowledged.

The description of *Edwardsia isimangaliso* in Chapter 2 appears in Daly *et al.* (2012) and all sections that I have included in my dissertation were researched and compiled by myself and edited by Ass. Prof. MaryMegan Daly. As a collaborator in this paper, I was instrumental in describing the new species of sea anemone. All figures presented were compiled by me.

In Chapter 3, I have used the species diagnoses of previous authors, rewriting them and adding in information where possible. It is important to note that changing wording of taxonomic texts can be problematic, as meaning is often altered. In every case I have referenced the author and acknowledged their work.

All contributing photographers are acknowledged in Table 5.3 in Appendix E.

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Abstract

The taxonomy of South African Actiniaria was last reviewed by Carlgren in 1938. In this study, the systematics of the group is thus reviewed in its entirety for the first time in 74 years. Historical distributional data were gathered from the Iziko South African Museum (SAM) records, as well as from the uncatalogued wet collection, and from previously published literature. Photographic records submitted by SCUBA divers, and specimens collected during the course of this study provided more recent data. Updated information on the systematics and distribution patterns of all South African sea anemones is presented in the form of an easily accessible field key and guide with colour photographs of each species, enabling easy identification. Since the original works of Carlgren (1938), which listed a total of 40 species, 23 new records have been added to the South African fauna, 12 of which are added by this study. In addition, range extensions for 40 of the species were reported, and three new species were added to the order Actiniaria, two of which are described in this study.

These new discoveries raise the total number of recognised South African Actiniaria and Corallimorpharia to 63, of which 46% are endemic, 29% non-endemic, 22% cosmopolitan, and 3% introduced. Thirty-three percent of species in the inshore zone and 67 % of species in the upper bathyal zone are endemic, suggesting that relative rates of endemism increase with depth. Although the high endemism rates may to some extent be artificially elevated due to insufficient sampling of adjacent countries surrounding South Africa, the country remains a hot spot for endemism.

In terms of depth, the inshore zone between 5 – 30 m supports the highest species richness, with a total of 24 species. This is probably attributable to the increasing number of SCUBA divers collecting photographic data at this depth. Coastal anemone assemblages roughly correspond to the ecoregions within the Exclusive Economic Zone (EEZ), while only a few offshore anemone assemblages correspond to the ecoregions. However, as very few records are present in some of the quarter-degree grid cells, more samples are needed to make a conclusive argument.

In contrast to what has been found for a number of other marine invertebrate groups, including bivalves, gastropods, brachyurans and echinoderms, species richness did not increase around the coast from west to east for either coastal or offshore species. Instead, the distribution of Actiniaria around the coast followed similar trends to those shown by amphipods, isopods and polychaetes, with erratic species richness experienced from west to east and overall average species richness highest in the Southwestern Cape ecoregion. This pattern may either be related to poor sampling effort in some regions, or it may be attributable to the fact that the shelf zone is narrower in the Natal and Delagoa offshore regions than on the Agulhas Bank, which may limit the number of anemone species found on the East Coast. Despite the addition of new and previously unidentified records, the majority of South African Actiniaria are currently known from fewer than five records, with 28 % known from fewer than three records. Although sampling effort was increased at remote sites during the course of this study, a concentration of species records around Cape Town, False Bay and Durban was still apparent. Attention now needs to be directed towards the coastlines adjacent to South African borders with Namibia and Mozambique.

Chapter 1 – Introduction

Actiniaria, commonly referred to as sea anemones, are a small, yet moderately diverse order in South Africa. Although many South African marine invertebrate taxa are reasonably well documented (Gibbons *et al.* 1999), due to the difficulty of identifying sea anemones, this order has remained inadequately studied. There is a pressing need for specialised diversity studies, as many taxa become extinct even before discovery (Gordon 2001). According to Costello *et al.* (2011), by 2006 over 230 000 marine species had been discovered worldwide. This number rose to 230 000 by 2011, which equates to over 5000 marine species discovered per year. By extrapolation, Costello *et al.* (2011) calculated that 24 – 31% of marine species are still to be discovered, which approximates to a true global total of some 300 000 marine species. Discovering and describing species are the first steps to exploring biology. Having accurate knowledge of the species assemblage of the ecosystem in which a study is based, is essential for biodiversity assessments, on which many management protocols are based. According to Gordon (2000), Cnidaria are the sixth most diverse marine phylum in the world. Globally, over 1340 anemone species have been described (Fautin 2000); and on a local scale, South African Actiniaria represent approximately 4.7% of the global total.

Anemones are closely related to Scleractinia (corals), although sea anemones do not secrete a calcareous exoskeleton (Dunn 1981b). These soft-bodied cnidarians are found from intertidal rocky and sandy shores (Daly *et al.* 2012, Schama *et al.* 2012) down to extreme deep-sea environments of over 10 000 m (López-González *et al.* 2003) and live at all latitudes, from the tropics to the poles. Anemones are preyed upon by predatory fish, sea stars, nudibranchs and other invertebrate animals (von Salvini-Plawen 1972, Ates 1989); but defend themselves from possible predators by the use of cnidocysts, a suite of defensive structures which include nematocysts, spirocysts and ptychocysts. These structures are not only used for attachment and defence, but are also important characters used for the taxonomic identification of anemones.

The first noteworthy study of sea anemones, which were initially named ‘Sea Flowers’, was compiled by Gosse (1860). These early descriptions were extremely crude and many of them were not published in English, making them relatively inaccessible. The first mention of Actiniaria from South Africa was by Lesson (1830), who described three species from the Cape of Good Hope, *Bunodosoma capensis* being the only one of these which is still valid. Additional samples were collected from the same location by Quoy & Gaimard (1833). Milne Edwards (1857a) added a fifth species, *Cystiactis reynaudi* - recently renamed *Bunodactis reynaudi*, which is common on West Coast rocky intertidal shores. A few years later Verrill (1865, 1866, 1869b) described three more species, which are now known as *Haloclava capensis*, *Anthothoe stimpsonii* and *Corynactis annulata*.

Minimal work was done on South African Actiniaria for the next decade, after which Studer (1879) described *Bolocera kerguelensis* from the Cape Peninsula. Descriptions were also published by Hertwig (1882a, 1888) and by Pax (1908, 1909, 1914, 1920, 1922, 1924, 1926), although most of these descriptions have proven to be somewhat unreliable. The most significant work published on South African sea anemones to date is the monograph of South African Actiniaria and Zoantharia compiled by Carlgren (1938). This work remains the leading reference to South African sea anemone taxonomy, as is Carlgren’s survey of world Ptychodactiaria, Corallimorpharia and Actiniaria (Carlgren 1949), which addresses Actinia worldwide. Unfortunately, the majority of Carlgren’s work was not published in English, thus it is not easily accessible. Also significant is Stephenson’s work between the years 1920 and 1928, in which he attempted to classify and document the British sea anemone fauna (Stephenson 1928). This work was updated in his second volume (Stephenson 1935), which contains useful, comprehensive descriptions. Although Stephenson subsequently moved to South Africa and became Professor of Zoology at the University of Cape Town from 1931 – 1941, his interests over that period moved to rocky shores, and he did not publish on South African sea anemones, instead sending many of his notes to Carlgren. Fautin (2011) produced an online summary of Hexacorallians from a global perspective, which is extremely useful; however, no descriptions were included in this reference work. *Preactis millardae* (England & Robson 1984), *Korsaranthus natalensis* (Riemann-Zürneck & Griffiths 1999), *Sagartia ornata* (Acuña *et al.* 2004) and *Metridium senile* (Griffiths *et al.* 1996) are the most recent additions to the South African sea anemone fauna. The

biogeography of the two orders was briefly reviewed by Acuña & Griffiths (2004), but data were only obtained from previously published papers, and a complete review of museum records was not executed. Branch *et al.* (2010) is the latest addition to the literature in the form of a field guide for divers, naturalists and zoologists; and describes and illustrates a number of sea anemones found around the South African coastline from the intertidal to the limit of recreational SCUBA diving depths. No recent publication includes deep-sea species.

It is important to note that the Corallimorphidae, the ‘coral anemones’, were initially described as a family within the order Actiniaria, but are now recognised as a distinct order within the Hexacorallia (Carlgren 1949). Corallimorpharia, as they are now known, are similar to ‘true’ anemones in that they lack skeletons; but their anatomy and cnidom closely resemble those typical of Scleractinia, or ‘stony’ corals (Fautin *et al.* 2002). Also included in this study is the suborder Ptychodacteae, which was previously referred to as the order Ptychodactiaria (Carlgren 1949). For ease of reference, Actiniaria, Corallimorpharia and Ptychodacteae are all referred to as ‘sea anemones’ in this study.

A major discovery since the origin of alpha taxonomy, is that of genetics. Molecular techniques have been increasingly employed to study the systematics of Actiniaria (Beagley *et al.* 1998, Huyser 1996, Schama *et al.* 2005, Daly *et al.* 2007, Daly *et al.* 2010). Daly *et al.* (2008) produced the most complete phylogeny of Actiniaria to date; as a result, species that are currently grouped together may eventually be rearranged, based on molecular findings. This recent molecular work lead to the recommendation by Daly *et al.* (2008) that the Actinian phylogenetic tree be revised. In addition, the study confirmed findings that molecular evolution is exceptionally slow in Actiniaria, and that some morphological features on which early classifications were based are monophyletic; although the validity of many taxonomic characters still needs to be revised. Much valuable work is being done through ‘The Cnidarian Tree of Life Project’ (NSF 2009), whereby a large proportion of the anemone fauna worldwide is being genetically sequenced to assist reclassification of the order. As much of this work is extremely specialised and is being addressed by evolutionary systematists, this study does not focus on the molecular systematics of Actiniaria.

Importance of sea anemones

Despite anemones being a relatively low diversity group when compared, for example, with the crustacean order Amphipoda (>7000 species) or the polychaete order Phyllodocida (>10 000 species), they are highly successful in an ecological sense (Carlgren 1949). Notable is the large size and abundance of deep-sea anemones, as well as the abundance of sea anemones on rocky intertidal shores, including South African shores. Actiniaria, mainly from the family Actinostolidae, form an important component of deep-sea hydrothermal vent fauna (Desbruyères & Segonzac 1997, Fautin & Barber 1999). Anemones from the genus *Liponema* are known to cover large expanses of sandy bottom in deep-sea ecosystems (Fautin 1988a), multiplying by shedding regenerative tentacles as they roll along the sea floor; while extensive intertidal carpets of *Bunodactis reynaudi* are common on the West Coast of South Africa (Stephenson & Stephenson 1972). Other common intertidal species in South Africa include *Pseudactinia flagellifera*, *Anthothoe stimpsonii* and *Anthopleura michaelseni*. Squires (1964) observed that Actiniaria are important components in many coral reef ecosystems, aiding in the energy balance of their environment, and Fishelson (1970) demonstrated that anemones can alter certain ecosystems; based on experiments, he showed that coral recruits in the Red Sea were excluded from areas dominated by sea anemones.

The proliferation of Actiniaria is facilitated by their ability to reproduce both asexually and sexually (broadcast spawning), with brooding forms generally being uncommon (Fautin 2002). Both methods of reproduction may occur in individuals of the same species, depending on environmental conditions (Stephenson 1928). Asexual reproduction can occur by means of budding from the column, longitudinal fission, transverse fission, fragmentation, basal laceration or parthenogenesis (Fautin 1999, 2002). Asexual reproduction allows clones of a species to cover large areas of an ecosystem (Hughes 1987), as with the proliferation of individuals of *Metridium senile* attached to the PetroSA pipeline on the South Coast of South Africa. Since the life-span of individual sea anemones of many species may span a century or more (Dunn 1981a), actinians comprise an important part of the marine ecosystem.

Ecotourism, which creates many jobs for South Africans and contributes a large percentage towards the GDP of the country, is enhanced by SCUBA divers which travel from all parts of the world to view the pelagic and reef species found in South African waters. Sea anemones, especially the large tropical species that harbour anemone fish along with other interesting symbionts, are attractive invertebrates that divers enjoy viewing underwater. As diving operations constitute a large source of income for local businesses in many areas of South Africa, it is in the interests of the locals to protect the invertebrates which form an important part of the reef ecosystem. In addition, the percentage endemism of the marine invertebrate fauna of South Africa averages at 31% (Acuña and Griffiths 2004) with 46% of South African sea anemones listed as endemic. It is thus recognised that sea anemones form an important part of the biodiversity in the region and further research is needed to determine the biogeography and taxonomy of these species.

There have been numerous recent studies that have documented the benefits of sea anemones to humans (Samejima *et al.* 2000, Wang *et al.* 2000, Tu *et al.* 2003, Honma & Shiomi 2006, Moran *et al.* 2006, Monroy-Estrada *et al.* 2007, Zaharenko *et al.* 2008, Morales *et al.* 2009). These studies have found actinarian tissues to be important in the study of proteins and the behaviour of membranes. Actinoporins, a type of protein extracted from anemones, are used to study pore formation (Alegre-Cebollada *et al.* 2007), while other proteins are used in the understanding of spectral properties (Chan *et al.* 2006). Another group of proteins extracted from anemones is being used in numerous aspects of cancer research, and extracts from a few species of Actiniaria have been found to have a negative effect on tumours in mice (Dunn *et al.* 1975). In addition, the toxins produced by sea anemones are of traditional use to Hawaiian tribes, which use them as poison on their weapons and as a heart stimulant (de Barry *et al.* 1977, Dunn 1981a). Pharmaceutical studies are currently being undertaken to see if it is viable to purify these toxins for human use (Lanio *et al.* 2001). Viability tests are also being run to determine whether these substances can be synthesised in a laboratory environment (Macek & Lebez 1988).

More than fifty species of fish are facultative symbionts of the following sea anemone families: Actiniidae, Stichodactylidae and Thalassianthidae (Randall & Fautin 2002, Patzner 2004); while shrimps, amphipods, porcelain crabs and other invertebrates may also take refuge amongst the

protective tentacles of anemones (Bruce 1976, Fautin *et al.* 1995). Benefits of the fish symbiosis to the anemone include the removal of mucus and necrotic tissue from the host (Arvedlund *et al.* 2006), the use of the ammonium-rich fish excrement as food for the host, and decreased predation of the host by predatory fish (Fautin & Allen 1997). In turn, the fish not only receive protection from predators, but also feed on scraps left over from anemone meals (Fautin & Allen 1992).

A similar symbiosis between both hermit crabs living in gastropod shells (Hazlett 1981, Mercier & Hamel 2008, Gusmão 2010) and live gastropods (Fautin & Goodwill 2009) with sea anemones attached to their shells has been documented. Amphipods (Vader 1970 & 1984, Vader & Krapp-Schickel 1996), copepods (Humes 1982, 1985) and other symbionts have been recorded on the column, amongst the tentacles and in the gut of certain anemone species; and a few species of sea anemones have been found to secrete chitin, creating a larger shell for hermit crabs and preventing frequent shell abandonment due to size restraints (Fautin 1987). Interestingly, many tropical anemones form a complex relationship with zooxanthellae. This symbiosis, most frequent within the order Scleractinia, also occurs in some sea anemones found on the East Coast of South Africa, which has a sub-tropical climate. The anemone houses the dinoflagellates in the tentacles, oral disc and occasionally in the upper column, and provides the organisms with light and protection, while the anemone benefits from the sugars produced by photosynthesis (Dunn 1981a).

Sea anemones not only act as hosts for a variety of marine fauna, but also form an important link in the marine food web as opportunistic predators. Kruger & Griffiths (1998) calculated that a False Bay intertidal population of mixed anemone species consumed hundreds of thousands of isopods, and tens of thousands of amphipods, cirripedes, pelecypods (clams, scallops, and oysters) and gastropods per meter of shoreline per year. It was suggested that predation of anemones on motile predators, such as isopods, may be important in structuring these communities; while the consumption of sedentary species, such as bivalves, were opportunistic, and only occurred when these species drifted into reach (Kruger & Griffiths 1998). Subtidal anemones of the genus *Preactis* have been observed feeding on gorgonians and alcyonarians of the species *Capnella thyrsoidea*, while *Pseudactinia* have been observed feeding on small fish,

crabs, bryozoans, and even jellyfish (pers. obs.). Despite sea anemones being major secondary consumers in rocky shore ecosystems, they are also preyed upon by a number of species. Nudibranchs extract nematocysts from the tissues of sea anemones and use them for their own defence, while crabs (Virnstein 1979), fish (Pihl *et al.* 1992), pycnogonids, sea stars, and other invertebrate animals also prey on anemones (von Salvini-Plawen 1972, Ates 1989).

Definition of morphological characters

To aid readers of all backgrounds and fields of interest in understanding the terminology used in scientific descriptions of Actiniaria, typical morphological characteristics are defined below. Many of these features are illustrated in Figures 1.1-1.3. Definitions were supplemented by information from the Illustrated Glossary of Sea Anemone Anatomy (McCloskey 2012).

An anemone is essentially a polyp consisting of a coelenteron, which is surrounded by the column wall (Figure 1.1). The coelenteron is the internal body cavity, where nutrient absorption and body extension is controlled. The basic structure of actinian tissues consists of an ectoderm, or outer cell layer; and an endoderm, the inner cell layer; with mesoglea, consisting of connective tissue, found between the two.

Moving down the column from the distal end to the proximal end of the anemone, the often brightly-coloured oral disc is surrounded by the tentacles, the actinopharynx joins the mouth to the coelenteron, and the pedal, or basal, disc is used for attachment (Figure 1.1). The mouth may be surrounded by lips and is commonly raised up on a hypostome (Figure 1.2). Running down from the mouth, the actinopharynx is typically covered with rugae or longitudinal furrows (Figure 1.5), which allow the structure to stretch when large prey items are ingested. Siphonoglyphs are deep grooves usually positioned opposite each other on the distal end of the actinopharynx and assist with feeding (Figure 1.5). They may be extended to form a lobed conchula as in *Peachia*. The marginal sphincter (frequently referred to as a sphincter) is the muscle which enables the anemone to contract the upper column (Figure 1.1). It is usually found in close proximity to the margin of the anemone and may either be embedded in the mesoglea (called a mesogleal sphincter), or in the endoderm (called an endodermal sphincter). The muscle may be further described as being either diffuse or spread out along the length of the upper

column (Figure 1.4 B&D), restricted if it is concentrated to a smaller area (Figure 1.4A), or circumscribed if it is extremely concentrated (Figure 1.4C). A sphincter muscle may also be found at the base of tentacles, as in *Bolocera*, enabling the anemone to shed tentacles as a defence mechanism. The margin is the line formed where the edges of the column wall and oral disc meet; whereas the limbus is the distinct border along which the column joins the pedal disk (Figure 1.1).

Burrowing anemones have a rounded, swollen base called a physa (Figure 1.3). They may also have a specialised column consisting of a scapus below and a scapulus above (Figure 1.3). The scapus is occasionally covered by a cuticle called a periderm, which is secreted by the anemone. It also may have projections, such as tenaculi or tubercles: tenaculi are hard, sticky papillae and tubercles are merely small, rounded swellings. The scapulus is typically smooth and leathery, with a thick column wall. In the absence of a scapulus, there may be a capitulum, which is typically thin-walled; however, some species may have all three regions: a scapus, a scapulus and a capitulum. Some Actiniaria have a parapet, which is a raised collar that drops down into a groove, or fosse, at the oral disc (Figure 1.2).

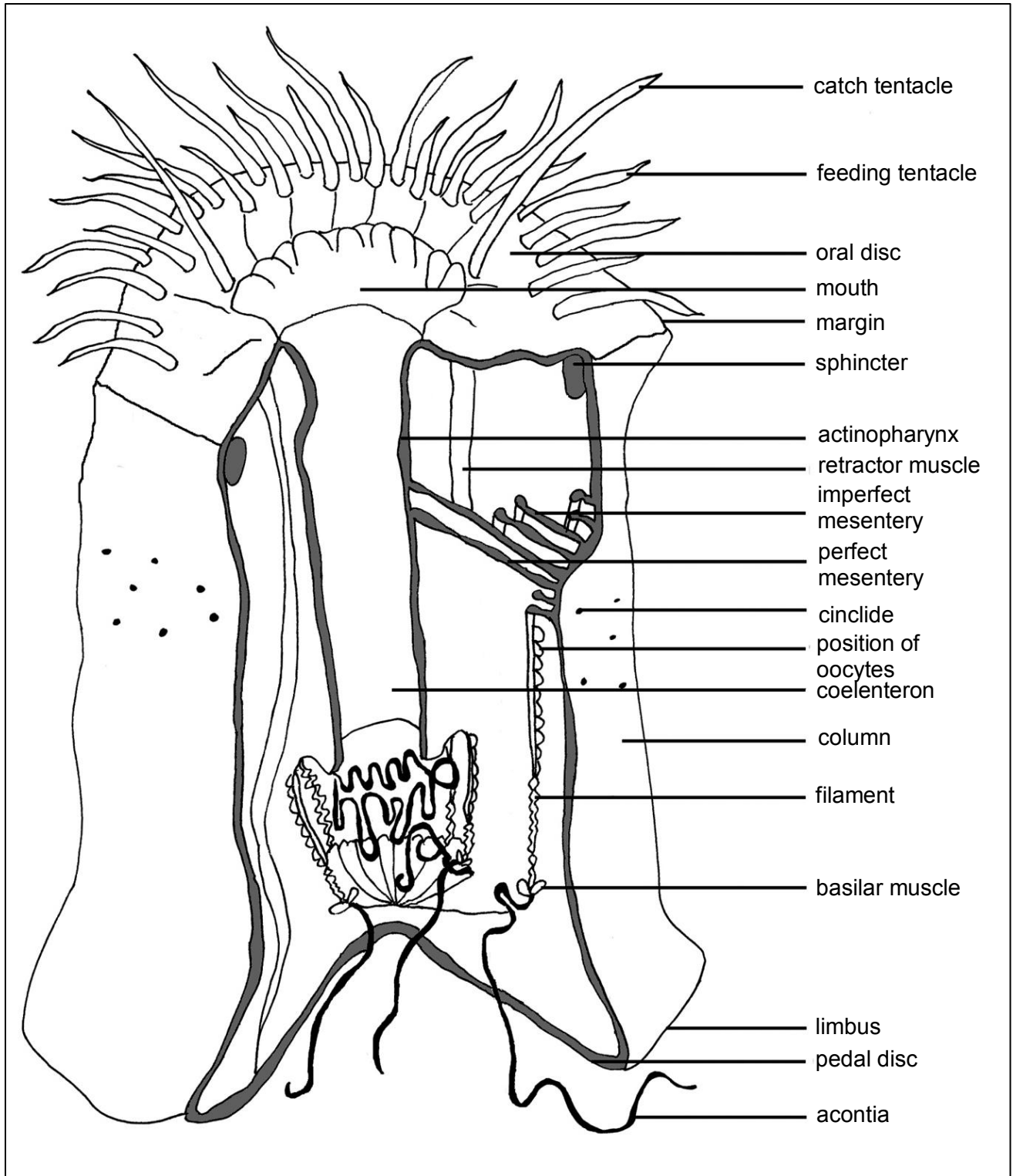


Figure 1.1: A stylised diagram of a typical sea anemone depicting both external and internal morphology with grey shading indicating cut surfaces. Acontia are shaded black.

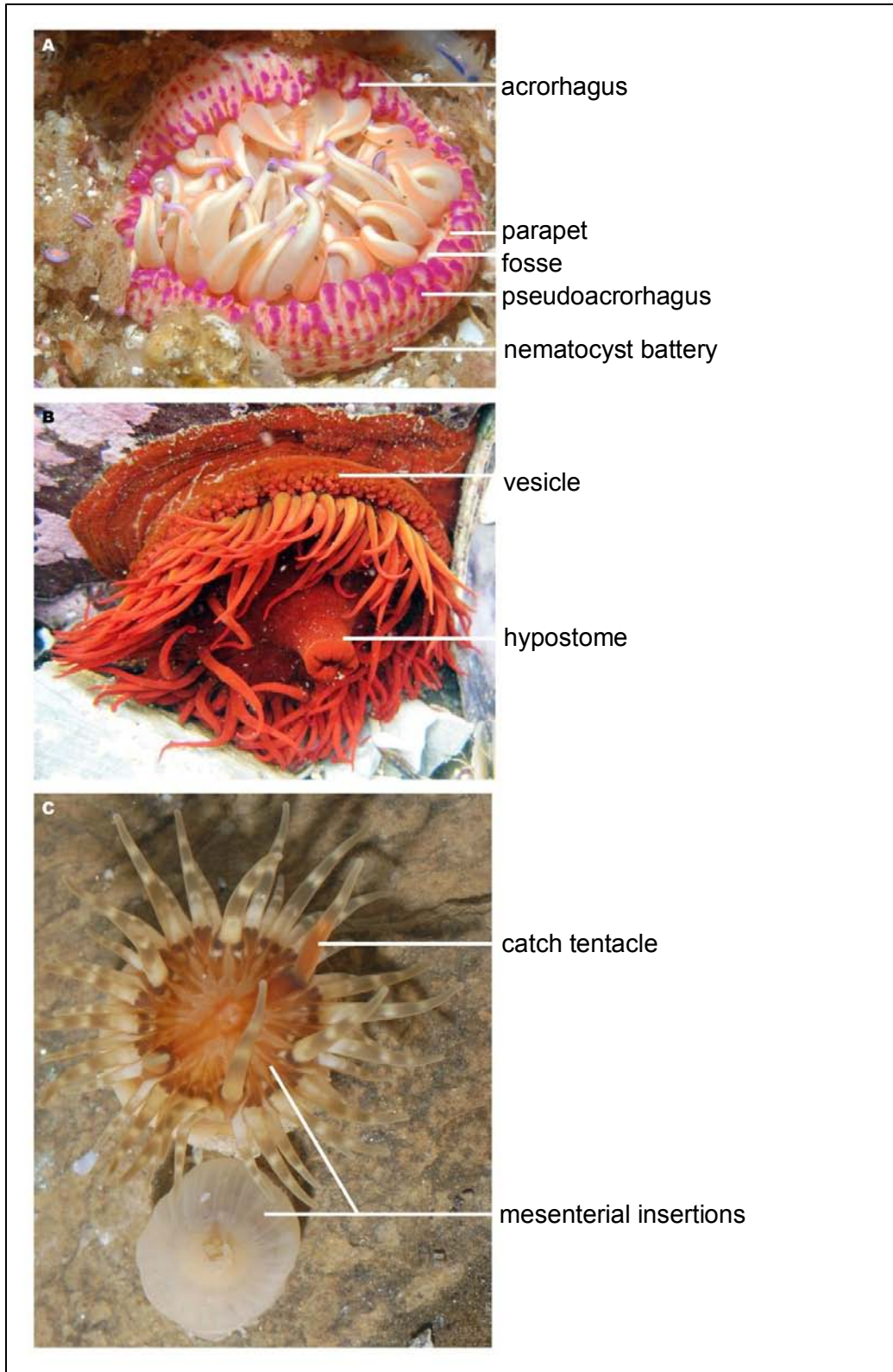


Figure 1.2: Photographs of A) *Anthostella stephensoni*, B) *Pseudactinia flagellifera* and C) *Isanthus capensis* with annotations showing structures commonly used in anemone classification.

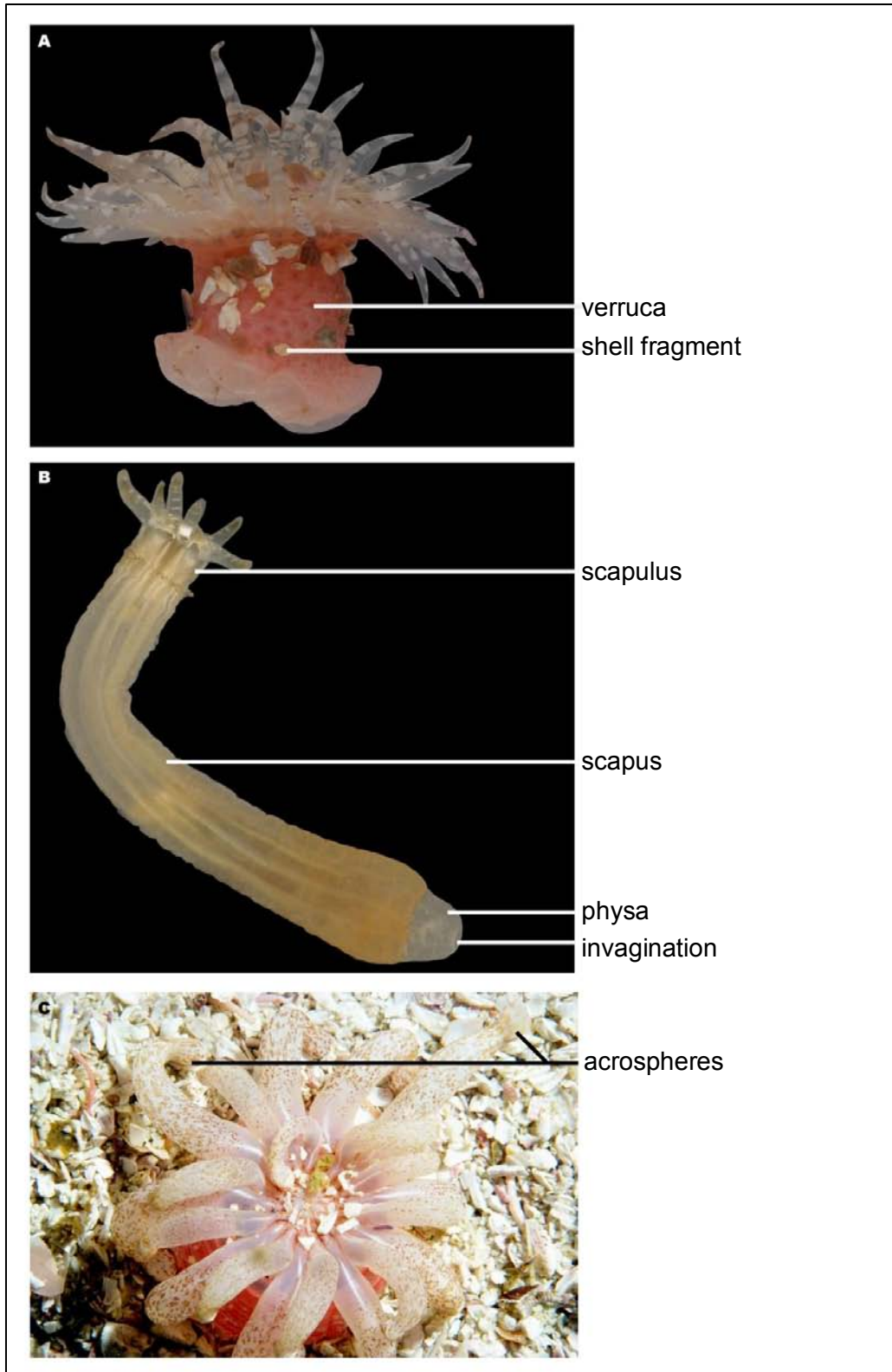


Figure 1.3: Photographs of A) *Anthopleura annea*, B) *Edwardsia isimangaliso* and C) *Haloclava capensis* with annotations showing structures commonly used in anemone classification.

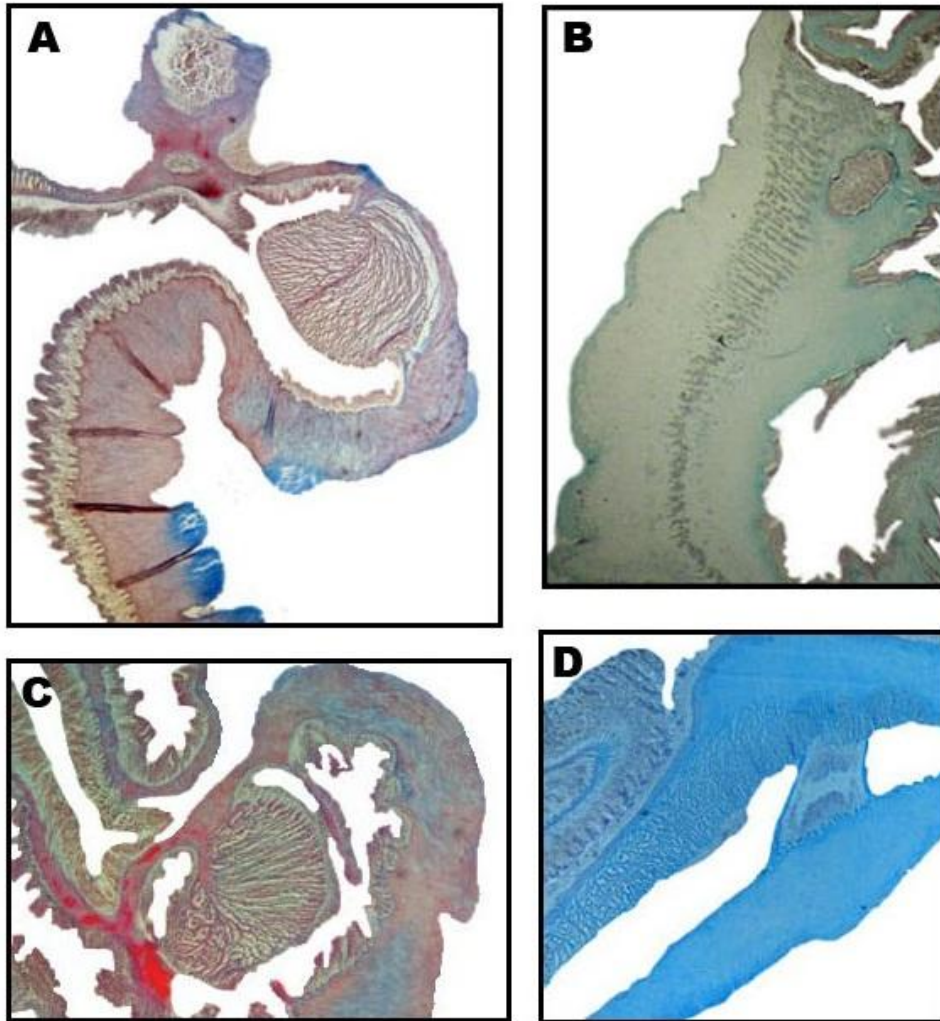


Figure 1.4: Images of a variety of marginal sphincters showing a A) restricted mesogleal sphincter, B) diffuse mesogleal sphincter, C) circumscribed mesogleal sphincter and D) diffuse endodermal sphincter.

The coelenteron is split up into many partitions by means of numerous septa, which are called mesenteries (Figure 1.5). These are formed from sheets of endoderm and mesoglea which grow out of the column wall. These mesenteries are usually referred to in pairs, as two mesenteries of equal length are usually found next to one another. They can either reach all the way from the column to the actinopharynx, in which case they are termed perfect mesenteries, or only reach partway, and are then termed imperfect mesenteries (Figure 1.5). One role of mesenteries is to increase the surface area for nutrient absorption; another is to allow for site specific changes in internal pressures allowing for body pressure to be locally controlled. The endocoel is the space enclosed by the mesenterial pairs, while the exocoel is the space enclosed by mesenteries belonging to different pairs.

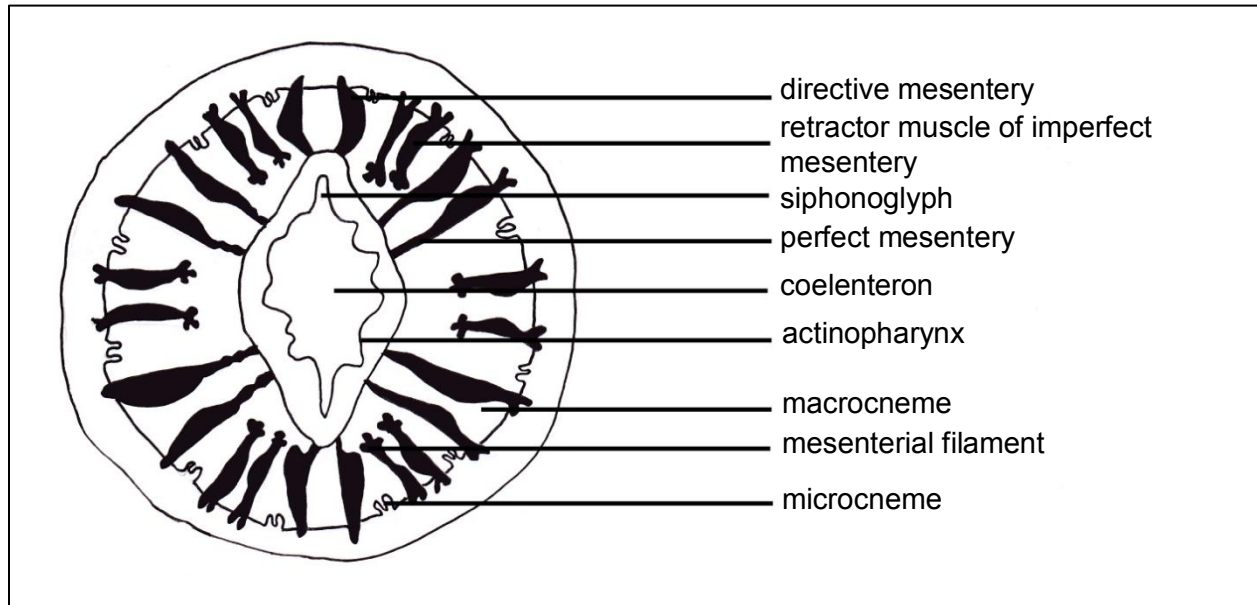


Figure 1.5: Diagram of a cross section of the column of an anemone showing internal morphology. Redrawn from Hyman (1940).

Mesenteries are arranged in cycles according to the age and size of the anemone. Mesenterial insertions are the lines where the mesenteries join the oral or pedal disc and may also be visible on the column (Figure 1.2). Marginal stomata are apertures which may be present in mesenterial walls and enable water to travel between mesenteries. Oral stomata have a similar function but are situated between the oral disc and the macro- and microcnemes. Macrocnemes are well-developed, usually perfect mesenteries, typically bearing a strong retractor, gonads and filament; whereas microcnemes are small, imperfect mesenteries, usually lacking these structures (Figure 1.5). Directive mesenteries are pairs of perfect mesenteries usually attached to the siphonoglyphs and are identified by retractor muscles, which point away from the endocoel (Figure 1.5).

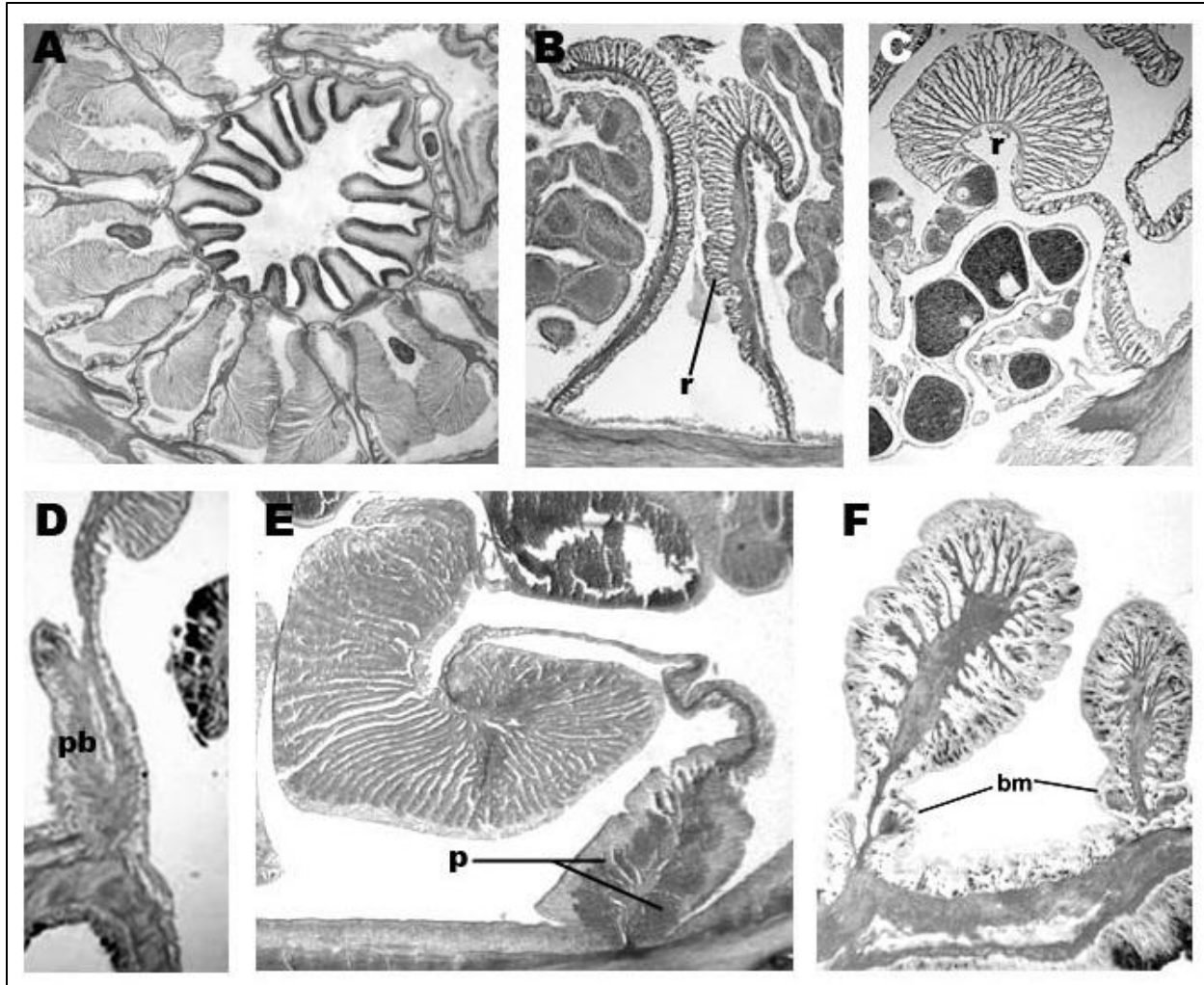


Figure 1.6: Mesenterial muscles in relation to the body wall, which is depicted at the bottom of each image. A) Cross section of a sea anemone showing the position of the retractor muscles. Retractor muscles can be B) restricted or C) circumscribed. The D) parietobasilar muscle and the E) parietal muscles may be found below the retractor muscles. Parietal muscles always occur in pairs. Basilar muscles F) are not found in all anemone species. If they are present, they are situated where the mesentery joins the inner wall of the column.

The mesenterial muscles are responsible for the contraction of the anemone as well as the control of tentacular function, and are usually reticular or net-like. Basilar muscles (Figure 1.6F) may be found on either side of each mesentery at the pedal disc (Stephenson 1928), but are only present in the *Thenaria* (which includes the *Mesomyaria* and the *Endomyaria*). Parietobasilar muscles never occur in pairs and are on opposite sides of the mesentery to the retractor muscle. They run diagonally from the column to the pedal disc (Carlgren 1949) and assist the anemone with attachment (Figure 1.6D). Parietal muscles (Figure 1.6E) are modified parietobasilar muscles

that extend along the column wall on either side of each mesenterial insertion and only exist in the absence of basilar muscles (Stephenson 1928). Retractor muscles bulge out from each mesentery into the endocoels (Figure 1.6 B&C), are usually equal in size and aid in the contraction of the column.

Mesenterial filaments are usually attached along the inner edge of most mesenteries and may bear gonads (Figure 1.1 & 1.5). Gonochoric anemones, which are either female or male, have either oocytes or spermatocysts respectively, while hermaphroditic anemones may have both types of gonads which mature at separate times. Many species of Actinia use asexual reproduction as a means of survival, forming colonies dominated by clones descended from one individual. Common forms of asexual propagation include budding, where the new individual is attached to the parent until mature; longitudinal fission, where the anemone splits in half from oral disc to base, and pedal laceration, whereby a section of the base splits off to form a new individual. Another method of reproduction is brooding, which is the retention of fertilized eggs that mature into juveniles in the coelenteron. Glandular filaments called trophonema develop within the coelenteron and secrete a substance on which the young feed during development. For a more complete discussion of sea anemone anatomy, see Shick (1991).

Characteristic of all cnidarians are cnidae, which are hollow shafts or tubules with pointed tips enclosed within a transparent capsule. When disturbed by a stimulus, most commonly tactile, the tightly-coiled thread which is attached to the tubule acts like a spring, everting the capsule and shooting the pointed tubule into the tissue of the predator or prey (Anderson & Boucharad 2009). This is an effective means of defence, prey capture, or even a method of attachment. Nematocysts used in violent encounters are usually laced with venom, which causes paralysis of the prey (Fautin 2009). There are two types of cnidae found in anemones: nematocysts, which are stinging capsules, and spirocysts (Figure 1.2F), which are usually used for attachment.

The cnidom belonging to each species is the collection of cnidae found in tissues from an assortment of anatomical areas of the anemone. Typical actinian cnidae mentioned in this study include basitrichs, holotrichs, atrichs, microbasic *p*-mastigophores, microbasic amastigophores and spirocysts. Microbasic nematocysts have a shorter tubule than macrobasic nematocysts,

which have a tubule that is folded to fit into the capsule. Basitrichs have a very weak distinction between the tubule and the thread (Figure 1.7A), whereas with *p*-mastigophores this demarcation is strongly marked (Shick 1991). Basitrichs have a tubule which is barbed at the base and a thread with spines which coils evenly around the tubule (Figure 1.7A), whereas *p*-mastigophores have a thick, barbed tubule which is usually spined and has a v-shaped tip (Figure 1.7D). Amastigophores have a v-shaped tubule tip and a long, folded, barbed tubule, usually without a thread (Figure 1.7E). Atrichous isorhiza (Figure 1.7C), more commonly known as atrichs, have a smooth thread without barbs and a poorly differentiated tubule (Carlgren 1949). In contrast, holotrichs or holotrichous isorhiza (Figure 1.7B) have a barbed thread, also without a differentiated tubule (Daly *et al.* 2003).

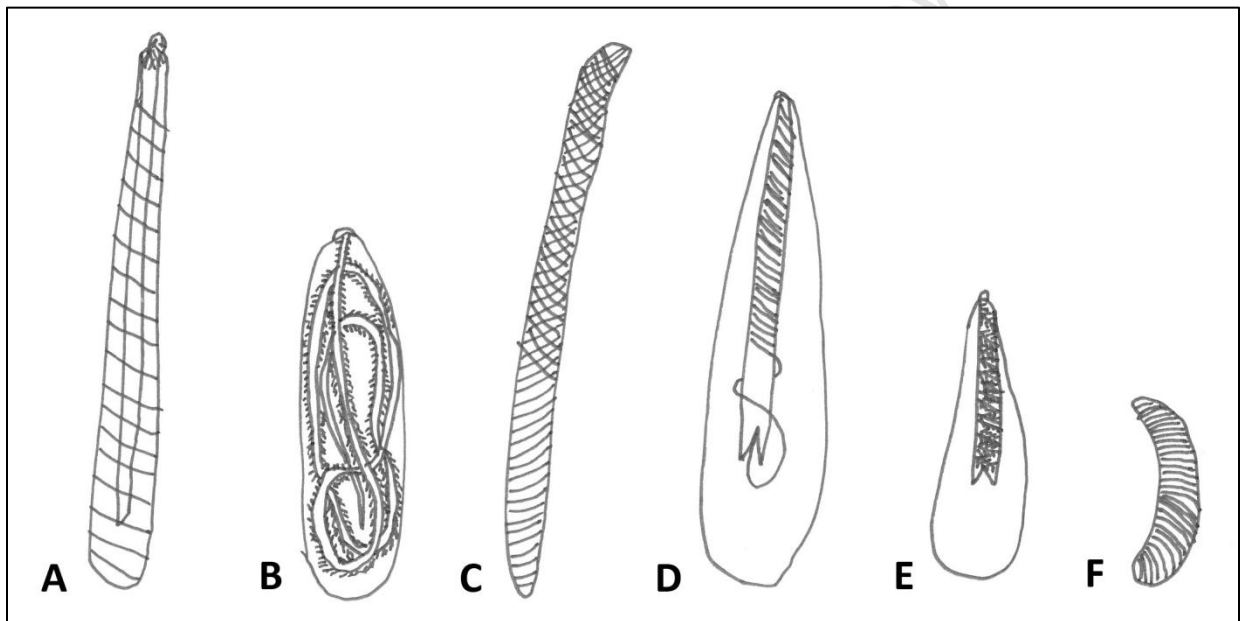


Figure 1.7: A stylised diagrams showing examples of A) a basitrich, B) a holotrich, C) an atrich, D) a microbasic *p*-mastigophore, E) a microbasic amastigophore and F) a spyrocyst.

Acontia are specialised threads that are packed with a high concentration of nematocysts (Figure 1.1). The bases of the threads are attached to the mesenterial walls below the filaments and the tips are free to be extruded either through the mouth, or through cinclides (Figure 1.1), which are special pores in the body-wall. Acontia have two uses: defence and prey capture. Cnidae in the pedal disc are used for attachment, those in the acrorhagi (Figure 1.2) are used for defence, and those in the tentacles are commonly used for prey capture. Tentacle tips may be swollen into

acrospheres, which are packed with nematocysts as in *Haloclava capensis* (Figure 1.3). Specialised structures on the column include nematoblasts, which are unique cells containing high concentrations of nematocysts, and nemathybomes, which are formed by invaginations of the column wall which contain batteries of nematocysts.

An acrorhagus (or marginal spherule) is a simple or branched, bulbous projection of the body wall situated near the margin (Figure 1.2) and containing a very high concentration of nematocysts, including holotrichs (Daly 2003). These structures are also used during intraspecific battles for territory. Pseudoacrorhagi (or pseudospherules) are similar in form to acrorhagi (Figure 1.2), but do not contain holotrichs (Stephenson 1928, Daly 2003). Verrucae are hollow pockets extending from the column wall (Figure 1.3). These structures may be simple or compound and are adhesive, but lack nematocysts in the centre of the structure. In contrast, vesicles are non-adhesive and have nematocysts scattered around the entire structure (Figure 1.2). For more information on cnidae see Schmidt (1972).

Aim and objectives

Many publications suggest that anemones cannot be accurately identified to species level in the field (Daly 2004), however, this is untrue for most South African species. Indeed, Stephenson states that ‘in many cases, especially where one can see the animal alive, specific limits are perfectly sharp’ (Carlgren 1949). I have found that the majority of South African species can be identified without difficulty, as long as the column, the oral disc and the tentacles are visible.

The lack of a dedicated actinian researcher in South Africa has resulted in an underestimation of the number of species of South African Actiniaria, as was mentioned by Acuña & Griffiths (2004). This thesis aims to build upon the existing monograph of Carlgren (1938) by updating the synonymy, adding new species and species records, and reviewing the distributional ranges of species already known from South Africa. As the methods currently used to identify these animals are extremely specialised and use internal anatomical features rather than external appearance, it is exceptionally difficult for a generalist zoologist or a naturalist to accurately identify individual species. This thesis provides a fully illustrated guide, including colour

photographs and basic descriptions, which will enable even those without a background in taxonomy to identify these animals in the field, leading to a better understanding and appreciation of the diversity of marine life in South Africa.

Outline of chapters

Despite previous work, there remain many gaps in the taxonomic and biogeographic knowledge of South African Actiniaria. This is mainly due to a lack of skilled actinian taxonomists in the region, and the absence of thorough, systematic sampling around the entire coastline. In addition, there are no updated, comprehensive keys for most of the genera. This thesis rectifies this situation and comprises of the following chapters:

Chapter 1 provides a general background and literature review of South African sea anemones, and describes the basic anatomy of actinians. This terminology is used when referring to anemone morphology and histology in later chapters.

Chapter 2 contains descriptions of two new species of anemone from the order Actiniaria. This section comprehensively describes the external morphology, the internal histology and the cnidom of each of the new species. A third species, which is being described by Estefanía Rodríguez, an anemone taxonomist in New York, is also mentioned. Unfortunately this species was sent overseas for description before the conception of this thesis and the description has not yet been completed, thus it is referred to by its generic name here. Chapter 2 also outlines range extensions of species found in South Africa for the first time.

Chapter 3 comprises a guide of the South African Actiniaria and Corallimorpharia. It provides a comprehensive account of all species recorded in South Africa and includes the first documented illustrations for many of these species. With the addition of a key, designed to be used to identify live anemones in the field, this guide provides an important tool for the precise identification of anemone species. It includes a brief synonymy of each species with distribution ranges obtained from multiple sources. The classification of each species is based on their current phylogenetic relationships using alpha-taxonomy and follows the online classifications of Fautin (2011) and

Appeltans *et al.* (2012). New records and range extensions of South African sea anemones are documented within this chapter and a description of each species is provided to aid identification. In addition, each species is classified in terms of endemism as reported in the literature (Fautin 2011, Mead *et al.* 2011a).

Chapter 4 outlines the biogeographic patterns in species richness and endemism within South African Actiniaria and Corallimorpharia. This includes analyses of species distribution according to the recent ecoregions and ecozones laid out by Sink *et al.* (2012). In addition, these data are analysed according to depth. The rate of species discovery is also addressed. Deep-sea data obtained from trawls and dredges are included in the analyses for the first time.

Chapter 5 is a short synopsis, providing a brief summary of the findings documented in this study and is followed by a list of literature cited.

University of Cape Town

Chapter 2 – Species descriptions, new records and range extensions of South African sea anemones

General introduction

During the course of this study three species new to science were documented. The first, a very tiny species, was discovered by Helen and Guido Zsilavec while diving at 15 m in False Bay, near Cape Point. As this anemone was discovered before the inception of this study, specimens were sent to Dr. Estefanía Rodríguez, assistant curator of the American Museum of Natural History. She is in the process of describing this material as a new species in the genus *Halianthella*. Here it is referred to as *Halianthella* n. sp., but it is known to SCUBA divers at the ‘clown anemone’.

The second new species, known as the ‘dwarf spotted anemone’, was first collected by Prof. Charles Griffiths from Oudekraal near Cape Town. This species is more common than the ‘clown anemone’, and is described here for the first time. Here it is referred to as *Anthostella* n. sp. as the formal publication of the description is still pending.

Edwardsia isimangaliso was initially mistaken as a sipunculid worm, due to its small size and vermiform shape; however, Dr. Deena Pillay later suspected the animal to be an anemone. He sent it to Ass. Prof. MaryMegan Daly, with whom I collaborated to describe the species. It was found in the St. Lucia Estuary, on the East Coast of South Africa. Only the taxonomic portion of a joint paper, of which I am a co-author, is included in this thesis, while the associated ecological section is omitted.

Description of *Edwardsia isimangaliso* n. sp. from the St. Lucia Estuary

Introduction

The St. Lucia Estuary is the largest estuarine lake in Africa, and is the site of ongoing studies, due to the unique nature of its connection to tributaries and to the sea. The Estuary is situated in northern KwaZulu-Natal at approximately 27°52' S and 32°21' E. The estuarine complex is made up of three shallow lakes: North Lake, South Lake and False Bay, which are connected to the Indian Ocean through a 21 km meandering channel known as 'The Narrows' (Figure 2.1). The system is extensive, covering 300 – 350 km², depending on water levels (Begg 1978).

Despite the Estuary being listed as a Ramsar Wetland Site of international importance, the system has undergone numerous natural and anthropogenic disturbances. The Mfolozi River, historically the main river feeding into the St. Lucia Estuary, was diverted in 1952 due to the large amounts of sediment from sugarcane farming clogging the system (Cyrus *et al.* 2011). Due to the drastic reduction of fresh water, the Estuary closed in 2002, causing salinity to rise. Despite occasional breaching of the mouth, this is largely a closed system, creating a unique, but crucial ecosystem within the iSimangaliso (formerly Greater St. Lucia) Wetland Park, South Africa's first UNESCO World Heritage Site (Taylor *et al.* 2006).

Among the unusual features of this system is an inverse salinity gradient, which typically develops during periods of freshwater deprivation, resulting in hypersaline conditions. The area is currently experiencing such conditions (Cyrus *et al.* 2011), and research pertaining to stress factors affecting ecosystem functioning is ongoing. Over the course of these surveys, several specimens of an unidentified vermiform organism were retrieved from macrofaunal samples collected on both the eastern and western shores at Catalina Bay and Charters Creek, respectively. These sites are both situated on the southern part of the South Lake (Figure 2.1). When these animals are contracted, tentacles are completely hidden, as they retract inside the coelenteron. This misled researchers into mistaking these anemones as sipunculid worms. Here I describe this species as the sea anemone *Edwardsia isimangaliso* n. sp.

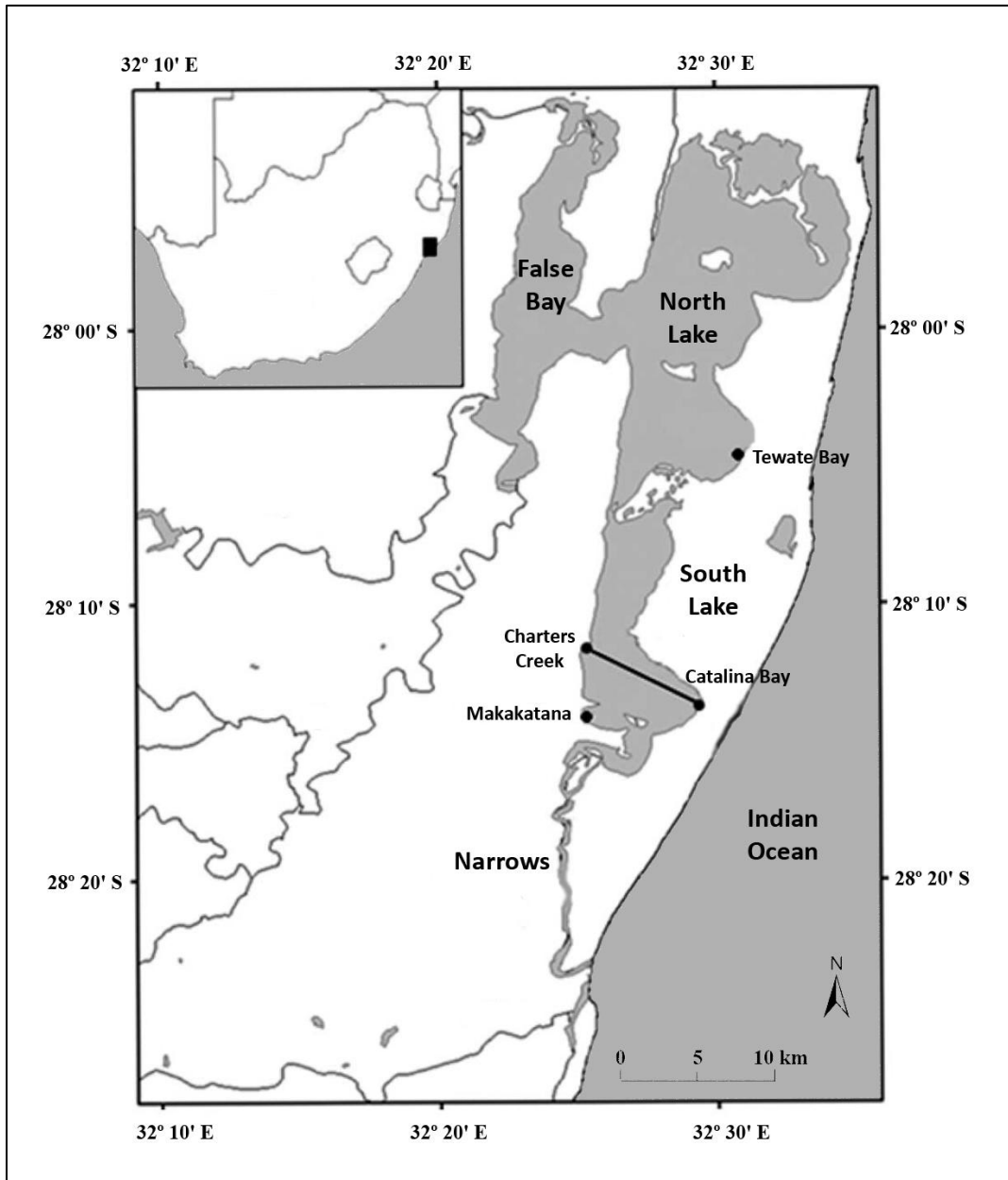


Figure 2.1: Map of the St. Lucia Estuary showing sampling sites from which *Edwardsia isimangalis* were collected in June 2010. Figure adapted from Daly *et al.* (2012).

Methods

Anemone collection

Macrofaunal samples in the St. Lucia Estuary were collected at four stations situated in the major basins of the Estuary (Figure 2.1). Commencing in February 2005, samples and measurements were taken at quarterly intervals, generally in February, April, July and November of each year (Pillay & Perissinotto 2008). Benthic samples were collected using a Zabalocki-type Ekman grab with a sampling area of 0.0236 m² and a penetration depth of 15 cm. Three replicate samples were collected at most sites, with each sample comprising three grabs. Samples were emptied into buckets and elutriated by adding water and stirring vigorously, thereby suspending benthic invertebrates. The supernatant was washed through a 500 µm sieve. After repeating this process five times, any material retained on the sieve was emptied into a plastic jar. The remaining sediment was washed through a 2 mm sieve to collect larger and heavier organisms, such as bivalves, gastropods or crustaceans. All samples were preserved in 4% formaldehyde solution and stained with phloxin-B to facilitate sorting in the laboratory. Further details can be obtained from Pillay & Perissinotto (2008).

In June 2010, a detailed cross-lake transect using the grab was conducted between Charters Creek and Catalina Bay (Figure 2.1) in order to map the distribution of the anemone at a spatial resolution of approximately 1 km. Three samples containing numerous anemones were obtained and analysed from each of the eight points occupied along the transect. The cross-lake transect revealed that *Edwardsia isimangalis* was limited to the shore area of Charters Creek, at a depth of about 12 cm. Anemone specimens were found only in D-net samples, not in grab samples. The species was also confined to substrata dominated by fine to very fine sand and did not occur in areas with high silt or coarse sand.

Anatomical analysis

Whole live and preserved specimens were examined and photographed under a dissecting microscope. Live specimens were dissected to determine whether the upper part of the anemone contained photosymbionts. Preserved specimens were dehydrated, embedded in paraffin, serially

sectioned at 9 – 12 μm , and stained in haematoxylin and eosin (Kiernan 2008). Nematocyst preparations were made by cutting a piece of tissue approximately 0.5 mm^2 from a preserved specimen, floating the tissue in water on a microscope slide, and squashing it with a coverslip. The tentacles of most specimens were retracted into the actinopharynx, potentially contaminating samples from both regions. The small size of specimens meant that the animal was partially destroyed while sample cnidae, thus the number of specimens examined was limited. Nematocyst measurements were made following Daly & Ljubenkov (2008) and capsules were identified according to Mariscal (1974) & England (1987). The holotype and paratypes were deposited in the Iziko South Africa Museum (SAM) in Cape Town, South Africa. Additional material was deposited in the American Museum of Natural History (AMNH) in New York, USA.

Results

Order Actiniaria

Family Edwardsiidae Andres 1881

Definition of Edwardsiidae

Actiniaria with elongate, vermiform body usually divisible into two or more regions: between long scapus provided with periderm and short capitulum may be short scapulus lacking periderm and ectodermal specializations. Pedal disc rounded, may be differentiated into physa. No sphincter or acontia. Mesenteries divisible into macro- and microcnemes; always eight perfect macrocnemes, microcnemes at least four. Macrocnemes comprise two pairs of directives and four lateral mesenteries, two on each side, whose retractors face ventral directives. Retractors diffuse to strongly restricted; parietal muscles always distinct (Daly & Ljubenkov 2008).

Genus *Edwardsia* de Quatrefages 1842

Definition of *Edwardsia*

Edwardsiidae with body divisible into physa, scapus, scapulus, and capitulum; physa short, ampullaceous, without nemathybomes or periderm. Scapus long, with batteries of nematocysts (nemathybomes) sunk into mesoglea. Tentacles at least 12, inner ones shortest. Weak ventral siphonoglyph. Eight macrocnemes and at least four imperfect, very weak microcnemes in distal column. Only eight perfect mesenteries fertile and with filaments. Retractors very strong, diffuse to restricted reniform, parietal muscles well developed. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores, pterotrichs (Carlgren 1949, England 1987).

Type species

Edwardsia beautempsi de Quatrefages 1842 by subsequent designation (Carlgren 1949).

Remarks

Not all types of cnidae are known from all species of the genus (Daly & Ljubenkov 2008).

***Edwardsia isimangaliso* n. sp.**

(Figure 2.2A – E, Table 2.1)

Diagnosis

Edwardsia with elongated body and slightly rounded pedal disc and 12 – 16 tentacles (Figure 2.2A). Small nemathybomes visible as opaque white points between mesenterial insertions. Zooxanthellae in the filaments (Figure 2.2B). Length of whole animal 12 mm in life, 6 – 8 mm when preserved.

External anatomy

Column covered in thin, fine periderm. Capitulum and scapus yellow-beige in life. Tentacles translucent white with yellow-beige tips and irregularly arranged white blotches on oral surface, 12 – 16, blunt tipped, in two cycles: outer cycle slightly longer and always with eight tentacles

(Figure 2.2B). Small opaque nemathybomes arranged along scapus in narrow, sparse band midway between mesenterial insertions. Physa naked, blunt, without nemathybomes, with rugae and central invagination; small sand grains may adhere to rugae. Physa may be retracted inside scapus. Length of contracted type specimen 7 mm, diameter 1.5 mm.

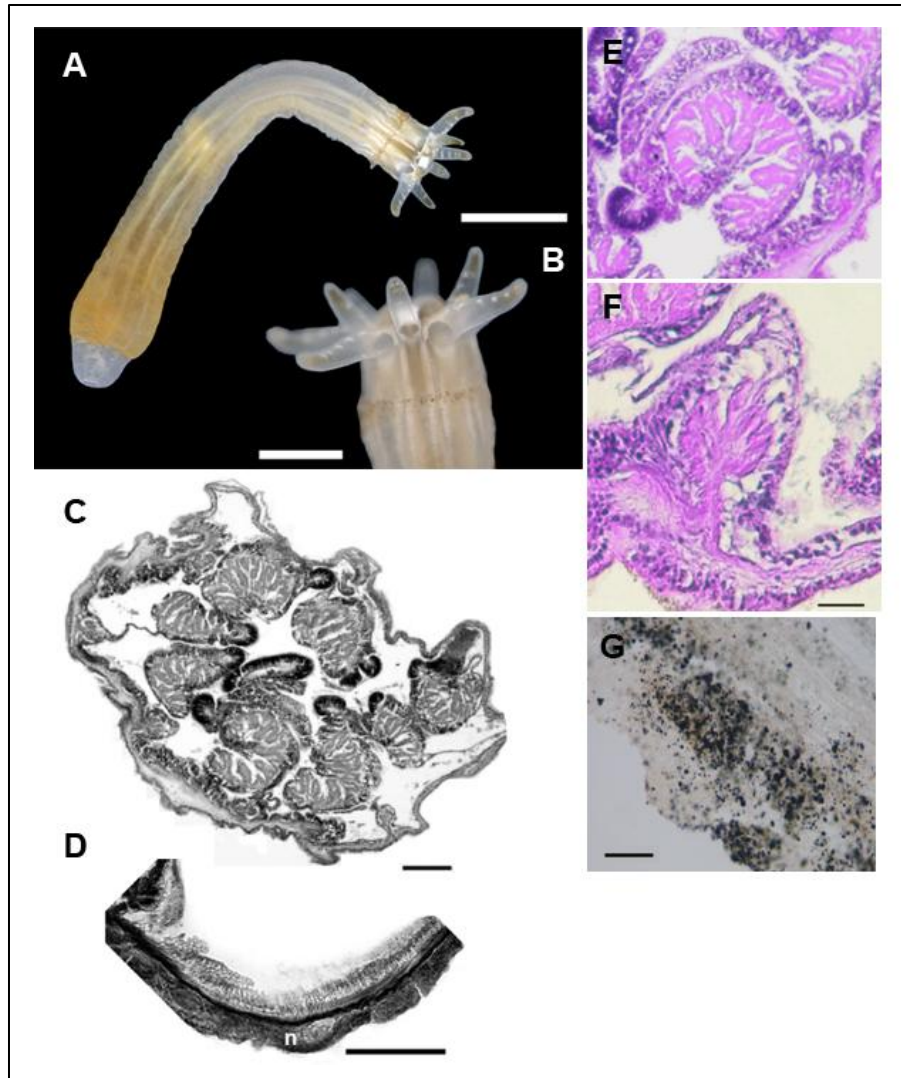


Figure 2.2: Anatomy and histology of *Edwardsia isimangaliso*. External anatomy of a living animal: A) anemone with capitulum, but without periderm. Invagination visible at aboral end (scale 2 mm), and B) anemone fully expanded (scale 1 mm). C) Cross-section through the mid-column, showing arrangement of eight retractor muscles (scale 100 μm). D) Cross-section of body wall showing small nemathybome (n) embedded in mesoglea. Nemathybome approximately halfway between two parietal muscles (scale 1 mm). E) Cross-section of retractor muscle (scale 100 μm). F) Cross-section of parietal muscle (scale 20 μm). G) Zooxanthellae in mesenterial filament (scale 50 μm).

Table 2.1: Size range (in μm) of the cnidae of *Edwardsia isimangalis* and other species of Edwardsiidae from Africa. The column labeled 'samples' (S) indicates how many of the sampled specimens contained a particular type of cnida. The column labeled 'number' (N) indicates the total number of capsules measured for *E. isimangalis*. Sources for comparative data include: Carlgren 1938 (*Edwardsia capensis*), Seshaiya & Cutress 1969 (*Edwardsia jonesii*), and England 1987 (*Edwardsianthus pudica*). Where multiple sizes of cnidae are reported, the capsules within any specimen show discontinuous rather than overlapping size ranges. Dashes (-) indicate capsules that were not reported. Abbreviation: Mi.= microbasic.

	<i>Edwardsia isimangalis</i>	S	N	<i>Edwardsia capensis</i>	<i>Edwardsia jonesii</i>	<i>Edwardsianthus pudica</i>
Tentacles						
Small Basitrichs	8.1-13.8 x 1.6-2.5	7:7	28	-	-	-
Basitrichs	14.5-25.9 x 1.6-3.1	7:7	305	22.0-25.0 x 2.5	24-27 x 2.2-2.5	8.2-29.6 x 1.7-3.5
Spirocysts	7-16 x 1.2-2.9	7:7	281	14-24 x 2.0-3.0	18-22 x 2.5	9.4-23.8 x 1.7-3.6
Column						
Basitrichs	(6.6) 7.5-14.7 x 1.0-2.5 (3.0)	7:7	122	-	-	-
Nemathybome						
Basitrichs	29.3-40.5 x 3.5-5.7	4:4	39	68.0-86.0 x 5.5-6.0	48-72 x 4.5-5.5	35.4-55.4 x 2.4-3.5
Physa						
Basitrichs	9.8-16.0 x 1.2-2.7	7:7	51	-	12 x 2	-
Filaments						
Small Basitrichs	9.5-16.9 x 1.2-2.6	7:7	47	-	24-33 x 4.5	11.8-33 x 1.7-3.3
Basitrichs	16.7-25.2 x 2.6-4		78	-	22-25 x 5.5-6	21.2-40.1 x 2.5-5.8
Mi. <i>p</i> -mastigophores	16.1-24.1 x 3.1-5.4	7:7	127	-	-	18.9-32.4 x 4.1-7.0
Actinopharynx						
Basitrichs	11.7-27 x 1.7-3.9	2:2	45	34.0-37.0 x 3.5-4	28-31 x 2.5-3	11.3-43.7 x 1.7-5.3
Mi. <i>p</i> -mastigophores	16.723.8 x 3.2-4.6	2:2	47	26.0-29.0 x 6.0-6.5	-	20.1-37.8 x 4.0-8.2

Internal anatomy and histology

Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. No marginal sphincter. Single, ventral siphonoglyph. Retractor muscles circumscribed, relatively small, with branches on a single face. Branches of retractor similar in height, widely spaced, with few ramifications. Parietal muscle trianguloid in cross-section, with relatively unbranched lateral branches equal in thickness to central lamella (Figure 2.2F). Nemathybomes embedded in mesoglea, ovoid in section. Gonochoric, with all examined specimens either male or female. Epidermis thin and irregular in outline on scapus, becoming thicker at physa. Mesoglea thicker on scapulus than on physa.

Cnidom

Spirocysts, basitrichs, microbasic *p*-mastigophores (Figure 2.3, Table 2.1).

Material examined

Holotype: SAM H5134, Charters Creek, Lake St. Lucia, South Africa, May 2010, 0.2 m. Paratypes: SAM H5135, 3 specimens, February 2010, 0.08 m; SAM H5136, 2 specimens, May 2010, 0.2 m; SAM H5137, 14 specimens, July 2010, 0.17 m and SAM H5138, 10 specimens, November 2010, whole specimens. SAM H5139, 15 March 2010 and SAM H5140, SAM H5141, SAM H5142, SAM H5143, SAM H5144, 24 July 2010, scraped for cnida analysis. SAM H5145, March 2010 and SAM H5146, SAM H5147, SAM H5148, SAM H5149 and SAM H5150, 15 March 2010, whole specimen used for histology and accessioned as slides. SAM H5151 and SAM H5152, May 2010, scraped for cnida analysis. SAM H5153, May 2010, used for histology and accessioned as slides. All samples collected by Prof. Renzo Perissinotto and his team at Charters Creek, Lake St Lucia, South Africa.

Etymology

Named after the iSimangaliso Wetland Park, which includes the St Lucia Estuary, where the species was discovered.

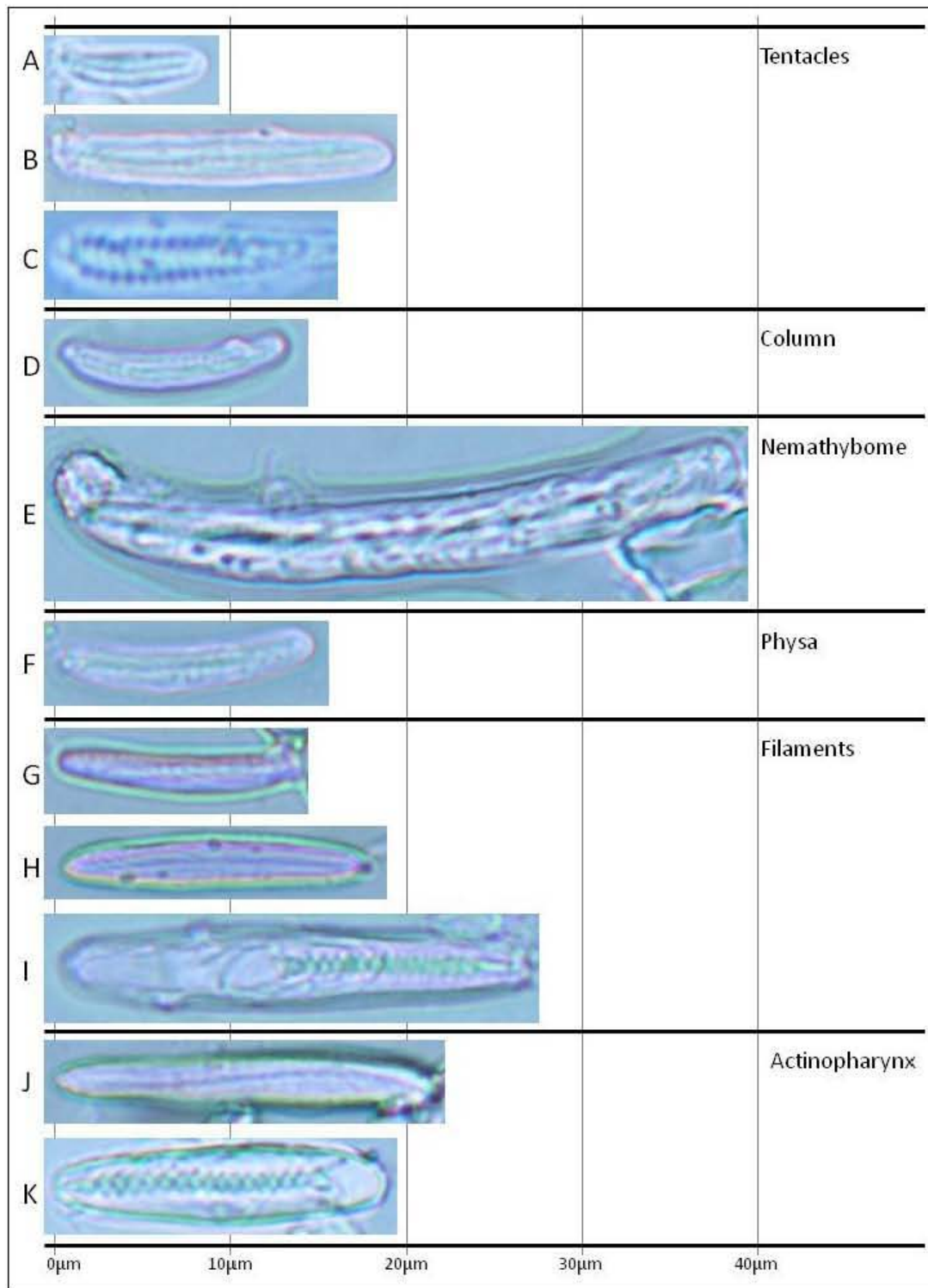


Figure 2.3: Cnidae of *Edwardsia isimangaliso*. Cnidae of the tentacles: small basitrichs (A), basitrichs (B), and spirocysts (C); column: basitrichs (D); nemathybome: basitrichs (E); physa: basitrichs (F); mesenterial filaments: small basitrichs (G), basitrichs (H) and microbasic *p*-mastigophores (I); and actinopharynx: basitrichs (J) and microbasic *p*-mastigophores (K).

Discussion

Similar species

Edwardsia is a cosmopolitan genus, incorporating species that live in the shallow coastal zone, as well as species that live deep offshore. All species in the family Edwardsiidae extend their oral disc and distal column above the sediment to feed. Edwardsiids are predators, eating relatively large prey, including polychaete worms and gastropods, in addition to small benthic crustaceans (Oliver *et al.* 1982). Relatively few predators are known to eat these anemones; however, they are preyed upon by some crabs and fish (Virnstein 1979, Pihl *et al.* 1992).

Edwardsia is one of only a few genera within Actiniaria to survive in inland waters. Furthermore, the capability of *Edwardsia isimangaliso* to survive at a wide range of salinities is unique among anemones (Shick 1991). In addition, Edwardsiidae is the sole actiniarian family in which this physiological and ecological trait has evolved in multiple lineages. The estuarine and hypersaline species of *Edwardsia* are geographically diverse, with *E. isimangaliso* occurring in Africa, *E. danica* in Europe (Ax & Shilke, 1964), *E. athalyei* and *E. jonesii* in India (England 1990, Seshaiya & Cutress 1969), and *E. californica* in North America (McMurrich 1913). Although the genus *Nematostella* is known to tolerate a salinity range from 2 – 52 ppt in the laboratory (Williams 1973, Shearer *et al.* 1997), no single species of *Edwardsia* has been found in waters spanning this range, and no experimental studies have explored the salinity tolerance of species within this genus.

The most distinctive attributes of *E. isimangaliso* are its ability to live in a harsh habitat, and the relatively small number of tentacles arranged around the oral disc. Although several species are reported from lakes or brackish water, *E. isimangaliso* is the only species of *Edwardsia* reported from hypersaline water. Most Edwardsiids have 16 or more tentacles; only 6 of over 50 species in the genus have 12 – 16 tentacles. These include *E. andresi* and *E. fusca* from the North Atlantic (Danielssen, 1890), *E. duodecimentaculata* from shallow lagoons in Fiji (Carlgren, 1931), *E. jonesii* from India (Seshaiya & Cutress, 1969), *E. juliae* found in shallow water off the coast of California (Daly & Ljubenkova, 2008), and *E. sanctahelanae* from the island of St Helena in the southern Atlantic Ocean (Carlgren, 1931). All of these differ significantly from *E.*

isimangaliso in distribution, details of anatomy, and cnidom and, with the exception of *E. jonesii*, all are reported from ocean basins.

Two species of *Edwardsia* are reported from Africa; with a cosmopolitan species, *Edwardsianthus pudica* (Klunzinger 1877), reported from East Africa and the Red Sea (Carlgren 1931, England 1987). Like *E. isimangaliso*, *E. capensis* is known from South Africa (Carlgren, 1938), but it is reported from waters near Cape Town. *Edwardsia capensis* is easily distinguished from *E. isimangaliso* by its habitat, ecology, cnidom (Table 2.1), relatively larger and more developed mesenterial muscles, and greater number of tentacles. Furthermore, *E. capensis* is from deeper waters, having been collected down to a depth of 91.4 m (Carlgren 1938), and experiences salinity levels normal for the Atlantic Ocean, whereas *E. isimangaliso* is known only from hypersaline waters at depths shallower than 10 m. *Edwardsia kamerunensis*, reported only from Cameroon (Carlgren 1927a), has 20 tentacles and relatively longer nematocysts in the nemathybomes (Table 2.1). *Edwardsianthus pudica* differs from *E. isimangaliso* in the attributes of the genus (England 1987, Daly 2002), the size of the nemathybome nematocysts, the morphology of the mesenterial musculature, and the greater number of tentacles.

Ecological context

Conclusive evidence of *E. isimangaliso* in the St. Lucia Estuary dates from February 2005, when the first specimens identified were collected near Catalina Bay, on the eastern shores of South Lake (Figure 2.1). As this anemone was misidentified as a sipunculid worm in previous ecological studies, it is probable that *E. isimangaliso* was present in the St. Lucia Estuary long before 2005. Indeed, Boltt (1975) reported unidentified ‘anemones’ at Makakatana, just south of Charters Creek, and at the northern end of the Narrows. It should be noted that previous reports of sipunculids from the St. Lucia Estuary (as in Blaber *et al.* 1983, Pillay & Perissinotto 2008, MacKay *et al.* 2010) may be inaccurate. *Edwardsia isimangaliso* is found only in the near-shore waters between Charters Creek and Makakatana Bay. No other anemones of the genus *Edwardsia* have been reported from other estuarine systems in South Africa, thus *E. isimangaliso* is currently classified as endemic to Lake St. Lucia.

The discovery of zooxanthellae in tissues of the upper column of *E. isimangaliso* was surprising, as this is a burrowing anemone. It is hypothesised that *E. isimangaliso* may combine heterotrophic and autotrophic feeding modes according to variation in resource availability (Daly *et al.* 2012). Despite the fact that *E. isimangaliso* harbours zooxanthellae in the upper column, very low amounts of chlorophyll-a pigment were present in the tissues. This suggests that the relationship between the anemone and the algae may be facultative, supplying comparatively little nutrition to the anemone (Daly *et al.* 2012). The reproductive biology of *E. isimangaliso* is currently unknown, thus investigations into the life history and growth rates of this species should be prioritised. As this anemone is endemic to a single estuary, more work needs to be done to determine how the physical factors regulating the ecosystem may affect the survival of this species. Until the rarity and optimal living conditions of *E. isimangaliso* are more accurately determined, conservation measures should focus on preserving the unique habitat of the St. Lucia Estuary.

University of Cape Town

Description of *Anthostella* n. sp. from the Cape Peninsula

Introduction

Actiniidae is one of the largest and most diverse families in the order Actiniaria (Gomes *et al.* 2011). Although species belonging to this family are among the most comprehensively studied anemones globally, distinguishing genera and species within Actiniidae is often challenging, due to vast character variability (Daly 2004). Identification of species within this family is also complicated by the fact that many genera are based on the absence of certain features, rather than the presence of distinguishing characters (Daly *et al.* 2008).

A new sea anemone resembling species from the genus *Anthostella* is described from the Cape Peninsula and surrounds. Although most of the areas in which the new species was found contain popular dive sites for recreational SCUBA divers, it is often difficult for divers untrained in anemone identification to distinguish between very similar species. Thus, it is probable that this small species was considered as a juvenile *Anthostella stephensoni* by divers that encountered it. Only in the early 1980s, when Prof. Charles Griffiths was conducting a kelp bed survey, was it suggested that this may be a new species.

Due to a lack of anemone taxonomists at the time, this species has remained un-described for three decades; however, a picture of the new species was published on the back cover of a renowned marine field guide for southern Africa (Branch *et al.* 1994). As some anemone species are currently difficult to identify without genetic analysis or histological methods, organisms found in marine surveys are often identified as an existing species, rather than identified and described correctly. Here we describe *Anthostella* n. sp. from two specimens, one found in Hout Bay and the other from Riy Banks, Port Elizabeth. This species is characterised by having a weak, diffuse marginal sphincter, small basitrichs in the mesenterial filaments, and a smaller size in comparison to other species in the genus. In addition, only the first mesenterial cycle contains perfect mesenteries.

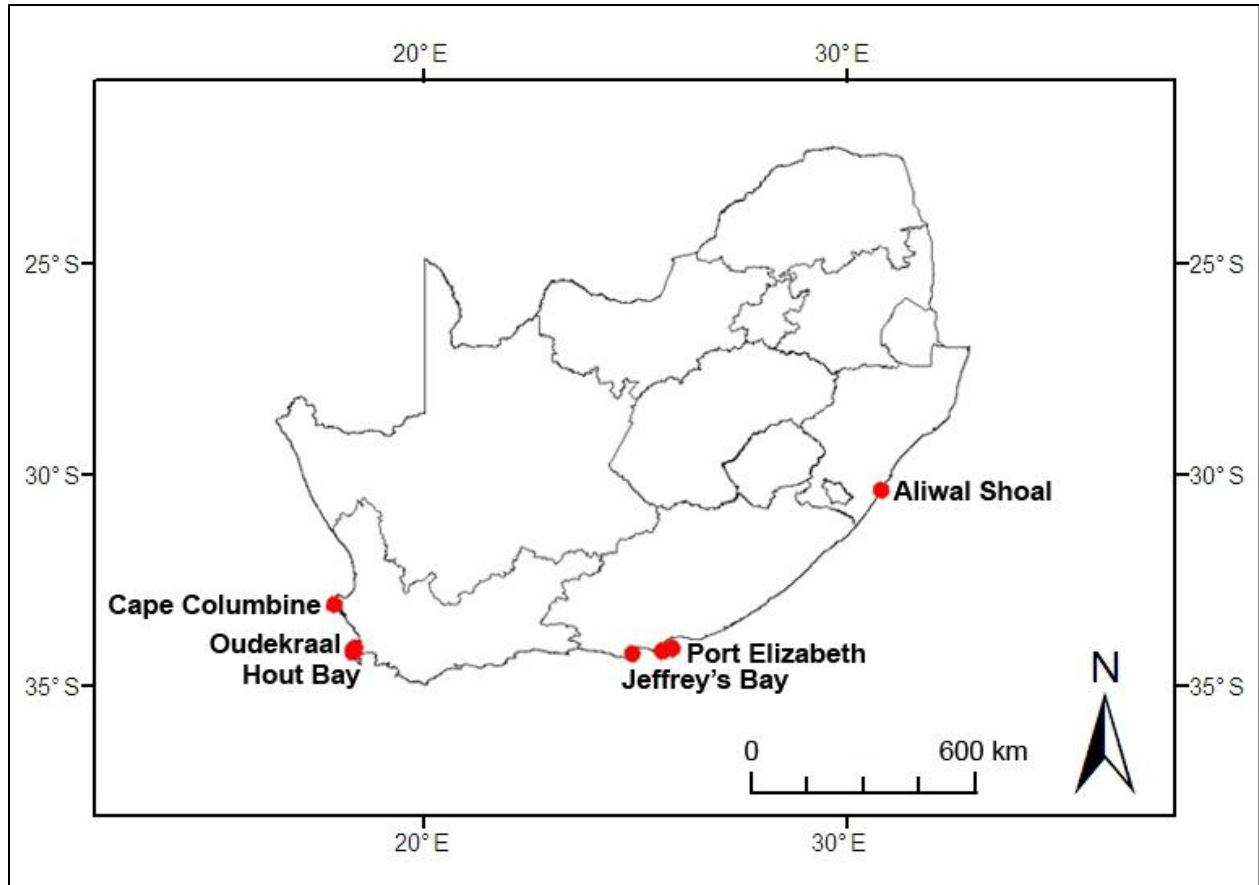


Figure 2.4: Map of the South Africa showing areas where *Anthostella n. sp.* was found.

Methods

Anemone collection

Rocky shore, rocky intertidal and SCUBA diving surveys were conducted at as many sites as possible during field trips. As some areas along the coastline were inaccessible, sampling effort across the coast was not even, but an attempt was made to obtain representative samples in each ecoregion. During sampling trips, anemones were gathered for examination using a specialised scraper tool.

Animals were observed in aquaria for a maximum of two weeks and then anaesthetized for four hours using menthol crystals placed in salt water. Fresh samples were fixed for seven days in 4%

formaldehyde diluted with salt water and then stored in 70% ethanol. Duplicate samples were placed in 96% ethanol to enable genetic analyses for future studies. After identification and description of wet material, all specimens were placed in the Iziko South African Museum (SAM) marine invertebrate collection. In addition to samples collected in the field, photographic data from recreational SCUBA divers were used to determine the geographical range of the species.

Anatomical analysis

Fixed tissue squashes were mounted onto slides for nematocyst analysis. DPX was used as a mounting medium and tissue was viewed under a compound microscope at 1000× magnification. No stains were used. Undischarged capsules were randomly selected off the slide and the length and width measured from seven areas: tentacles, acrorhagi, nematocyst batteries, actinopharynx, column, mesenterial filaments and pedal disc. A maximum of 21 nematocysts was measured in each area of two individuals found in False Bay (Table 2.2). When two distinct size-classes of the same nematocyst type were present within a tissue, they were counted separately and labelled as either small or large. The classification of nematocysts follows that of England (1991). Although spirocysts have been found to correlate with anemone size (Francis 2004), they were included in the analyses to allow comparison with other work.

Morphology of live and preserved specimens was examined under a dissecting microscope and pedal disc diameter and column height were recorded. For histological analyses, preserved specimens were dehydrated, embedded in paraffin, serially sectioned at 9 µm, and stained using Heidenhain's Azan trichome stain (Kiernan 2008). This species description is currently based on two specimens; however, once and additional two specimens have been collected, these data will be added to the formal description before publication in a scientific journal. The slides, which are the product of histological analyses and cnidae squashes from SAF108B and SAF-434, shall be deposited in the Iziko South Africa Museum (SAM) in Cape Town, South Africa. The two specimens that shall be designated as the holotype and paratype are currently in the possession of Dr. Estefanía Rodríguez at the American Museum of Natural History (AMNH) in New York,

USA. After examination, they shall be deposited at the Iziko SAM. All other records of this species are from photographs obtained from SCUBA divers.

Results

Order Actiniaria

Family Actiniidae Rafinesque 1815

Definition of Actiniidae

Nynantheae with basilar muscles. Column may be smooth or dotted with verrucae, acrorhagi, pseudoacrorhagi or vesicles, but without acontia. Sphincter either absent or endodermal, and may be either diffuse or circumscribed. Tentacles commonly simple, occasionally with bifurcated tips. Mesenteries not divided into macro- and microcnemes. Greater than six pairs of perfect mesenteries.

Genus *Anthostella* Carlgren 1938

Definition of *Anthostella*

Actiniidae with smooth column covered by numerous longitudinal rows of nematocyst batteries marked by bright spots. Weak fosse surrounded by large, club-shaped acrorhagi at margin interspersed by pseudoacrorhagi. Sphincter diffuse. Tentacles of moderate length, simple. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Two siphonoglyphs, each attached to a pair of directives. Mesenteries few, equal number proximally and distally. Mesenteries of the first and second cycles perfect. Directives and weak mesenteries infertile, all perfect mesenteries fertile. Retractors diffuse, parietobasilar muscles strong, basilar muscles weak. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores.

Type species

Anthostella stephensoni Carlgren, 1938, by monotypy (Fautin *et al.* 2007b).

Anthostella n. sp.

(Figure 2.5A – F, Table 2.2)

Diagnosis

A very small *Anthostella* species with an elongated body and strongly adhesive pedal disc. Acrorhagi prominent around margin and nematocyst batteries marked by maroon, violet or purple spots arranged on column in vertical rows. Up to 48 short, stubby tentacles (Figure 2.5A-C). Weak marginal sphincter, only first mesenterial cycle with perfect mesenteries. Both small and large basitrichs found in mesenterial filaments. Anemone typically extends column across reef to reach food.

External anatomy

Pedal disc strongly adhesive and attaches to exposed rocky reef, generally the same diameter as column, but may be slightly tapered. Column short when relaxed, but anemone may extend to over four times its body length. Between 5 – 15 longitudinal rows of maroon dots on column, representing nematocyst batteries. Number of batteries dependant on anemone size. Acrorhagi marked with maroon, mauve or purple dots. Column pale yellow-orange, smooth and without sand grains or debris attached. Tentacles simple, white with violet or purple blunt tips, up to 48 in number. Hexamerously arranged in four cycles: six tentacles in the first and second cycles, 12 in the third and 24 in the fourth cycle. Tentacle length approximately half of oral disc diameter, outer tentacular cycle slightly longer than inner (Figure 2.5A). Oral disc most commonly translucent and unmarked, but mesenterial insertions may be displayed by white stripes radiating from the mouth of larger specimens. Mouth white or pale yellow, occasionally marked by a purple ring. Two siphonoglyphs marked externally by purple spots (Figure 2.5C).

Height of live animal 6 – 12 mm, diameter of oral disc 6 – 10 mm. Length of preserved type specimen 15 mm, diameter of oral disc 8 mm, diameter of mid-column 11 mm, diameter of pedal disc 10 mm, average length of oral tentacles 5.6 mm, average length of marginal tentacles 7.5 mm.

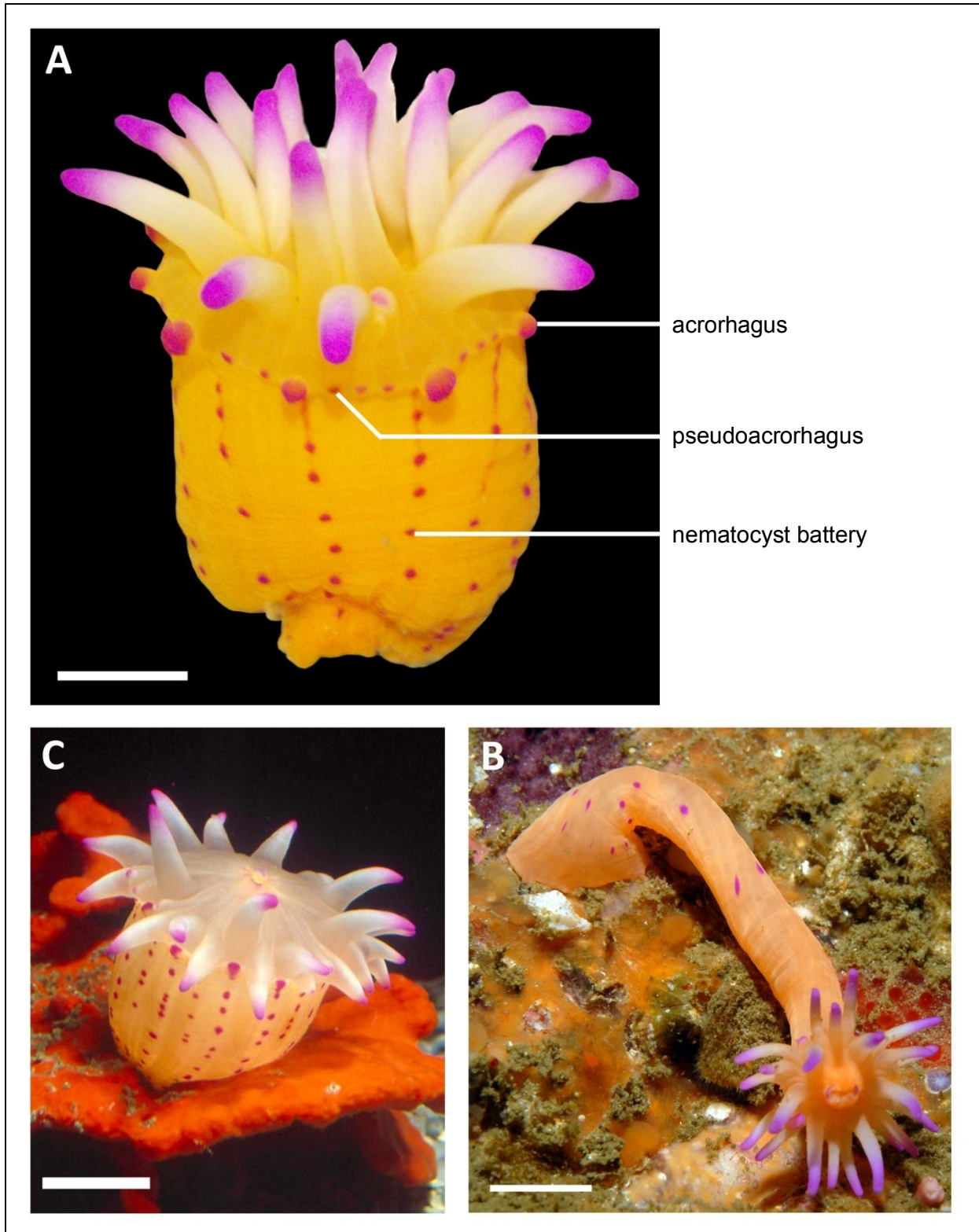


Figure 2.5: External anatomy of *Anthostella* n. sp. with A) nematocyst batteries and acrorhagi visible (scale 3 mm), B) stretching for food (scale 6 mm), and C) fully expanded with oral disc and tentacular arrangement visible (scale 5 mm).

Internal anatomy and histology

Two siphonoglyphs with directives attached. First cycle with all mesenteries perfect; second, third and fourth cycles all with imperfect mesenteries (Figure 2.6). Mesenterial arrangement $8+8+8+4 = 28$ pairs. All specimens examined infertile. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Marginal sphincter present (Figure 2.7A). Retractor muscles restricted and relatively small, parietobasilar muscles strong (Figure 2.7B). Basilar muscles extremely weak or not present. Epidermis $4.2\ \mu\text{m}$, mesoglea $5.7\ \mu\text{m}$, gastrodermis $0.7\ \mu\text{m}$.

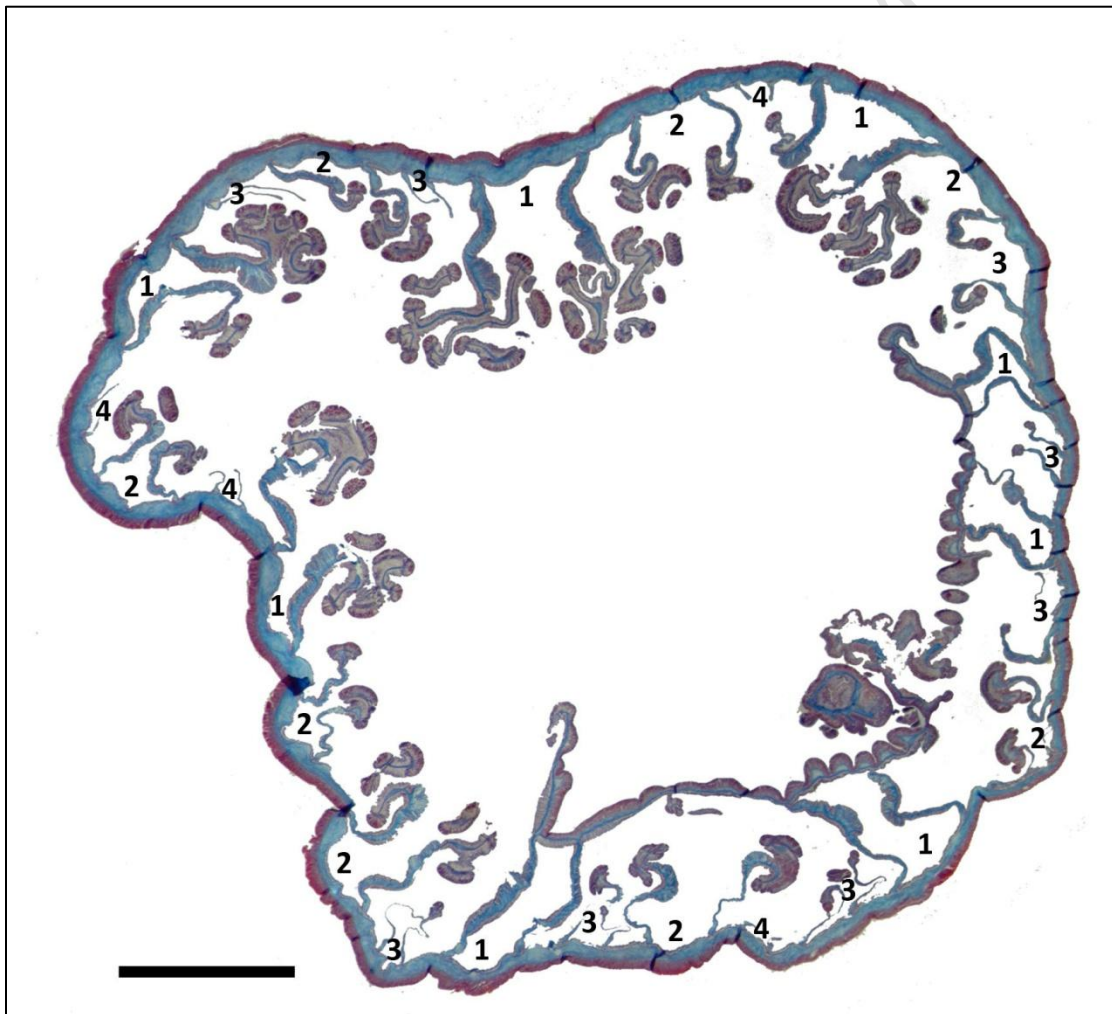


Figure 2.6: Cross-section through the mid-column of *Anthostella* n. sp. showing the arrangement of the four cycles of mesenteries (scale 2 mm).

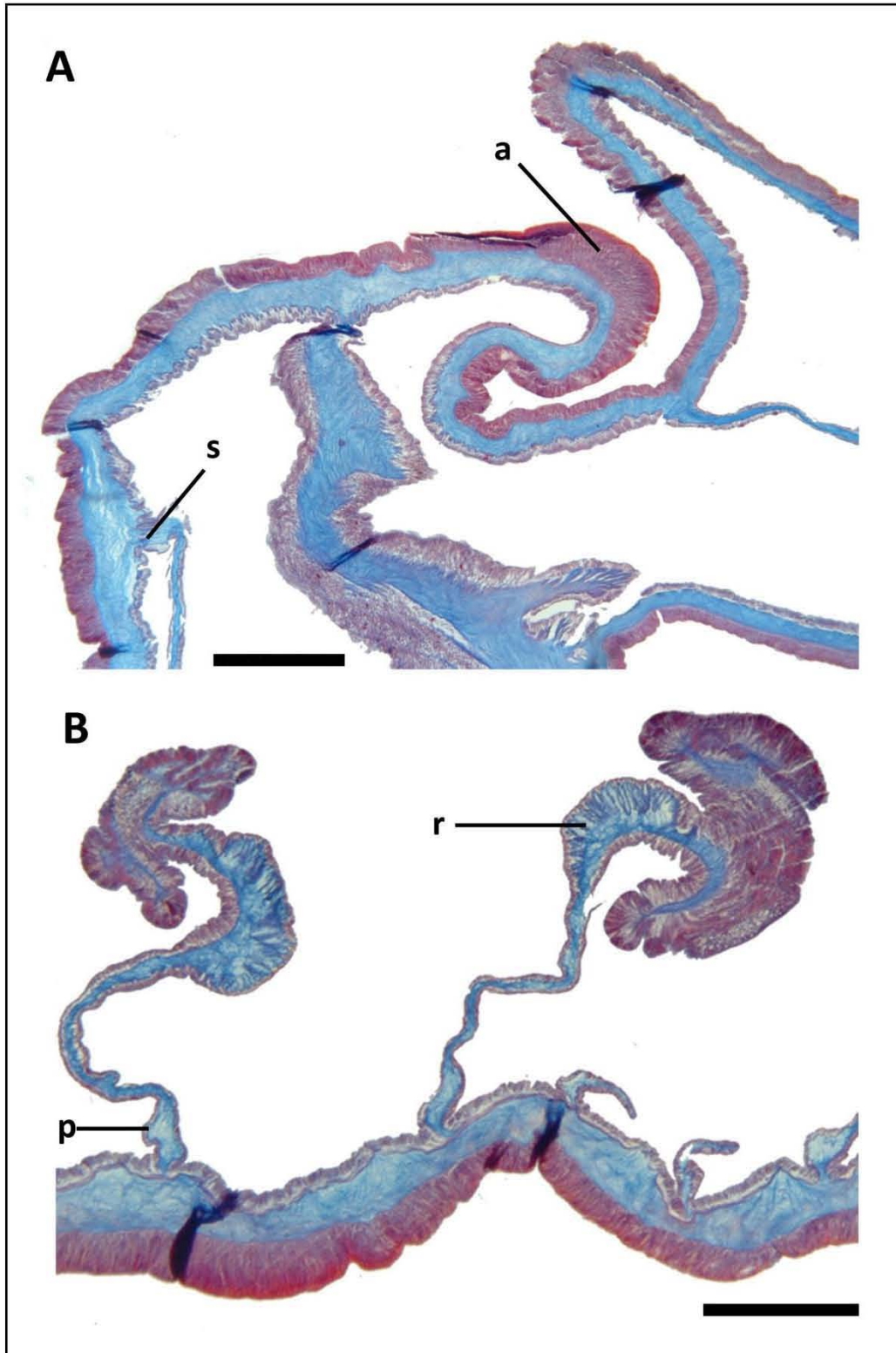


Figure 2.7: Histology of *Anthostella n. sp.* showing: A) longitudinal-section of body wall with acrorhagus (a) and diffuse sphincter (s) (scale 1 mm), and B) cross-section of retractor muscle (r) and parietobasilar muscle (p) (scale 0.5 mm).

Cnidom

Spirocysts, basitrichs, microbasic *p*-mastigophores, holotrichs (Figure 2.8, Table 2.2).

Material examined

SAF-108B, 33°59'05.82"S 25°51'46.44"E, Ruy Banks, Port Elizabeth, Algoa Bay, South Africa, 11 March 2008, 20 m. SAF-434, 34° 2'28.32"S 18°18'04.98"E, Star Walls, Hout Bay, South Africa, 24 March 2008, 29 m. The above mentioned specimen numbers are not museum catalogue numbers as the slides are still to be deposited in the museum collection. All samples collected by Dr. Estefanía Rodríguez while SCUBA diving. Holotype and paratype still to be designated.

University of Cape Town

Table 2.2: Size range (in μm) of the cnidae of *Anthostella* n. sp. and other species of *Anthostella* from Africa. The column labeled ‘samples’ (S) indicates the number of sampled specimens of *Anthostella* n. sp. with a particular type of cnida. The column labeled ‘number’ (N) indicates the total number of capsules measured for *Anthostella* n. sp. Sources for comparative data include Carlgren (1945) for *Anthostella stephensoni* and Carlgren (1900) for *Anthostella badia*. Where multiple sizes of cnidae are reported, the capsules within any specimen show discontinuous rather than overlapping size ranges. Dashes (-) indicate capsules that were not reported, while N/A indicates tissues that were not examined. Abbreviation: Mi.= microbasic.

	<i>Anthostella</i> n. sp.	S	N	F	<i>Anthostella stephensoni</i>	<i>Anthostella badia</i>
Tentacles						
Basitrichs	15.5-25.8 x 1.6-3.9	2:2	42	+++	21.0-26.8 x 2.5-2.8	28-40
Spirocysts	15.9-26.5 x 1.9-4.5	2:2	40	+++	29.6 x 3.5	-
Acrorhagi						
Basitrichs	13.2-18.2 x 2.1-3.7	2:2	40	+++	-	36-44 x 3-6
Holotrichs	18.5-32.66 x 2.27-4.81	2:2	17	+	53.6-65.6 x 4.2-5.0	-
Nematocyst batteries						
Basitrichs	14.3-24.6 x 2.2-3.8	2:2	40	+++	N/A	N/A
Mi. <i>p</i> -mastigophores	15.2-23.9 x 2.5-5.6	1:2	15	+	N/A	N/A
Actinopharynx						
Basitrichs	17.5-31.3 x 2.4-5.2	2:2	40	+++	25.4-35.2 x 3.0-4.2	22-28
Mi. <i>p</i> -mastigophores	-	0:0	0	---	18.3-24.0 x 5.0-5.6	-
Column						
Basitrichs	12.7-20.0 x 2.0-3.9	2:2	40	+++	12.7-17.0 x 2.2-2.8	20-32
Mesenterial filaments						
Basitrichs (small)	7.5-13.6 x 0.9-3.6	2:2	24	++	-	N/A
Basitrichs (large)	15.2-25.1 x 2.0-4.5	2:2	35	+++	26.8-29.6 x 3.5-4.0	N/A
Mi. <i>p</i> -mastigophores	18.2-24.8 x 4.0-5.6	2:2	35	+++	15.5-22.6 x 5.0-6.3	N/A
Pedal disc						
Basitrichs	9.4-20.9 x 1.8-3.5	2:2	27	++	N/A	20-32

Table 2.3: Comparison between the three species of *Anthostella*. Data for *Anthostella stephensoni* obtained from Carlgren (1938) and data from *Anthostella badia* from Carlgren (1900).

Characteristic	<i>Anthostella n. sp.</i>	<i>Anthostella stephensoni</i>	<i>Anthostella badia</i>
Dimensions (preserved)			
Diameter of column	11 mm	15 – 16 mm	20 – 30 mm
Height of column	15 mm	30 mm	10 – 11 mm
Length of tentacles	5.6 – 7.5 mm	Not recorded	9 – 15 mm
External anatomy			
Column	Pale yellow-orange, smooth	Pale yellow, smooth	Brownish-red, smooth
Markings on column	Violet nematocyst batteries	Violet or maroon spots	Not mentioned
Acrorhagi	Marked with maroon, mauve or purple dots	Marked with maroon or mauve dots	55, white
Pseudoacrorhagi	Interspersed between acrorhagi	Present	Not mentioned
Tentacles	Up to 48	48	107
Siphonoglyphs	Two	Two	Three
Internal anatomy			
Sphincter	Weak, diffuse	Diffuse, well developed	Diffuse, strong
Directives	Two pairs, infertile	Two pairs, infertile	Not mentioned
Mesenteries	1 st cycle perfect, 2 nd to 4 th imperfect	24, 1 st and 2 nd cycles perfect	± 116
Parietobasilar muscles	Strong	Strong	Weak
Basilar muscles	Weak	Weak	Well developed
Retractor muscles	Restricted, small	Diffuse	Not recorded
Fertility	Infertile	Perfect mesenteries fertile	Infertile
Distribution	Cape Columbine to Aliwal Shoal	Table Bay to Gordon's Bay	Micronesia, Tanzania, India

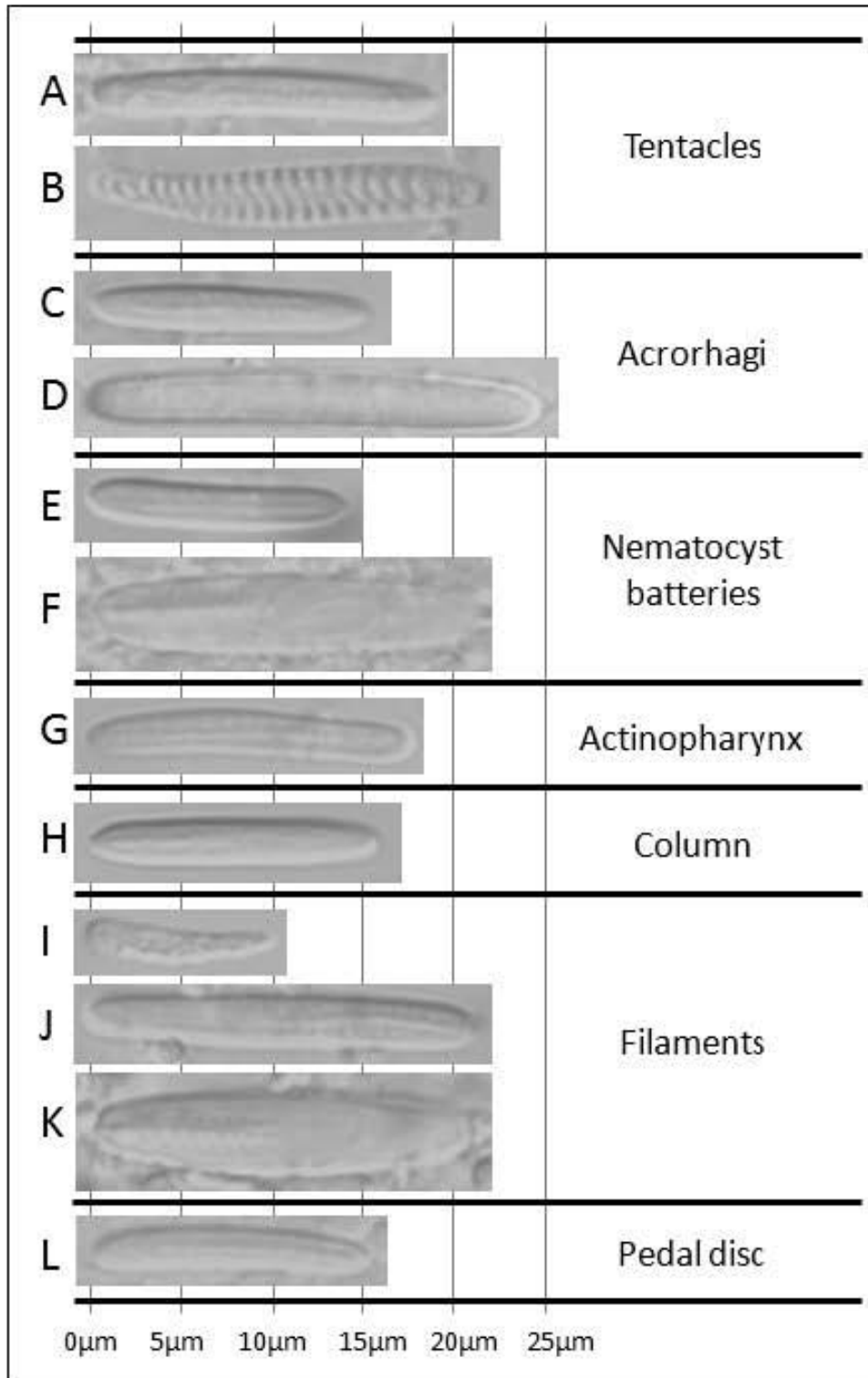


Figure 2.8: Cnidae of *Anthostella* n. sp. Cnidae of the tentacles: basitrichs (A) and spirocysts (B); acrorhagi: basitrichs (C) and holotrichs (D); nematocyst batteries: basitrichs (E) and microbasic *p*-mastigophores (F); actinopharynx: basitrichs (G); column: basitrichs (H); mesenterial filaments: small basitrichs (I), large basitrichs (J) and microbasic *p*-mastigophores (K); and pedal disc: basitrichs (L).

Discussion

Similar species

Anthostella is one of the 17 genera found within the Actiniidae in South Africa. The genus currently contains only two species: *Anthostella stephensoni* and *A. badia*. *Anthostella stephensoni* was described from both the West and South Coasts of the Cape Peninsula by Carlgren (1938), and is endemic to South Africa. *Anthostella badia* is known from Micronesia, India and Tanzania, and has never been recorded in South Africa. The new species described here is distinct from both these species of *Anthostella*, but closely resembles *A. stephensoni* in appearance and morphology.

Anthostella stephensoni is similar to *Anthostella* n. sp. in that both species have up to 48 tentacles and a smooth column with patches of pigment marking nematocyst batteries arranged in longitudinal lines (Table 2.3). In addition, their colouration is very similar, both species have acrorhagi interspersed with pseudoacrorhagi and their musculature is comparable. Not much information is available for *A. badia* (Carlgren 1900); however, this species also has acrorhagi and a smooth column, and displays the characteristics of the genus. *Anthostella* n. sp. differs from *A. badia* in musculature, sphincter design and size; with the latter having a greater diameter.

These features, when found together, make *Anthostella* n. sp. unique: a weak marginal sphincter, small basitrichs in the mesenterial filaments, and only the first mesenterial cycle with perfect mesenteries. The new species is smaller than other species in the genus (Table 2.3).

Ecological context

Knowledge of the existence of *Anthostella* n. sp. on the Cape Peninsula dates back to the early 1980s, when the first specimen recognised to be different from *Anthostella stephensoni* was collected by SCUBA divers at Oudekraal, (Figure 2.4). Subsequently, a field trip led by Dr. Estefanía Rodríguez aimed at collecting sea anemones took place in March 2003. When samples

obtained during this trip and photographic data from recreational SCUBA divers were combined, it was apparent that the range of *Anthostella* n. sp. extended to both the West and East Coasts of South Africa. As this anemone was previously misidentified as a juvenile *Anthostella stephensoni*, it is probable that *Anthostella* n. sp. was present around the South African coastline before 1980. Thus, it should be noted that previous reports of *A. stephensoni* may be inaccurate. The new species is found between 9 – 29 m, and has a slightly narrower depth range in comparison to that of *A. stephensoni*.

Anthostella n. sp. has a rather unusual behaviour whereby the animal may extend its column up to eight times its normal length to feed on octocorals attached to the rocky reef. Observation of this behaviour, which has never been observed in *Anthostella stephensoni*, was fundamental in prompting Prof. Charles Griffiths to explore the differences between small and large specimens of *Anthostella*, ultimately leading to the description of this new species. Due to a limited number of samples, the reproductive biology of the anemone is currently unknown, thus investigations into the life history of this species should be further investigated. As this anemone is endemic to South Africa, SCUBA divers and researchers are urged to collect photographic data of *Anthostella* in order to determine the distributional range more accurately.

New records and range extensions for South African Actiniaria and Corallimorpharia

Introduction

As previously mentioned, Actiniaria are an important component of the marine ecosystem. Despite this, not much work was done on this group after the publication of the original monograph of 'South African Actiniaria and Corallimorpharia' in the late 1930s (Carlgren 1938). Since then, a lack of sampling, as well as the incorrect identification of species as a result of the oversimplification of field guides, has led to an underestimation of the South African fauna (Acuña & Griffiths 2004). During this study, an assortment of new data were collected and trawl data were added, resulting in the addition of 12 anemone species to the South African fauna.

Methods

The subtidal data used in this section were collected by SCUBA divers conducting dive surveys in the case of *Pseudactinia* sp., *Megalactis griffithsi*, *Triactis producta*, *Heteractis aurora*, *Heteractis crista*, *Stichodactyla haddoni* and *Cryptodendrum adhaesivum*. Data for *Actinoscyphia plebeia* were extracted from available trawl records provided by the Department of Agriculture, Forestry and Fisheries (DAFF), and data for *Heteractis malu* and *Peachia* sp. were obtained from SCUBA diver photographic records. *Peachia parasitica* was found within the medusa of a jellyfish during a collection trip for a separate study.

To enable brevity within Table 2.4, the West Coast was defined as the coastal zone stretching from the Namibian border to Cape Point, the South Coast as the zone stretching eastwards from Cape Point to the Mbashe River in the Transkei, and the East Coast as the zone stretching from the Mbashe River northwards to the Mozambique border. During sampling trips, animals were gathered for examination using a specialised scraper tool. As collection permits for Sodwana Bay and Rocktail Bay were not granted for this study, only photographic records were obtained in these areas for the following species: *Megalactis griffithsi*, *Triactis producta*, *Heteractis malu*,

Stichodactyla haddoni and *Cryptodendrum adhaesivum*. Permits were not granted due to the value of these anemones for ecotourism in the form of SCUBA diving. Following identification of wet material, all specimens were placed in the Iziko South African Museum (SAM) marine invertebrate collection, along with digital copies of photographs and an Excel database containing details of all records.

Results

A total of 12 species new to South Africa was recorded during this study. Table 2.4 lists the South African specimens and photographic data for each new record. Five of these new records are based on photographic evidence, while specimens exist for the remaining seven.

Table 2.5 compares the distribution and depth ranges of each species before the start of this study and the updated species ranges after its completion. This study extended the known depth range of 77 % of the species listed in Table 2.5. In addition, depth ranges for seven of the species were reported for the first time.

The distribution ranges of nine species were extended to the west, 13 species to the east, and 18 species to both the west and the east (Table 2.5). Species with range extensions to the west include: *Actinauge granulata*, *Amphianthus natalensis*, *Bolocera kerguelensis*, *Halcampa capensis*, *Halcampaster teres*, *Halcurias capensis*, *Korsaranthus natalensis*, *Phelliactis algoaensis* and *Preactis millardae*. The ranges of the following species were extended to the east: *Aiptasia parva*, *Anemonia natalensis*, *Anthopleura michaelsoni*, *Bunodactis reynaudi*, *Calliactis algoaensis*, *Corynactis annulata*, *Edwardsia capensis*, *Entacmaea quadricolor*, *Heteractis magnifica*, *Metridium senile*, *Phelliactis capensis*, *Pseudactinia flagellifera* and *Rhodactis rhodostoma*. Range extensions for the majority of species were to the west and east. These species were *Acontiophorum mortenseni*, *Actinostola capensis*, *Amphianthus capensis*, *Amphianthus laevis*, *Anthopleura anaeae*, *Anthopleura insignis*, *Anthosactis capensis*, *Anthostella stephensoni*, *Bunodosoma capense*, *Calliactis polypus*, *Gyractis sesere*, *Halianthella annularis*, *Haloclava capensis*, *Isanthus capensis*, *Isophellia algoaensis*, *Liponema multiporum*, *Pseudactinia varia* and *Urticinopsis crassa*.

Table 2.4: Selected specimen and photographic records of 12 species recorded in South Africa for the first time. Records based on photographs are only listed if no specimens are available. Cat # refers to the category number of the specimen lodged in SAM, station # refers to the site where the specimens were collected and photograph # refers to the file name of the photograph lodged at SAM.

Species	Cat #	Date	Latitude	Longitude	Coast	Station #	Depth	Photograph #
<i>Actinoscyphia plebeia</i>	H5181	31/01/2011	31°09'44.16"S	15°37'22.68"E	West	31427	653	Actinostola capensis_Groen River_1-2
<i>Actinoscyphia plebeia</i>	H5179	31/01/2011	31°09'44.16"S	15°37'22.68"E	West	31427	427	
<i>Actinoscyphia plebeia</i>	H5178	24/01/2011	32°36'43.14"S	16°29'30.42"E	West	31399	811	Actinostola capensis_Columbine_1
<i>Peachia parasitica</i>	H5202	27/10/2011	33°50'11.03"S	18°25'42.52"E	West	TB01	2	Peachia parasitica_Table Bay_1-3
<i>Peachia</i> sp.	H5385	29/03/2002	33° 7'17.26"S	18° 3'06.57"E	West		1	
<i>Peachia</i> sp.			33°58'53.43"S	25°40'05.51"E	South		8	Peachia sp._Philips Reef_1
<i>Peachia</i> sp.			34° 2'34.89"S	25°38'30.92"E	South		18	Peachia sp._Scotsmans Reef_1-2
<i>Pseudactinia</i> sp.	H5588	11/03/2008	33°59'05.82"S	25°51'46.44"E	South	SAF110A	20	Pseudactinia n. sp._Riy Banks_1-5
<i>Pseudactinia</i> sp.	H5599	11/03/2008	33°59'04.14"S	25°51'50.46"E	South	SAF112B	17	Pseudactinia n. sp._Riy Banks_7-9
<i>Megalactis griffithsi</i>		28/07/2008	27° 5'53.18"S	32°50'39.91"E	East		18	Megalactis griffithsi_Pineapple Reef_1
<i>Megalactis griffithsi</i>		07/12/2003	27°30'38.23"S	32°42'20.54"E	East		20	Megalactis griffithsi_Sodwana Bay_1
<i>Alicia sansibarensis</i>	H5158	25/04/2004	27°27'30.00"S	32°43'34.80"E	East	Jago 811	105	Alicia sansibarensis_White Sands_1-2
<i>Triactis producta</i>		01/07/2011	30°14'60.00"S	30°49'00.00"E	East		30	Triactis producta_Aliwal Shoal_1-3
<i>Heteractis aurora</i>	H5401	08/04/2002	27°36'22.08"S	32°39'48.96"E	East	D12	12	
<i>Heteractis aurora</i>	H5467	06/10/2009	27°27'02.74"S	32°49'22.08"E	East	RR2	22	Heteractis aurora_Ribbon Reef_1-2
<i>Heteractis crispa</i>	H5469	05/10/2009	27°19'03.03"S	32°50'17.08"E	East	AR1	15	Heteractis crispa_Antons Reef_1-2
<i>Heteractis malu</i>		30/07/2008	27° 7'02.21"S	32°50'46.34"E	East		15	Heteractis malu_Aerial Reef_1-2
<i>Heteractis malu</i>		13/01/2004	27°30'38.23"S	32°42'20.54"E	East		20	Heteractis malu_Sodwana Bay_1
<i>Stichodactyla haddoni</i>		12/01/2005	27°30'10.63"S	32°42'16.62"E	East		14	Stichodactyla haddoni_Bikini Reef_1
<i>Stichodactyla haddoni</i>		11/05/2004	27°30'38.23"S	32°42'20.54"E	East		17	Stichodactyla haddoni_Devils Peak_1-4
<i>Stichodactyla haddoni</i>		14/04/2005	27°30'38.23"S	32°42'20.54"E	East		20	Stichodactyla haddoni_Sodwana Bay_1
<i>Cryptodendrum adhaesivum</i>			27°30'38.23"S	32°42'20.54"E	East		10	Cryptodendrum adhaesivum_Sodwana_1
<i>Cryptodendrum adhaesivum</i>			27°30'38.23"S	32°42'20.54"E	East		15	Cryptodendrum adhaesivum_Sodwana_2

Table 2.5: A comparison between the previous and updated distribution and depth ranges for each anemone species. References for previous records are listed. The three species new to science, as well as the new records for South Africa are not listed, as these are discussed previously in this chapter.

Species	Previous records		Updated records		Expansion	Reference
	Location	Depth	Location	Depth		
<i>Acontiophorum mortenseni</i>	Agulhas Bank	73-76	Hondeklip Bay to Transkei	73-775	West & East	Carlgren (1938)
<i>Actinauge granulata</i>	Cape Point to Agulhas Bank	64-500	Port Nolloth to Agulhas Bank	64-657	West	Carlgren (1938)
<i>Actinia ebhayiensis</i>	Port Nolloth to Durban	0	Port Nolloth to Durban	0-10	-	Carlgren (1938)
<i>Actinostola capensis</i>	Table Bay to Agulhas Bank	168-500	Port Nolloth to Port Shepstone	81-1005	West & East	Carlgren (1938)
<i>Aiptasia parva</i>	East London	?	East London to Sodwana Bay	1-45	East	Carlgren (1938)
<i>Amphianthus capensis</i>	Agulhas Bank	155	Port Nolloth to Sodwana Bay	12-623	West & East	Carlgren (1938)
<i>Amphianthus laevis</i>	Sea Point	?	Hondeklip Bay to Port Elizabeth	36-457	West & East	Carlgren (1938)
<i>Amphianthus natalensis</i>	Durban	804	Agulhas Bank to Sodwana Bay	1-804	West	Carlgren (1938)
<i>Anemonia natalensis</i>	Durban	0-2	Durban to Sodwana Bay	0-2	East	Carlgren (1938)
<i>Anthopleura anneae</i>	Durban	0	Langebaan Lagoon to St. Lucia	0-15	West & East	Carlgren (1940b)
<i>Anthopleura insignis</i>	Kleinmond to Port St. John's	0	Table Bay to Durban	0-29	West & East	Carlgren (1940b)
<i>Anthopleura michaelsoni</i>	Port Nolloth to Durban	0	Port Nolloth to Bhanga Nek	0-36	East	Carlgren (1938)
<i>Anthosactis capensis</i>	Elands Bay	287	Hondeklip Bay to Sodwana Bay	12-498	West & East	Carlgren (1938)
<i>Anthostella stephensoni</i>	Table Bay to Gordon's Bay	0	Cape Columbine to St. Lucia	0-42	West & East	Carlgren (1938)
<i>Anthothoe stimpsonii</i>	Port Nolloth to Durban	0-76	Port Nolloth to Durban	0-120	-	Carlgren (1938)
<i>Bolocera kerguelensis</i>	Table Bay to Agulhas Bank	73-325	Port Nolloth to Agulhas Bank	16-750	West	Carlgren (1938)
<i>Bunodera reynaudi</i>	Port Nolloth to Durban	0	Port Nolloth to St. Lucia	0-30	East	Carlgren (1938)
<i>Bunodosoma capense</i>	Saldanha to East London	0-27	Port Nolloth to Durban	0-100	West & East	Carlgren (1938)
<i>Calliactis algoensis</i>	Port Elizabeth	91	Port Elizabeth to Sodwana Bay	66-850	East	Carlgren (1938)
<i>Calliactis polypus</i>	Durban	?	False Bay to Sodwana Bay	2-201	West & East	Carlgren (1938)
<i>Condylanthus magellanicus</i>	Cape Point to Agulhas Bank	73-500	Cape Point to Agulhas Bank	73-500	-	Carlgren (1938)
<i>Corynactis annulata</i>	Port Nolloth to False Bay	0-73	Port Nolloth to East London	0-108	East	Carlgren (1938)
<i>Edwardsia capensis</i>	False Bay	91	False Bay to Sodwana Bay	0-91	East	Carlgren (1938)
<i>Entacmaea quadricolor</i>	East Coast	?	Aliwal Shoal & Sodwana Bay	14-18	East	Acuña & Griffiths (2004)
<i>Gyractis sesere</i>	Durban	0	Port Edward to Sodwana Bay	0-20	West & East	Carlgren (1938)
<i>Halcampa capensis</i>	False Bay	91	St. Helena Bay & False Bay	12-91	West	Carlgren (1938)
<i>Halcampaster teres</i>	East London	0-3	Sea Point to East London	0-11	West	Carlgren (1938)
<i>Halcurias capensis</i>	Cape Point to Agulhas Bank	100 – 287	Kommetjie to Agulhas Bank	25-349	West	Carlgren (1938)
<i>Halianthella annularis</i>	Oudekraal to Kommetjie	0	Saldanha Bay to Richard's Bay	0-79	West & East	Carlgren (1938)
<i>Haloclava capensis</i>	False Bay	21	Lambert's Bay to Port St. John's	0-170	West & East	Carlgren (1938)
<i>Heteractis magnifica</i>	Durban	?	Sodwana Bay to Rocktail Bay	14-25	East	Acuña & Griffiths (2004)
<i>Isanthus capensis</i>	Table Bay to Kommetjie	0	Hondeklip Bay to False Bay	0-157	West & East	Carlgren (1938)
<i>Isophellia algoensis</i>	Port Elizabeth	40	Hondeklip Bay to East London	15-1240	West & East	Carlgren (1938)

Species	Previous records		Updated records		Expansion	Reference
	Location	Depth	Location	Depth		
<i>Korsaranthus natalensis</i>	Durban	?	False Bay to Durban	0-32	West	Carlgren (1938)
<i>Liponema multiporum</i>	Agulhas Bank	500	Hondeklip Bay to St. Francis Bay	110-500	West & East	Carlgren (1938)
<i>Litophellia octoradiata</i>	Durban	0	Durban	0	-	Carlgren (1938)
<i>Metridium senile</i>	Table Bay	6-12	Table Bay and Mossel Bay	9-122	East	Griffiths <i>et al.</i> (1996)
<i>Phellia aucklandica</i>	Oudekraal	0-1	Oudekraal	0-1	-	Carlgren (1938)
<i>Phelliactis algaensis</i>	Port Elizabeth	40	Cape Point & Port Elizabeth	40	West	Carlgren (1938)
<i>Phelliactis capensis</i>	Cape Point	566-1024	Cape Point to St. Lucia	560-1204	East	Carlgren (1938)
<i>Preactis millardae</i>	Oudekraal to False Bay	10 - 20	Sea Point to False Bay	0-32	West	England & Robson (1984)
<i>Pseudactinia flagellifera</i>	Port Nolloth to Durban	0-45	Port Nolloth to St. Lucia	0-102	East	Carlgren (1938)
<i>Pseudactinia varia</i>	Oudekraal to East London	0-76	Cape Columbine to Durban	0-102	West & East	Carlgren (1938)
<i>Rhodactis rhodostoma</i>	Durban	0	Durban to Sodwana Bay	0-20	East	Carlgren (1938)
<i>Sagartia ornata</i>	Langebaan Lagoon	0	Langebaan & Saldanha Bay	0-56	-	Acuña <i>et al.</i> (2004)
<i>Stichodactyla mertensii</i>	Durban	?	Sodwana Bay	15-20	-	Acuña & Griffiths (2004)
<i>Telmatactis natalensis</i>	Durban	0-1	Durban	0-1	-	Carlgren (1938)
<i>Urticinopsis crassa</i>	Cape Point	566-1024	Hondeklip Bay to Agulhas Bank	143-1024	West & East	Carlgren (1938)

Discussion

Apart from the three previously mentioned species new to science, a total of 12 species new to South Africa were recorded (Table 2.4). The following account summarises the previously known range of each species, details where South African species were found, mentions similar species known from South Africa, and lists museum specimens and selected photographs of each of the new species recorded.

Actinoscyphia plebeia

Actinoscyphia plebeia was previously known from Antarctica, Chile and the South Georgia Islands off Argentina. The addition of this species to the South African fauna is based on multiple trawl records from both the West and South Coasts of South Africa collected by the Department of Agriculture, Forestry and Fisheries (DAFF) during annual trawl surveys. According to available records, this species was first found in 2007 on the Agulhas Bank, and specimens were unidentified until this study. Three specimens are lodged in the Iziko South African Museum (SAM): H5181, H5179 and H5178 (Table 2.4) and additional records are based on trawl data. The distribution range of this species extends from Kleinsee on the West Coast to the Agulhas Bank on the South Coast, and it is found between 128 – 866 m. *Actinoscyphia plebeia* is distinguishable from *Actinostola capensis* by the maroon colouration of tentacles and oral disc, the smooth column and the slimy texture of *A. plebeia*.

Peachia parasitica

This species was previously known from the East and West Coasts of North America, as well as from the East Coast of Greenland. The addition of this species to the South African fauna is based on a single specimen collected by Dr. Deborah Robertson-Andersson in 2011. The anemone was collected from Table Bay during a boat-based expedition targeting the collection of jellyfish. The juvenile was found attached to the underside of the medusa of the jellyfish *Chrysaora fulgida*. This specimen is lodged in SAM with catalogue number H5202 (Table 2.4). *Peachia parasitica* is distinguishable from *Peachia* sp. by the unmarked tentacles and oral disc of the former, as well as the tendency of juveniles to live as parasites.

Peachia sp.

Due to a lack of well-preserved samples, it was not possible to determine the specific name of this anemone, thus the previous range is unknown. The addition of this species to the South African fauna is based on a single specimen found in 1 m of water and collected from Langebaan Lagoon in 2002. Two photographic records of this species exist, both from Port Elizabeth on the South Coast between 8 – 18 m deep. The specimen is lodged in SAM with catalogue number H5385 (Table 2.4). *Peachia sp.* is distinguishable from *Peachia parasitica* by unmistakable chevron patterns on the tentacles.

Pseudactinia sp.

As it was not possible to determine the specific name of this anemone, the previous range is unknown. The addition of this species to the South African anemone fauna is based on two specimens collected from Algoa Bay in 2008, as well as 34 photographic records from the South Coast. The distributional range of this species is recorded from False Bay to Aliwal Shoal from 1 – 29 m. The two specimens are lodged in SAM: H5588 and H5599 (Table 2.4) and additional records are based on photographic records collected by recreational SCUBA divers. Photographic records are not listed in Table 2.4 and are obtainable from SAM. *Pseudactinia sp.* is large and has a very wide oral disc like that of *P. flagellifera*, but has only one row of vesicles, while *P. flagellifera* up to five. *Pseudactinia varia* is much smaller than *Pseudactinia sp.*, but also has one row of vesicles. *Pseudactinia sp.* is unique in that the column is often mottled and the oral disc is striped. The distinction between species is not purely morphological, but is also based on molecular studies (Heestand 2009).

Megalactis griffithsi

This species was previously known from the area around Melanesia, Polynesia and Micronesia. The addition of this species to the South African fauna is based on two photographic records, one from Sodwana Bay and the other from Rocktail Bay. *Megalactis griffithsi* was first recorded in 2003 (Table 2.4) and is known from depths of 18 – 20 m. The original photograph remained unidentified until this species was again encountered during a research dive that formed part of

this study in 2008. Although the specimen was not collected, it was possible to observe the behaviour of the anemone, and based on this, as well as the external morphology visible in photographs, the species name was determined. *Megalactis griffithsi* is distinguishable from *Actinodendron hansingorum* and other species of the genus by the alternating dark and light areas between each segment of the oral disc. The number of secondary branches on the tentacles also does not exceed 35 in number (Ardelean & Fautin 2004).

Alicia sansibarensis

Alicia sansibarensis was previously endemic to Zanzibar. The addition of this species to the South African fauna is based on one specimen from Sodwana Bay collected from 105 m in 2004. This specimen remained unidentified until now due to a lack of taxonomic expertise. The anemone is lodged in SAM with catalogue number H5158 (Table 2.4). *Alicia sansibarensis* is distinguishable from *Triactis producta*, the only other species of the family Aliciidae found in South Africa, by the division of the column of *A. sansibarensis* into a scapus and a capitulum. The tentacles of *A. sansibarensis* are very long and snake-like, while those of *T. producta* are short.

Triactis producta

This species was previously known from across most of the Indo-Pacific. The addition of this species to the South African fauna is based on one photographic record from a 30 m dive at Aliwal Shoal in 2011 (Table 2.4); however, a number of other sightings have been reported from Aliwal Shoal and Sodwana Bay by SCUBA divers. It was possible to determine the species of the anemone conclusively based on external morphology visible in photographs, as this anemone is unique in that it possesses pseudotentacles that function to maximise photosynthesis by zooxanthellae. *Triactis producta* is distinguishable from *Alicia sansibarensis* by the presence of bifurcated stalked outgrowths protruding from mid-column.

Heteractis aurora

Heteractis aurora was previously known from across most of the Indo-Pacific. The addition of this species to the South African fauna is based two specimens from Sodwana Bay. The first specimen was found in 2002, but remained unidentified until this study. Subsequently, numerous sightings have been reported between depths of 12 – 15 m, with one sighting at Aliwal Shoal. The two specimens are lodged in SAM: H5401 and H5467 as shown in Table 2.4; with six additional photographic records not listed here, but obtainable from the SAM database. *Heteractis aurora* is distinguishable from other species of the genus by the ‘beaded’ tentacles formed by swellings along their length.

Heteractis crispera

The range of this species extends across most of the Indo-Pacific. The addition of *Heteractis crispera* to the South African fauna is based on one specimen from Sodwana Bay found during a field survey for this study in 2009. This specimen is lodged in SAM with catalogue number H5469, as shown in Table 2.4. The seven photographic records are obtainable from the SAM database. The distributional range of this species is from Aliwal Shoal to Rocktail Bay between 15 – 22 m deep. *Heteractis crispera* is distinguishable from other species of the genus by the frosted stripes on each tentacle and the thick, leathery column.

Heteractis malu

This species was previously known from across most of the Indo-Pacific. The addition of *Heteractis malu* to the South African fauna is based on two photographic records from Sodwana Bay from 15 – 20 m, with the first taken by a SCUBA diver in 2004 (Table 2.4). The species was encountered again during a field survey for this study in 2008. Although the anemone was not collected, it was possible to conclusively determine the species based on external morphology visible in photographs. They show adhesive verrucae on the column, as well as short, sparse tentacles (Fautin *et al.* 2008).

Stichodactyla haddoni

The range of this species extends across most of the Indo-Pacific. The addition of *Stichodactyla haddoni* to the South African fauna is based on three photographic records from Sodwana Bay in 14 – 20 m of water. The anemone was first recorded by a SCUBA diver in 2004, with two additional photographs taken in 2005 (Table 2.4). No South African specimens of this anemone are housed in SAM; however, a specimen from just north of the Mozambique border is found in the museum collection. As this is a large anemone, it was possible to determine the species based on external morphology visible in photographs. *Stichodactyla haddoni* is usually easily distinguishable from *S. mertensii*. *Stichodactyla haddoni* is usually found in sand, has a weakly adherent pedal disc, has extremely sticky tentacles, has a column that is unable to contract completely, and has a maximum oral disc diameter of 500 mm. In contrast, *S. mertensii* is found attached to coral reef, has an extremely adhesive pedal disc, has non-adherent tentacles, is able to slowly contract into crevices (Fautin & Allen 1997) and has a maximum oral disc diameter of 1500 mm.

Cryptodendrum adhaesivum

Cryptodendrum adhaesivum was previously known from across most of the Indo-Pacific. The addition of this species to the South African fauna is based on two photographic records taken between 10 – 15 m at Sodwana Bay during SCUBA diving surveys for this study (Table 2.4). As this is a large anemone, it was possible to determine the species based on external morphology visible in photographs. *Cryptodendrum adhaesivum* is unlike other South African anemones as it has two forms of tentacles: inner tentacles each with five branches at tip, and outer tentacles with a single bulb at tip (Fautin & Allen 1997).

Range extensions

Since the work of Carlgren (1938), which is the only publication that lists species ranges, large numbers of distribution data for anemones have been collected. These data have been stored in museums and on online databases such as ‘Hexacorallians of the world’ (Fautin 2011), but these ranges have never before been published as maps for the anemones of South Africa. This study

achieves just that in Chapter 3, where maps showing the distribution of each species are placed alongside illustrations of the species.

The range expansion of *Metridium senile* is most definitely the most notable, as this is only one of two alien anemone species known in South Africa. This species was first recorded in South Africa from the Table Bay Harbour (Griffiths *et al.* 1996) in September 1995, when a well-established colony was discovered. Anemones were attached to artificial substrata, such as car tyres, at a depth of 10 – 16 m, and it is thought that this species was introduced to South Africa by a few individuals brought over by a ship from Europe (Griffiths *et al.* 1996). In February 2006 another population of *M. senile* was discovered on the PetroSA pipeline by Dr. Lara Atkinson. Individuals were morphologically identical to those of the Table Bay population, and it was interesting to note that both populations were established on artificial structures. The size of each of these alien populations should be monitored annually, to ensure that their range does not expand.

Other species that have experienced ranges extensions since the work of Carlgren (1938) are listed in Table 2.5. The majority of species experienced range extensions to both the west and east, suggesting that sea anemones around the South African coastline had been previously understudied. It should be noted that these range extensions do not show the expansion of species ranges over time, but rather provide a more comprehensive understanding of the true distribution range of each species.

Chapter 3 – Field key and guide to South African Actiniaria and Corallimorpharia

Introduction

The following guide is a comprehensible and updated guide to the South African Actiniaria and Corallimorpharia and supersedes the original monograph produced by Carlgren (1938). Unlike the original monograph, this version is designed to be used by naturalists who have no previous knowledge of the group. All South African species discovered over the last 74 years, as well as new records to the region, are included. Most entries are coupled with colour photographs, and where identification of the preserved specimen is difficult, photographs of these have been incorporated into the plates. In addition, the guide includes distribution maps for each species, which highlight where they were found: red dots indicate those species that are usually found on the shore, green dots signify species usually found within the depth range of SCUBA divers, and blue dots show deep-sea species. The data are displayed as points, rather than distributional ranges, in order to rule out assumptions of occurrence and to provide more accurate endemism data. A number of species are represented by very few samples and as a result their true distribution ranges may be understated. This is largely due to a combination of inadequate sampling and a lack of expertise in South Africa (Griffiths *et al.* 2010), which is a topic that will be discussed further in Chapter 4.

This guide follows modern classification systems and lists brief synonymies for each species, with the key reference highlighted in bold text. Complete synonymies can be found on the website Hexacorallians of the World: Sea anemones, corals, and their allies (Fautin 2011). Taxa are systematically arranged according to phylogenetic relationships, as outlined by the World Register of Marine Species or WoRMS (Appeltans *et al.* 2012). Each taxon entry is followed by the descriptor's name and year of first publication, with brackets indicating subsequent name changes. A short description is provided for each species in note form; as well as details on their size, colour, cnidae complement and distribution. The diagnosis and description for each species was combined into one paragraph, as the work is written to function as a guide and not a formal

monograph. Refer to Carlgren (1938) for complete species diagnoses. Diagnoses for higher taxonomic orders are from Carlgren (1949).

Each species is listed as either cosmopolitan, endemic, non-endemic or introduced, according to their distribution. Non-endemic applies to species that do not belong exclusively to South Africa, but are not so widespread as to be considered cosmopolitan. They may only occur in a small section of the Southern Hemisphere or in countries bordering South Africa.

Methods

Distributional data used here are based on previously published literature, data obtained from the collections of the Iziko South African Museum, as well as SCUBA diver photographic records and sampling undertaken during the course of this study. Biogeographic distribution ranges for each species were plotted in ArcGIS 9.3 and all plates were constructed using Adobe Photoshop CS2. The location of each town mentioned in the species range descriptions is shown in Figure 3.1.

A list of relevant synonyms was drawn up for each species. Synonyms included in each list were chosen from a complete list of synonyms which can be found on the website entitled Hexacorallians of the World (Fautin 2011). Synonyms included were chosen based on their relevance to the South African anemone fauna. In addition, all references containing species descriptions and species revisions were included and key references are in bold font.

The morphology of 622 museum specimens was examined to confirm anemone identification. In instances where anemones were incorrectly identified, they were renamed and the museum records were altered to reflect the changes. Cnidae analysis and histological analysis of every specimen was not possible, thus species that were not apparent from external morphology remained unidentified. The aforementioned methods were only employed while preparing the species descriptions of *Anthostella* n. sp. and *Edwardsia isimangaliso*. It is important to note that it was possible to identify anemones with obviously unique characteristics by means of photographic evidence alone. Due caution was applied to these identifications and all available

literature was consulted. All specimens are housed in the Iziko South African Museum (SAM) and no other collections were examined.

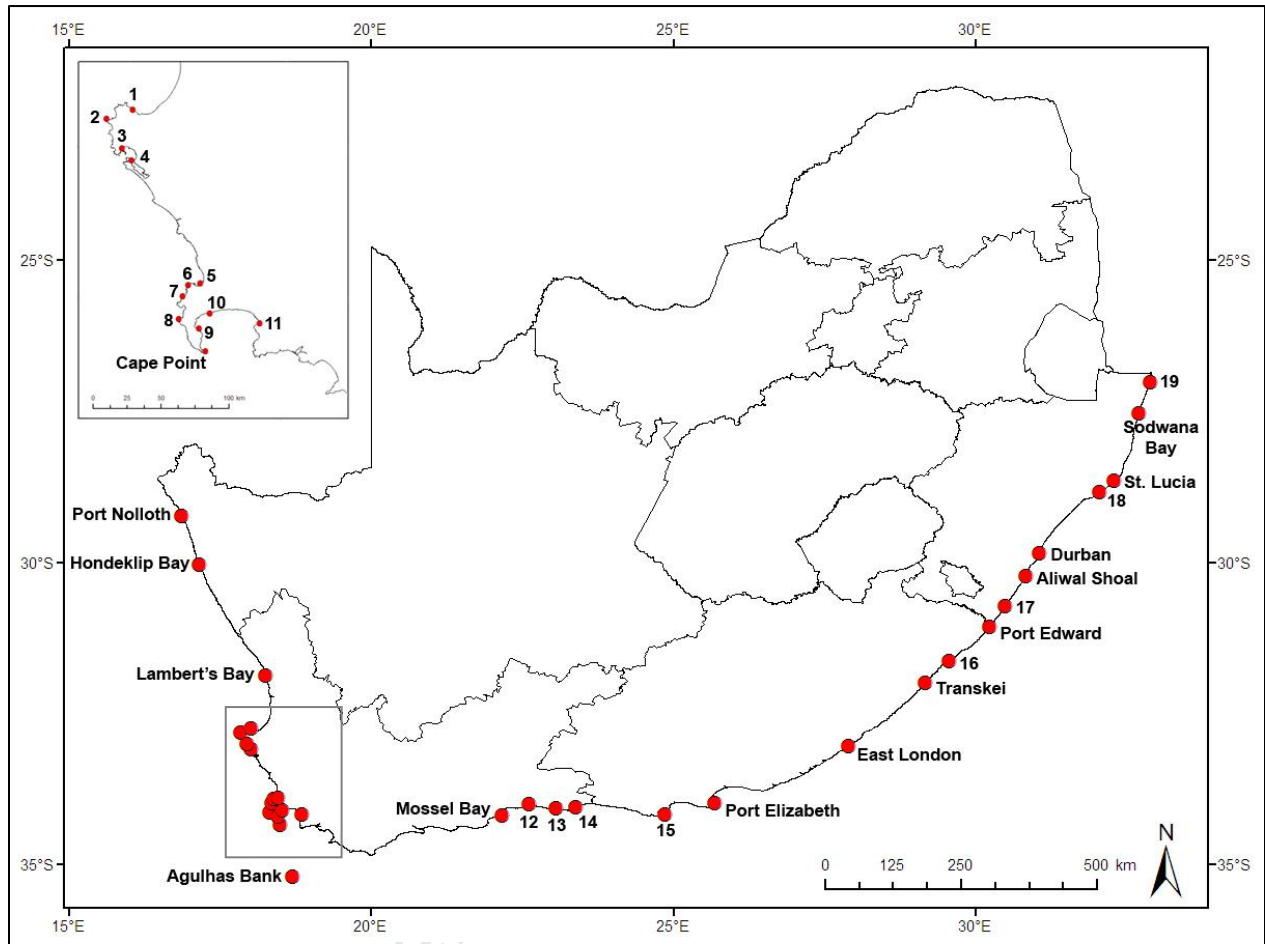


Figure 3.1: Map of South Africa showing coastal towns: 1) St. Helena Bay, 2) Cape Columbine, 3) Saldanha Bay, 4) Langebaan Lagoon, 5) Table Bay, 6) Sea Point, 7) Oudekraal, 8) Kommetjie, 9) Miller's Point, 10) Strandfontein in False Bay, 11) Rooi Els, 12) Wilderness, 13) Knysna, 14) Plettenberg Bay, 15) St. Francis Bay, 16) Port St. John's, 17) Port Shepstone, 18) Richards Bay and 19) Bhanga Nek.

Results

Table 3.1 is a comparative listing of all known species reported from the region in the previous studies by Carlgren (1938), Acuña & Griffiths (2004) and based on the results of this study. Carlgren (1938) did not recognise the superfamily Acontiaria, which Acuña and Griffiths (2004) used to indicate all species which have, or once had, acontia. I recognise this group; however, I

list the families Actinoscyphiidae and Metridiidae under the superfamily Actiniaria *incertae sedis* and not under Acontiaria. *Metridium* was added to the South African faunal list by Griffiths *et al.* (1996).

The old terminology ‘tribus’ or ‘tribe’ has been replaced with either order, suborder or superfamily, depending on the context. Carlgren (1938) did not recognise the infraorder Anthenaria and instead grouped all families without basilar muscles under Nyantheae. *Edwardsia isimangaliso* and *Halianthella* n. sp. are new species that were discovered during this study, the former of which was described in Daly *et al.* (2012) and the description of which forms part of this thesis. Carlgren (1938) reported *Haloclava capensis* as belonging to the family Halcampoididae, but this species was subsequently moved to Haloclavidae (Table 3.1). A specimen of *Haloclava capensis* in the Iziko South African Museum (SAM) was misidentified as *Haloclava brevicornis*, and this species was subsequently incorrectly reported to occur in South Africa by Acuña & Griffiths (2004). I have removed this record from the current species list.

A juvenile specimen of *Peachia parasitica* was recorded for the first time in South Africa by Dr. Deborah Robertson-Andersson in October 2011. In addition, photographs of the genus *Peachia* were sent to me by Andre Aggenbach from the Eastern Cape SCUBA Diving Club. Unfortunately there are no specimens that match these photographs, thus whether the species in the photograph represents an adult form of *P. parasitica* remains unknown. This possibility is unlikely as both records were reported from different sides of the South African coast and *P. parasitica* originates from the North East Atlantic.

Carlgren (1938) placed the Acontiaria under the ‘tribe’ Nyantheae, whereas Acuña and Griffiths (2004) placed them under the infraorder Thenaria and within the superfamily Acontiaria (Table 3.1). Carlgren (1938) grouped the Actiniidae along with the Actinostolidae and Isanthidae in the ‘tribe’ Nyantheae, but in 2004 the former was nested under the superfamily Endomyaria and the latter were placed in the superfamily Mesomyaria. Thenaria are anemones with basilar muscles, Endomyaria are Thenaria usually without a sphincter and lacking acontia, Acontiaria are Thenaria with acontia or acontia-like organs and Mesomyaria are Thenaria without acontia, but with a mesogleal sphincter (Carlgren 1949).

Acuña & Griffiths (2004) updated the species names, removing the trema in *Calliactis algoensis*, *Phelliactis algoensis* and *Isophellia algoensis* (Table 3.1). Acuña and Griffiths (2004) reclassified Carlgren's (1938) *Anthothoë stimpsoni* as *Anthothoe chilensis* which was previously only found in Chile, Argentina and Brazil. After studying South African specimens, I agree with Carlgren's (1938) classification and categorize this species as *Anthothoe stimpsonii*.

Acuña *et al.* (2004) added *Sagartia ornata* to the list of South African Actiniaria, and Schama *et al.* (2012) recognised *Actinia ebhayiensis* as a new species and not as *Actinia equina* as previously thought by Carlgren (1938) and Acuña & Griffiths (2004). *Anthopleura anneae* and *Anthopleura insignis* were described by Carlgren (1940a) and *Anthostella* n. sp. is described for the first time in this paper (Table 3.1).

Of the deep-sea anemones, *Bolocera capensis* was synonymised with *Bolocera kerguelensis* by Dunn (1983), *Liponema brevicirrata* was synonymised with *Liponema multiporum* (Dunn 1983) and moved from Actiniidae to the family Liponematidae, and *Paractinostola capensis* was synonymised with *Actinostola capensis* (Riemann-Zürneck, 1978). *Bunodosoma capensis*, a species predominantly found on rocky shores, was renamed *Bunodosoma capense* (Fautin 2011) and the sub-tropical species *Actinioides sultana* was reported as *Gyractis excavata* by Acuña and Griffiths (2004) and is reported here as *Gyractis sesere* after these names were synonymised by Fautin (2005). Lastly, *Condylactis natalensis* was synonymised with *Korsaranthus natalensis* by Riemann-Zürneck & Griffiths (1999).

Table 3.1: Listing of orders Actiniaria and Corallimorpharia from South Africa as reported in this study, by Acuña and Griffiths (2004) and by Carlgren (1938). Crosses indicate species and classifications that agree over the years or between two separate studies.

Laird 2012	Acuña & Griffiths 2004	Carlgren 1938
ORDER Actiniaria	X	X
SUPERFAMILY Actiniaria <i>incertae sedis</i>	Acontiaria	
FAMILY Actinoscyphiidae		
<i>Actinoscyphia plebeia</i>		
FAMILY Metridiidae	X	
<i>Metridium senile</i>	X	
SUBORDER Endocoelanthaeae	X	TRIBE Endocoelanthaeae
FAMILY Halcuriidae	X	X
<i>Halcurias capensis</i>	X	X
SUBORDER Nyantheae	X	TRIBE Nyantheae
INFRAORDER Anthenaria	X	
FAMILY Edwardsiidae	X	X
<i>Edwardsia capensis</i>	X	X
<i>Edwardsia isimangaliso</i>		
FAMILY Halcampidae	X	X
<i>Halcampa capensis</i>	X	X
<i>Halcampaster teres</i>	X	X
<i>Halianthella annularis</i>	X	X
<i>Halianthella</i> n. sp.		
FAMILY Haloclavidae	X	Halcampoididae
<i>Haloclava capensis</i>	<i>H. brevicornis</i> & <i>H. capensis</i>	<i>H. brevicornis</i> & <i>H. capensis</i>
<i>Peachia parasitica</i>		
<i>Peachia</i> sp.		
INFRAORDER Thenaria	X	
SUPERFAMILY Acontiaria	X	TRIBE Nyantheae
FAMILY Acontiophoridae	X	X
<i>Acontiophorum mortenseni</i>	X	X
FAMILY Aiptasiidae	X	X
<i>Aiptasia parva</i>	X	X
FAMILY Hormathiidae	X	X
<i>Actinauge granulata</i>	X	X
<i>Amphianthus capensis</i>	X	X
<i>Amphianthus laevis</i>	X	X
<i>Amphianthus natalensis</i>	X	X
<i>Calliactis algoaensis</i>	X	<i>Calliactis algoaënsis</i>
<i>Calliactis polypus</i>	X	X
<i>Phelliactis algoaensis</i>	X	<i>Phelliactis algoaënsis</i>
<i>Phelliactis capensis</i>	X	X
FAMILY Isophelliidae	X	X
<i>Isophellia algoaensis</i>	X	<i>Isophellia algoaënsis</i>
<i>Litophellia octoradiata</i>	X	X
<i>Telmatactis natalensis</i>	X	X
FAMILY Sagartiidae	X	X
<i>Anthothoe stimpsonii</i>	<i>Anthothoe chilensis</i>	<i>Anthothoë stimpsoni</i>
<i>Phellia aucklandica</i>	X	X
<i>Sagartia ornata</i>	X	
SUPERFAMILY Endomyaria	X	TRIBE Nyantheae

Laird 2012	Acuña & Griffiths 2004	Carlgren 1938
FAMILY Actiniidae	X	X
<i>Actinia ebhayiensis</i>	<i>Actinia equina</i>	<i>Actinia equina</i>
<i>Anemonia natalensis</i>	X	X
<i>Anthopleura annea</i>	X	
<i>Anthopleura insignis</i>	X	
<i>Anthopleura michaelsoni</i>	X	X
<i>Anthostella stephensoni</i>	X	X
<i>Anthostella</i> n. sp.		
<i>Bolocera kerguelensis</i>	X	<i>Bolocera capensis</i>
<i>Bunodactis reynaudi</i>	X	X
<i>Bunodosoma capense</i>	<i>Bunodosoma capensis</i>	<i>Bunodosoma capensis</i>
<i>Entacmaea quadricolor</i>	X	
<i>Gyractis sesere</i>	<i>Gyractis excavata</i>	<i>Actinioides sultana</i>
<i>Korsaranthus natalensis</i>	X	<i>Condylactis natalensis</i>
<i>Pseudactinia flagellifera</i>	X	X
<i>Pseudactinia varia</i>	X	X
<i>Pseudactinia</i> sp.		
<i>Urticinopsis crassa</i>	X	X
FAMILY Actinodendronidae		
<i>Megalactis griffithsi</i>		
FAMILY Aliciidae		
<i>Alicia sansibarensis</i>		
<i>Triactis producta</i>		
FAMILY Condylanthidae	X	X
<i>Condylanthus magellanicus</i>	X	X
FAMILY Liponematidae	Actiniidae	Actiniidae
<i>Liponema multiporum</i>	<i>Liponema multipora</i>	<i>Liponema brevicirrata</i>
FAMILY Stichodactylidae	X	
<i>Heteractis aurora</i>		
<i>Heteractis crispa</i>		
<i>Heteractis magnifica</i>	X	
<i>Heteractis malu</i>		
<i>Stichodactyla haddoni</i>		
<i>Stichodactyla mertensii</i>	X	
FAMILY Thalassianthidae		
<i>Cryptodendrum adhaesivum</i>		
SUPERFAMILY Mesomyaria	X	TRIBE Nyantheae
FAMILY Actinostolidae	X	X
<i>Actinostola capensis</i>	<i>Paractinostola capensis</i>	<i>Paractinostola capensis</i>
<i>Anthosactis capensis</i>	X	X
FAMILY Isanthidae	X	X
<i>Isanthus capensis</i>	X	X
SUBORDER Ptychodacteae	X	
FAMILY Preactiidae	X	
<i>Preactis millardae</i>	X	
ORDER Corallimorpharia	X	TRIBE Corallimorphiae
FAMILY Corallimorphidae	X	X
<i>Corynactis annulata</i>	X	X
FAMILY Discosomatidae	X	Discosomidae
<i>Rhodactis rhodostoma</i>	X	X

Field key

- 1) Anemone with acontia threads, which project through column or mouth when anemone disturbed..... 2
Anemone without acontia threads..... 18
- 2) Column divisible into two regions, with scapus and scapulus, or scapus and capitulum..... 3
Column not divisible into two regions..... 11
- 3) Not found in intertidal zone..... 4
Found only in intertidal zone..... 10
- 4) Column with tubercles..... 5
Column without tubercles..... 7
- 5) With 148 tentacles..... 6
With 96 tentacles..... *Actinauge granulata* (Plate 5 Figs F-H)
- 6) Column asymmetrical, shallow grooves between tubercles.....
..... *Phelliactis capensis* (Plate 8 Figs A-C)
Column symmetrical, deep grooves between tubercles.....
..... *Phelliactis algoaensis* (Plate 7 Figs F-G)
- 7) More than 100 tentacles..... 8
Fewer than 100 tentacles..... *Isophellia algoaensis* (Plate 8 Figs D-F)
- 8) Tentacles not fluffy..... 9
Tentacles fluffy..... *Metridium senile* (Plate 1 Figs D-F)

- 9) Column and oral disc white with green or brown dots. More than 290 red tentacles.....
 *Calliactis algoaensis* (Plate 7 Figs A-B)
- Column mottled brown, with purple stripes and purple acontia threads. Between 384 – 600
 cream-coloured tentacles, which may have pink spots..... *Calliactis polypus* (Plate 7 Figs C-E)
- 10) Column smooth. Tentacles red-brown with yellow dorsal stripes, may bulge at tips to form
 acrospheres..... *Telmatactis natalensis* (Plate 9 Figs A-B)
- Column warty, covered in tenaculi (adhesive bumps) to which sand adheres. Tentacles cream
 with brown bands, taper to a point..... *Phellia aucklandica* (Plate 10 Figs A-C)
- 11) Column without projections (tubercles, suckers, verrucae or vesicles). Sand does not adhere
 to column. Not internal brooder..... 12
- Column with suckers to which sand adheres. Internal brooder.....
 *Sagartia ornata* (Plate 10 Figs D-F)
- 12) Deep-sea, not found near coast..... 13
- Found in intertidal zone up to 120 m..... 16
- 13) With 48 tentacles. Pedal disc may adhere to loose gravel.....
 *Acontiphorum mortenseni* (Plate 5 Figs A-B)
- With up to 120 tentacles. Pedal disc attaches to octocorals and whip corals..... 14
- 14) Column mottled black and white, or brown and yellow.....
 *Amphianthus natalensis* (Plate 6 Figs F-I)
- Column without mottled colouration..... 15
- 15) Column yellow, tentacles red..... *Amphianthus capensis* (Plate 6 Figs A-C)
- Column and tentacles pale yellow..... *Amphianthus laevis* (Plate 6 Figs D-E)
- 16) Long slender tentacles. Column flares towards oral disc..... *Aiptasia parva* (Plate 5 Figs C-E)
- Short tentacles. Column does not flare towards oral disc..... 17

- 17) With between 130 – 370 tentacles. Column and tentacles without bright spots, often with stripes on column..... *Anthothoe stimpsonii* (Plate 9 Figs C-H)
- With 64 short tentacles. Column and tentacles with bright spots. (Known only from Isipingo on the East Coast)..... *Litophellia octoradiata* (Plate 8 Figs G-H)
- 18) Column smooth, without projections (tubercles, suckers, verrucae or vesicles) or specialised structures (tenticular vesicles or pseudotentacles)..... 19
- Column displaying projections (tubercles, suckers, verrucae or vesicles) or specialised structures (tenticular vesicles or pseudotentacles)..... 47
- 19) Large swellings (acrorhagi, pseudoacrorhagi or vesicles) at the margin, where column meets oral disc..... 20
- No swellings (acrorhagi, pseudoacrorhagi or vesicles) at the margin..... 26
- 20) Column with horizontal lines of purple, maroon or violet spots marking nematocyst batteries..... 21
- Column plain or mottled, without spots..... 22
- 21) Column height 15 mm. Attaches to rocky reef..... *Anthostella* n. sp. (Plate 12 Figs G-I)
- Column height 30 mm. Attaches to reef covered in sand.....
..... *Anthostella stephensoni* (Plate 12 Figs D-F)
- 22) Usually completely exposed at low tide, never found in rock pools. Column able to contract fully. Internal brooder..... *Actinia ebhayiensis* (Plate 10 Figs G-I)
- Seldom exposed at low tide, common in rock pools. Column not able to contract fully. Not internal brooder..... 23
- 23) Oral disc white, orange, red or pink, with or without faint white stripes..... 24
- Oral disc always red-brown or dark red, with stark white stripes. (Only found on East Coast)..... *Anemonia natalensis* (Plate 11 Figs A-C)

24) With 4 rows of swellings (vesicles) below tentacles.....	
.....	<i>Pseudactinia flagellifera</i> (Plate 15 Figs D-F)
With 1 - 2 rows of swellings (vesicles) beneath the tentacles.....	25
25) Column orange, pink or red, with tentacles matching column colour.....	
.....	<i>Pseudactinia varia</i> (Plate 15 Figs G-I)
Column orange, red, white or yellow, sometimes marbled with white. Tentacles with white stripes and occasionally purple tips.....	<i>Pseudactinia</i> sp. (Plate 15 Figs A-C)
26) Column divided into scapus and scapulus.....	27
Column not divided into scapus and scapulus.....	32
27) Up to 20 tentacles.....	28
More than 20 tentacles.....	30
28) Estuarine, exclusive to St. Lucia Estuary.....	<i>Edwardsia isimangalis</i> (Plate 2 Figs D-F)
Marine, not found in St. Lucia Estuary.....	29
29) With 12 cream-coloured tentacles. Column red-brow.....	<i>Halcampa capensis</i> (Plate 2 Figs G-I)
With 20 brightly spotted grey or brown tentacles. Column grey or brown.....	
.....	<i>Edwardsia capensis</i> (Plate 2 Figs A-C)
30) No brood pouches on scapus. Deep-sea species.....	
.....	<i>Condylanthus magellanicus</i> (Plate 17 Figs D-E)
Brood pouches on scapus. Inshore species.....	31
31) Tentacles white, tipped with orange, brown or purple.....	<i>Halianthella</i> n. sp. (Plate 3 Figs H-J)
Tentacles brown, with white chevron patterns.....	<i>Halianthella annularis</i> (Plate 3 Figs D-G)
32) Colonial anemones, found clustered together in groups.....	33
Non-colonial anemones, never found clustered together in groups.....	34

33) Only one tentacle type. All tentacles ending in acrospheres.....	
.....	<i>Corynactis annulata</i> (Plate 21 Figs F-I)
Two tentacle types: simple tentacles with blunt tips found at margin, and branched tentacles found from margin to mouth. (Only found on East Coast).....	
.....	<i>Rhodactis rhodostoma</i> (Plate 22 Figs A-B)
34) Tentacles with bulged or knobbed tips.....	35
Tentacles without bulged or knobbed tips.....	36
35) Tentacles with bulged tips, often shaped like a teat. Column and tentacles green, brown or grey, tips white.....	<i>Entacmaea quadricolor</i> (Plate 14 Figs A-B)
Major tentacles branch into smaller tentacles, which end in knobbed tips (acrospheres) and resemble bunches of grapes.....	<i>Megalactis griffithsi</i> (Plate 16 Figs D-F)
36) Deep-sea species, not found inshore.....	37
Inshore species, not found in deep-sea.....	42
37) Able to shed tentacles by means of sphincter at base.....	38
Unable to shed tentacles.....	39
38) Column cylindrical, height 50 mm. Base and margin equal diameter.....	
.....	<i>Bolocera kerguelensis</i> (Plate 13 Figs A-B)
Column squat, height 15 mm. Base much narrower than oral disc, which folds over base creating a flattened appearance.....	<i>Liponema multiporum</i> (Plate 17 Figs F-G)
39) Corrugated margin.....	40
Smooth margin, without corrugations.....	41
40) Column height approximately 160 mm. Between 96 – 140 tentacles.....	
.....	<i>Actinoscyphia plebeia</i> (Plate 1 Figs A-C)
Column height approximately 35 mm. More than 40 tentacles.....	
.....	<i>Urticinopsis crassa</i> (Plate 16 Figs A-C)

- 41) Column cloudy grey and cup-shaped, height 5 mm..... *Anthosactis capensis* (Plate 20 Figs E-F)
 Column white and cylindrical, height 4 – 22 mm..... *Halcurias capensis* (Plate 1 Figs G-J)
- 42) Column height less than 30 mm. Column and tentacles without longitudinal white stripes.
 Found amongst sand or gravel..... 43
 Column height 100 mm. Column and tentacles with longitudinal white stripes. Found on
 rocky reef..... *Korsaranthus natalensis* (Plate 14 Figs E-H)
- 43) Fewer than 48 tentacles. Found in sand..... 44
 With 48 tentacles. Attach to small stones amongst gravel.....
 *Isanthus capensis* (Plate 21 Figs A-B)
- 44) Between 20 – 30 tentacles..... 45
 With 12 tentacles. Juvenile form found on medusa of jellyfish.....
 *Peachia parasitica* (Plate 4 Figs E-F)
- 45) Outer tentacles do not rest on top of sand..... 46
 Outer tentacles rest on top of sand, 20 in number..... *Peachia* sp. (Plate 4 Figs G-H)
- 46) Long, thin tentacles. May be found amongst gravel or attached to sea grass.....
 *Halcampaster teres* (Plate 3 Figs A-C)
 Stocky tentacles, often with swollen tips. Found in sand.....
 *Haloclava capensis* (Plate 4 Figs A-D)
- 47) Colum not divided into scapus and capitulum..... 48
 Column divided into scapus and capitulum. Scapus with outgrowths holding numerous
 vesicles..... *Alicia sansibarensis* (Plate 16 Figs G-I)
- 48) Swellings (acrorhagi, pseudoacrorhagi or vesicles) on margin..... 49
 Without swellings (acrorhagi, pseudoacrorhagi or vesicles) on margin..... 54

49) Adhesive structures on column. Fosse present.....	50
Without adhesive structures on column. Fosse absent.....	53
50) Solitary, individuals of same species not usually closely packed.....	51
Found close to individuals of same species. (Only found on East Coast).....	
..... <i>Gyractis sesere</i> (Plate 14 Figs C-D)	
51) With densely packed verrucae and acrorhagi around margin.....	52
With 6 – 10 horizontal rows of widely spaced verrucae along length of column.	
Approximately 20 pale acrorhagi at margin.....	<i>Anthopleura annea</i> (Plate 11 Figs D-F)
52) With 2 – 4 horizontal rows of densely packed verrucae at margin. Approximately 8	
horizontal rows of verrucae below, with approximately 20 verrucae per row.....	
..... <i>Anthopleura insignis</i> (Plate 11 Figs G-I)	
With 5 – 6 horizontal rows of densely packed verrucae at margin. Approximately 15	
horizontal rows of verrucae below, with approximately 48 verrucae.....	
..... <i>Anthopleura michaelsoni</i> (Plate 12 Figs A-C)	
53) Entire column covered in densely packed, adhesive verrucae, which create mossy texture.	
Often found at high densities, forming large expanses of anemone carpets.....	
..... <i>Bunodactis reynaudi</i> (Plate 13 Figs C-E)	
Column covered with non-adhesive, regularly spaced vesicles arranged in vertical rows.	
Solitary.....	<i>Bunodosoma capense</i> (Plate 13 Figs G-I)
54) Found between 1 – 32 m depth.....	55
Found between 81 – 1005 m depth, deep-sea species....	<i>Actinostola capensis</i> (Plate 20 Figs C-D)
55) Fosse present. (Found only on East Coast).....	56
Fosse absent.....	62
56) Tentacles long and simple, blunt at tips.....	57
Tentacles short, may have bulges along length.....	58

- 57) Debris may attach to verrucae on column. Snake-like tentacles with frosty grey horizontal stripes..... *Heteractis crispera* (Plate 18 Figs D-F)
- Debris never attach to verrucae on column. Tentacles green or grey, swirl in current above oral disc..... *Heteractis magnifica* (Plate 18 Figs G-H)
- 58) Tentacles crowded onto oral disc, points of attachment extending from margin to mouth... 59
- Tentacles relatively sparse, points of attachment not extending to mouth..... 61
- 59) All tentacles simple and un-branched..... 60
- Tentacles of two types: simple and compound. Simple tentacles found in thick band close to margin. Compound tentacles stalked, found on inner portion of oral disc.....
-*Cryptodendrum adhaesivum* (Plate 20 Figs A-B)
- 60) Oral disc with maximum diameter of 500 mm. Pedal disc weakly adhesive. Extremely sticky tentacles..... *Stichodactyla haddoni* (Plate 19 Figs C-E)
- Oral disc very large with maximum diameter of 1500 mm. Pedal disc extremely adhesive. Tentacles not sticky..... *Stichodactyla mertensii* (Plate 19 Figs F-G)
- 61) Tentacles with approximately seven or more pale bulges along length, creating appearance of beaded tentacles..... *Heteractis aurora* (Plate 18 Figs A-C)
- Tentacles short, stubby and sparsely arranged on oral disc, may be bulged at tips.....
-*Heteractis malu* (Plate 19 Figs A-B)
- 62) Column with short, stubby ‘tentacular vesicles’..... *Preactis millardae* (Plate 21 Figs C-E)
- Column without vesicles. Swollen, branched pseudotentacles found midway up column.....
-*Triactis producta* (Plate 17 Figs A-C)

Guide to South African Actiniaria and Corallimorpharia

CLASS ANTHOZOA Ehrenberg 1834

SUBCLASS HEXACORALLIA Haeckel 1866

ORDER ACTINIARIA Hertwig 1882

Anthozoa with or without basilar muscles. Column smooth or provided with verrucae, tenaculi, vesicles, pseudospherules or other specialisations. Often divisible into different regions. Tentacles usually arranged hexamerously in alternating cycles. Typically simple, sometimes knobbed, branched or provided with papillae. Actinopharynx usually with siphonoglyphs that are connected with directive mesenteries. Pairs of mesenteries generally arranged in cycles. Retractors of mesenteries of variable appearance from diffuse to circumscribed. Parietobasilar muscles more or less strong, basilar muscles present or absent. Ciliated tracts of filaments always present. Cnidom: spirocysts, atrichs, holotrichs, microbasic *p*-mastigophores, micro- and macrobasic amastigophores (from Carlgren 1949).

Superfamily Actiniaria *incertae sedis*

Family Actinoscyphiidae Stephenson 1920

Genus *Actinoscyphia* Stephenson 1920

Anemone fairly large. Pedal disc sometimes small, may attach to debris. Column thick and smooth. Oral disc wide. Tentacles arranged in two cycles at margin, with mesogleal swellings at base. Sphincter weak, mesogleal. Siphonoglyphs well-developed. More mesenteries than tentacles. Six pairs of perfect mesenteries, sterile. Remaining mesenteries usually fertile. Retractors diffuse. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Actinoscyphia plebeia (McMurrich 1893) – new record

(Plate 1, Figs A – C)

Actinernus plebeius McMurrich, 1893: 165-167, pl. 24, fig. 42-45. Carlgren, 1896 : 174. Gravier, 1918: 6-7; 1922: 31-32.

Actinoscyphia plebeia Fautin, 1984: 37-40. Rodríguez, 2012: 215.

Diagnosis and description

Pedal disc adherent, narrower than oral disc. Column wall smooth and soft, but thick. Usually with only patches of ectoderm remaining. Mesogleal sphincter, narrow and weak. Oral disc wide, cup-shaped with curvilinear margin, may appear slightly convex and lobed in larger individuals. Occasionally folded in half, almost touching at tips. Pronounced radial ridges on upper surface of oral disc indicating insertion of mesenteries. Mouth raised on hypostome, with two large siphonoglyphs arranged symmetrically. Each siphonoglyph attached to a pair of directives. Between 96 and 140 short, pointed tentacles arranged in two to three cycles near the margin. More mesenteries than tentacles. Typically four cycles of mesenteries; however, small mesenteries forming incomplete fifth and sixth cycles may be present. Perfect mesenteries only present in the first cycle and gametes only present in the third and fourth cycles. All six pairs of perfect mesenteries sterile. Retractors weak, diffuse and parietobasilar muscles extremely small. Older mesenteries fertile, anemone gonochoric. Common name: Venus flytrap anemone.

Size

Live: height 50 mm, diameter of oral disc 35 – 160 mm, diameter of pedal disc 25 – 50 mm, length of tentacle 12 – 20 mm, diameter of tentacle base 1 – 2 mm.

Colour

Column mostly white to cloudy grey, but light brown where ectoderm remains. Oral disc, mouth and mesenterial filaments purple-red to maroon. Tentacles purple-brown, purple-red or maroon.

Cnidom (Fautin, 1984)

Actinopharynx: basitrichs, microbasic *p*-mastigophores. Filaments: basitrichs (small and large). Tentacles: basitrichs (small and large), holotrichs, spirocysts (small and large).

Habitat and distribution

A new record for South Africa, previously unidentified. A deep-sea species found between 128 – 866 m depth, most commonly found in the bathyal zone. May attach to octocorals or shells by means of chitinous secretions of the pedal disc (Fautin, 1984). Assumed to feed by closing wide oral disc over prey items and releases mucus when disturbed. Non-endemic, found in Antarctica, Chile and the South Georgia Islands. In South Africa range extends from Kleinsee on the West Coast to Agulhas Bank on the South Coast. It is probable that this species may also be found in Namibia, thus examination of Namibian collections is recommended for future studies. Distinguishable from *Actinostola capensis* due to maroon colouration of tentacles and oral disc, smooth column and slimy texture. Common in deep-sea trawl samples. Three specimens housed at SAM.

Family Metridiidae Carlgren, 1893

Acontia with microbasic *b*-mastigophores and microbasic amastigophores, latter may be absent in adult. Sphincter mesogleal. Mesenteries not divisible into macro- and microcnemes (from Carlgren 1949).

Genus *Metridium* de Blainville, 1824

Column divided into scapus and capitulum. Scapus forms distinct collar, above which is long capitulum. Cinclides scattered below collar. Sphincter mesogleal, found in uppermost part of scapus. Tentacles short, numerous. Oral disc circular in small individuals, lobed in larger individuals. Siphonoglyphs 1 – 2 in number. Six pairs of perfect mesenteries, often more. First six mesenterial pairs infertile. Retractors diffuse. Acontia well-developed, with microbasic *b*-

mastigophores and microbasic amastigophores, although amastigophores may be absent in larger individuals. Cnidom: spirocysts, basitrichs, microbasic *b*- and *p*-mastigophores, microbasic amastigophores (from Carlgren 1949).

***Metridium senile* (Linnaeus 1761)**

(Plate 1, Figs D – F)

Priapus senilis Linnaeus, 1761: 510.

Metridium senile Carlgren, 1949: 106. **Fautin *et al.*, 1989: 77-78.** Griffiths *et al.*, 1996: 157-158. Acuña & Griffiths, 2004: 195. Branch *et al.*, 2010: 28, pl. 7.2.

Metridium senile senile Hand, 1956: 203.

Metridium senile fimbriatum Hand, 1956: 192-206.

Diagnosis and description

Base well-developed and adhesive, often with irregular edges due to pedal laceration. Column narrower than base, with mouth surrounded by raised lips. Oral disc usually wide and may be lobed. Column smooth and divided into a proximal scapus and a wide, distal capitulum. Capitulum further separated into distinct parapet and fosse. Acontia may be discharged through cinclides, which are marked by dark spots below collar of scapus. One to two siphonoglyphs. Tentacles extremely variable in length and number and may be surprisingly long in smaller specimens. May number between 150 to more than 1000 in larger individuals, giving anemone a feathery appearance. Catch tentacles, which assist with fighting, infrequent. Mesogleal sphincter present in upper part of scapus. Mesenteries not divisible into macro- and microcnemes. Perfect mesenteries present but sterile; numbers differ due to asexual reproduction. Imperfect mesenteries closely resemble perfect mesenteries due to large, diffuse retractors. Immature, imperfect mesenteries lack retractors. Basilar muscles at pedal disk strong. Most exocoelic musculature weak, except for parietobasilar muscles. Reproduce both sexually and asexually by means of pedal laceration and asexual budding. Common names: cloned plumose anemone, frilled anemone, feather-duster anemone or plumose anemone.

Size

Live: height 80 – 500 mm, diameter of oral disc 120 – 150 mm.

Colour

In South African species, colour uniform throughout each individual - may be white, grey, orange, salmon or cream. Green and brown bi-coloured individuals common in Northern Hemisphere. A white ring may be visible around mouth and white stripes sometimes present at base of tentacles.

Cnidom (Hand 1956)

Tentacles: atrichs, basitrichs, holotrichs, microbasic amastigophores, microbasic *b*-mastigophores. Catch tentacles: spirocysts. Acontia: basitrichs, microbasic amastigophores, microbasic *b*-mastigophores. Actinopharynx: microbasic *b*- and *p*-mastigophores. Capitulum: basitrichs, microbasic amastigophores. Scapus: basitrichs, microbasic amastigophores. Filaments: basitrichs, microbasic amastigophores, microbasic *p*-mastigophores.

Habitat and distribution

Found attached to rocks in pools or amongst crevices in shallow intertidal, also dredged from depths of up to 230 m, where they attach to rocks in mud. May attach to shells of molluscs or gastropods. Feed on planktonic crustaceans. Hair-like flagellae on tentacles transfer food to mouth. Known from the West coast of North America, Argentina, North Atlantic, Mediterranean and Japan. In South Africa, *M. senile* have been found on pipelines offshore from Mossel Bay on the South Coast, as well as in Table Bay Harbour on the West Coast. South African populations introduced from Europe (Mead *et al.* 2011a). Seven local samples housed at the Iziko South African Museum (SAM) in Cape Town.

Suborder Endocoelanthae Carlgren 1924

Actiniaria with well-developed pedal disc but without basilar muscles. Column without vesicles or verrucae, with spirocysts. Margin tentaculate. Sphincter absent. Number of tentacles variable, often with aboral side thickened. Oral disc occasionally lobed. Siphonoglyph 1 – 2 in number. First six pairs of mesenteries developed, all subsequent pairs found in lateral endocoels with longitudinal muscles oriented as with directives. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Family Halcuriidae Carlgren 1918

Column elongate, with little groups of nematocysts. Up to 70 tentacles in more than two cycles, without basal swellings on aboral side. One siphonoglyph. Mesenteries divisible into macro- and microcnemes, either six or ten pairs of macrocnemes, some microcnemes perfect. Retractors of strong (from Carlgren 1949).

Genus *Halcurias* McMurrich 1893

Pedal disc small. Body elongate, almost smooth, but often with batteries of nematocysts, not lobed distally. Margin tentaculate or with parapet. Sphincter absent. Up to 70 tentacles. One siphonoglyph. Ten pairs of macrocnemes, fertile. Microcnemes found distally, some perfect. Retractors strong, parietobasilar muscles either well-developed or weak. Dioecious (from Carlgren 1949).

Halcurias capensis Carlgren 1928

(Plate 1, Figs G – J)

Halcurias capensis Carlgren, 1928a: 132, pl. 2, fig. 4, text-fig. 2; **1938: 18, text-fig. 4**; 1949: 19. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Column short, stout and smooth, with nematocysts arranged in batteries. Tentacles 30 – 68 in number. Retractors of first 10 pairs of mesenteries very strong, but weaker in smaller, infertile specimens. Parietobasilar muscles weak, no basilar muscles. Common name: Ridged anemone.

Size

Small anemone. Preserved: height 4 – 22 mm, breadth of pedal disc 3 – 22 mm.

Colour

Column translucent white, yellowish or orange, with or without small white spots. Tentacles, oral disc and actinopharynx orange.

Cnidom (Carlgren 1938)

Column, actinopharynx and tentacles all with basitrichs and spirocysts.

Habitat and distribution

Deep-sea species found on rocks in trawl samples at depths of 25 – 349 m. Recorded from Kommetjie, Cape Point and Agulhas Bank. Endemic to South African waters, seven specimens housed at SAM.

Suborder Nynantheae Carlgren 1899

Actiniaria with or without basilar muscles. Mesenteries always arranged in cycles, commonly hexamerously. Secondary mesenteries always develop in exocoels. Non-directive pairs consist of two mesenteries with retractors facing each other, unpaired mesenteries rarely occur. Holotrichous nematocysts only exceptionally present, and never in endoderm (from Carlgren 1949).

Infraorder Athenaria Carlgren 1899

Nyantheae without basilar muscles. Body elongate, vermiform, often divisible into different regions. Aboral end usually rounded into physa that may adhere to small objects, occasionally used for digging. Sphincter usually absent. Tentacles and mesenteries few, rarely more than 48, cyclically arranged. Mesenteries divisible into macro- and microcnemes. Acontia may be present (from Carlgren 1949).

Family Edwardsiidae Andres 1881

Athenaria with long scapus covered by cuticle, short upper scapulus, and very short, thin capitulum immediately below tentacles. Physa usually present. No sphincter or acontia. Mesenteries divisible into 8 macro- and at least 4 microcnemes. Of the macrocnemes there are two pairs of directives and four lateral mesenteries, whose retractors face ventral directives. Retractors diffuse to strongly restricted. Parietal muscles always distinct (from Carlgren 1949).

Genus *Edwardsia* de Quatrefages 1842

Body divisible into physa, scapus, scapulus and capitulum. Physa short, without nemathybomes. Scapus long with batteries of nematocysts (nemathybomes) sunk in mesoglea. At least 12 tentacles, inner shorter than outer. Weak siphonoglyph. Eight perfect and at least four imperfect mesenteries distally. Retractors very strong, parietal muscles well developed. Only perfect mesenteries fertile and with filaments. Cnidom: spirocysts, basitrichs, microbasic *b*- and *p*-mastigophores (from Carlgren 1949).

***Edwardsia capensis* Carlgren 1938**

(Plate 2, Figs A – C)

Edwardsia capensis Carlgren, 1938: 19-20, text-figs 5-6; 1949: 23. Williams, 1981: 341, 347. England, 1987: 127. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Colum distinctly divisibly into physa, scapus and scapulus and a less apparent capitulum. Scapus long and characterised by a coating of fine sand secured by small underlying nemathybomes, which run in eight longitudinal rows according to insertions of mesenteries. Scapulus deeply furrowed, but non-adhesive. Physa squat and narrows towards base, may be invaginated. Lacking nemathybomes. Total of 20 tentacles, six inner tentacles shorter than outer and extend upwards into the water column. Eight perfect mesenteries and more than four imperfect mesenteries distally. Eight longitudinal furrows of actinopharynx mirror the eight insertions of mesenteries. Retractors of perfect mesenteries diffuse, well developed. Parietal muscles also well-developed, no basilar muscles. All specimens examined either female or infertile. Common name: Neon-tentacled anemone.

Size

Tiny anemone. Preserved: height 20 mm, diameter of column 2 – 10 mm, length of tentacles 4 – 15 mm.

Colour

Two samples with varying colour schemes. Grey tentacles and white horizontal bands extending to tips. Up to 10 lime green dots proceeding up each long tentacle with bright red line running through centre. Oral disc white and column grey. Also may have brown-green tentacles and white bases, with up to nine green spots along the length of each. Red line bisects each spot and oral disc dark grey with cream mouth. Carlgren (1938) observed a sample with a grey scapus and a red-brown capitulum, with tentacles of the same colour.

Cnidom

Nematocysts measured but not identified, spirocysts found in tentacles (Carlgren 1938).

Habitat and distribution

Burrows deep into sandy sediment and lies with tentacles extended flat on substratum. Known from the South and East Coast of South Africa. Observed from False Bay, Wilderness, Reunion Rocks and Sodwana Bay. Found intertidally to a depth of 91 m. A rare species endemic to South Africa. No specimens housed in South Africa; however, a specimen collected from Reunion Rocks on the South Coast in March 2008 is housed at the Ohio State University in the USA.

***Edwardsia isimangalis* Daly & Laird 2012 – new species**

(Plate 2, Figs D – F)

Edwardsia isimangalis Daly *et al.*, 2012: 236-240, text-figs 2-3, table 1.

Diagnosis and description

Edwardsia with elongated body divided into scapus and scapulus. Tiny nemathybomes visible as opaque white spots between mesenterial insertions. Anemone with 12 – 16 blunt tentacles arranged in two cycles: outer cycle slightly longer than inner and always with eight tentacles. Zooxanthellae in filaments. Column covered in thin periderm. Physa blunt, without nemathybomes; but with rugae to which sand grains adhere. Proximal end often invaginated and can be retracted inside scapus. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. No marginal sphincter and a single, ventral siphonoglyph. Retractor muscles circumscribed and small, with widely spaced branches of similar height. Parietal muscle comparatively unbranched, no basilar muscles. Nemathybomes embedded in mesoglea. Gonochoric, both males and females examined. Common name: Salty-lake anemone.

Size

Live: height 12 mm. Preserved: height 6 – 8 mm, diameter of column 1.5 mm.

Colour

Capitulum and scapus yellow-beige with opaque nemathybomes. Tentacles transparent white with yellow-beige tips and irregularly arranged white spots.

Cnidom

Tentacles: basitrichs (small and large), spirocysts. Column, nemathybomes, physa: basitrichs. Filaments: basitrichs (small and large), microbasic *p*-mastigophores. Actinopharynx: basitrichs, microbasic *p*-mastigophores.

Habitat and distribution

A new record for South Africa. Burrows in sand in hypersaline waters between 0.08 – 0.2 m depth. Base not attached to stones or other debris. Feeds on the snail *Assimineia ovata*, as well as ostracods, benthic microalgae and *Cladophora* sp. May combine heterotrophic and autotrophic feeding modes with the aid of zooxanthellae in filaments. Endemic to the lower South Lake in the middle reaches of Lake St. Lucia on the East Coast of South Africa. Holotype, along with 19 other samples, housed at SAM. Collected from 0.2 m at Charters Creek, Lake St. Lucia during May 2010.

Family Halcampidae Andres, 1883

Elongate, cylindrical body, usually divisible into three regions, physa, scapus and capitulum. Scapus often provided with tenaculi or papillae containing many nematocysts. Sphincter mesogleal. Mesenteries divisible into macro- and microcnemes, usually six pairs of the former (from Carlgren 1949).

Genus *Halocampa* Gosse, 1858

Cylindrical body divisible into physa, scapus and capitulum. Scapus long, with adhesive tenaculi. Mesogleal sphincter tiny. Tentacles short, 8-12. No siphonoglyphs. Between 8 – 12 perfect mesenteries, two pairs of directives. Perfect mesenteries fertile with filaments and strong retractors. Other mesenteries sterile and weak. More mesenteries than tentacles. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophors (from Carlgren 1949).

Verrill (1865) mistakenly described two species under one name, *Halocampa capensis*. Carlgren (1938) later described the second species as *Halocampa capensis* which was distinct from *Halocampa capensis*. *Halocampa capensis* became a junior homonym and *Halocampa capensis* was renamed *Haloclava capensis* (Carlgren 1938).

Halocampa capensis Carlgren 1938

(Plate 2, Figs G – I)

non *Halocampa capensis* Verrill, 1865a: 151.

non *Halocampa capensis* Andres, 1883: 110. Pax, 1908: 485, 497, 500. Parulekar, 1990: 219-220, 223-224.

Halocampa capensis **Carlgren, 1938: 22-24** (junior homonym); 1949: 34. Acuña & Griffiths, 2004: 195. Branch *et al.*, 2010: 28, pl. 7.3.

Diagnosis and description

Body divisible into physa, scapus and capitulum. Mesogleal sphincter with no apparent siphonoglyphs. Column with thick, stratified mesoglea; that of scapus also very thick. Mesoglea of capitulum thin. Tenaculi of column weak, with sand grains attached. Twelve tentacles. Six pairs of mesenteries, most fertile and with retractors. Two pairs of directives, no microcnemes. Retractors folded and branched. Parietal muscles elongated, no basilar muscles. Gonochoric, only female examined. Common name: Burrowing anemone.

Size

Preserved and contracted: height 30 mm, diameter of column 5 mm, tentacles 3 mm. Live: height 50 mm, diameter of column 10 mm.

Colour

Column colourless with distal end red-brown in preservation. Column red-brown with physa, capitulum and tentacles yellow-cream. Insertions of mesenteries visible through column. Tentacles pale with darker banding and tips.

Cnidom

Nematocysts measured, but not identified (Carlgren 1938). Spirocysts found in tentacles.

Habitat and distribution

A deep-sea species often found with *Edwardsia capensis*. Lives between 12 – 91 m. Endemic to St. Helena Bay and False Bay. Holotype, which was collected from the mouth of False Bay, housed at Swedish Museum of Natural History. No specimens housed locally.

Genus *Halcampaster* Carlgren 1938

Halcampidae with smooth, cylindrical body without tenaculi, not divisible into regions. Mesogleal sphincter extremely weak. More than 12 tentacles. Two weak siphonoglyphs. Mesenteries usually pentamerously arranged. Only five pairs of macrocnemes, remainder microcnemes. More mesenteries than tentacles. Retractors of macrocnemes very strong, parietal muscles weak. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Halcampaster teres* Carlgren 1938**

(Plate 3, Figs A – C)

Halcampaster teres Carlgren, 1938: 24-25, text-fig. 9; 1945: 6; 1949: 35. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Column smooth, without tenaculi. Rounded, adherent base. Weak mesogleal sphincter in close proximity to ring of tentacles. Between 20 – 30 tentacles, possibly more. Tentacles able to contract entirely into column. Two weak siphonoglyphs with long cilia. Mesenteries with five pairs of macrocnemes and two pairs of directives. Retractors concentrated, parietal muscles weak, no basilar muscles. All specimens examined by Carlgren (1938) were sterile. Common name: Minute anemone.

Size

Preserved: height 2 – 8 mm, diameter of column 2 – 4 mm.

Colour

Live animals with translucent peach coloured column and pale tentacles, with feint white blotches. Column may also be a yellowish cream colour. Uniform cream colour in preservation.

Cnidom (Carlgren 1945)

Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores. Column: basitrichs (small and large), microbasic *p*-mastigophores. Tentacles: basitrichs, microbasic *p*-mastigophores, spirocysts.

Habitat and distribution

Tiny anemone found close to shore amongst gravel or attached to the sea grass *Zostera capensis*. Range extends from Sea Point on the West Coast to East London, on the South Coast. Endemic to South Africa. Syntype housed at SAM. Three photographic records, no additional specimens. Photographic records from Rooi Els, Sea Point and Knysna Lagoon.

Genus *Halianthella* Kwietniewski 1896

Halcampidae with body divisible into scapus and scapulus, the former with a thin cuticle. Pedal disc adherent, without basilar muscles. Scapus without batteries of nematocysts. Two sphincters. Same number of tentacles as mesenteries. Two weak siphonoglyphs, two pairs of directives, and six pairs of both macrocnemes and microcnemes. Retractors of macrocnemes strong. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Halianthella annularis Carlgren 1938

(Plate 3, Figs D – G)

Halianthella annularis Carlgren, 1938: 26-27; 1945: 6; 1949: 35. Day, 1974: 40. Acuña & Griffiths, 2004: 195. Branch *et al.*, 2010: 26, pl. 6.7.

Diagnosis and description

Scapus slender, without batteries of nematocysts, and with thin adhesive cuticle that is easily shed. Scapulus evident. Base of column with thin cuticle, flattened into adherent pedal disc. Two sphincters: short upper sphincter close to tentacles, lower sphincter longer. Always with 24 elongate tentacles, of which the innermost cycle may point upright. Two weak siphonoglyphs. Actinopharynx consists of six high ridges. Six pairs of macrocnemes, two pairs of directives, six pairs of microcnemes. Mesenterial insertions clear in preserved specimens. Retractors of macrocnemes kidney-shaped, basilar muscles absent. Young carried in an inconspicuous brood pouch near the upper part of the scapus. Ova large and juveniles emerge as fully-formed individuals. Common name: Brooding anemone.

Size

Live: height 14 – 22 mm, diameter of column 8 – 9 mm. Preserved: height 6 – 10 mm and diameter of column 3 – 6 mm.

Colour

Column flesh-coloured, orange, yellow or brown, with white spots at base of tentacles. Tentacles brown, red-brown or colourless, pale at the base. May have two transverse cream bands, or brown and white chevron patterns along the length of each tentacle. Tip often white. Actinopharynx colourless and embryos red.

Cnidom (Carlgren 1945)

Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores (small and large). Column: Basitrichs. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Found attached to stones or algae in intertidal zone. May be found between the grooves of kelp holdfasts at a depth of up to 9 m, or amongst shells up to depths of 79 m. Prefers sheltered areas under boulders, where surge is reduced. Carlgren (1938) reported this species as common; however, we list it as rare, as few samples were found. Distribution from Saldanha Bay on the West Coast to Richards Bay on the East Coast. Endemic to South Africa. Syntype and an additional 11 specimens at SAM.

***Halianthella* n. sp. – new species**

(Plate 3, Figs H – J)

Diagnosis and description

Scapus slender, without batteries of nematocysts, and with thin adhesive cuticle. Scapulus evident. Base of column with thin cuticle, flattened into adherent pedal disc. Two sphincters: short upper sphincter close to tentacles, lower sphincter longer. Always with 24 elongate tentacles arranged in groups of three. Innermost tentacles always point upright. Two weak siphonoglyphs. Six pairs of macrocnemes, two pairs of directives and six pairs of microcnemes. Retractors strong, basilar muscles absent. Ova and young anemones found in upper part of scapus (Plate 3, Fig. J). Common name: Clown anemone.

Size

Live: height 3 mm, diameter of oral disc 2 mm.

Colour

Column orange or red with brown stripes at base of tentacles. Lower part of tentacles white, upper part brown and tips orange, yellow or purple. Oral disc and mouth brown, embryos red (Plate 3, Fig. J). Anemone may be completely white.

Habitat and distribution

Found attached to reef and often shelter between the holdfasts of kelp (*Ecklonia maxima*). Known from depths of between 15 – 25 m. *Halianthella* n. sp. is known from only a few individuals, and is apparently endemic to False Bay and Oudekraal. This species is currently being described by Dr. Estefanía Rodríguez, assistant curator of the American Museum of Natural History.

Family Haloclavidae Verrill 1899

Proximal end usually terminating in a physa, otherwise adherent. Body elongate, rarely divisible into physa, scapus and scapulus. Column smooth or with papillae or suckers, rarely with cinclides. Sphincter usually absent. Only a few short tentacles. Inner shorter than outer, sometimes knobbed. One large siphonoglyph, which may form a conchula on oral disc. Retractors usually strong (from Carlgren, 1949).

Genus *Haloclava* Verrill 1899

Haloclavidae with elongate body and rounded base. Column indistinctly divisible into regions. Twenty longitudinal rows of papillae below tentacles, which end in acrospheres. Inner tentacles shorter than outer, 20 in number. Sphincter absent. A single well-developed siphonoglyph without conchula. Six mesenterial pairs in first cycle and four in second cycle, all perfect and fertile. Retractors strong, parietal muscles well-developed. Cnidom: basitrichs, spirocysts (from Carlgren 1949).

Verrill named *Halocampa capensis* in 1865 and until Carlgren (1938) described *Halocampa capensis* as being distinct, both species were grouped together as *Halocampa capensis*. *Halocampa capensis* is now known as *Haloclava capensis* (Carlgren 1938). Stimpson (1856) recognised *Edwardsia brevicornis* from False Bay, South Africa and Carlgren (1949) subsequently renamed it *Haloclava brevicornis*. This is the only record of *H. brevicornis* from South Africa. As the species is found in the same location as *H. capensis* and there are no apparent histological differences, I do not recognise *H. brevicornis* as a valid species from South Africa. Fautin (2011) also does not recognise this species from South Africa, and lists its distribution as limited to China.

***Haloclava capensis* (Verrill 1865)**

(Plate 4, Figs A – D)

Halocampa capensis Verrill, 1865a: 151; 1865b: 196; 1868: 319; 1869a: 101. Wright, 1866: 781. Andres, 1883: 110.

Haloclava capensis Verrill, 1899: 41. **Carlgren, 1938: 21-22**; 1949: 30. Acuña & Griffiths, 2004: 195.

Haloclava brevicornis Carlgren, 1949: 30.

Diagnosis and description

Pedal disc rounded. Column narrow, may contract to envelope tentacles when disturbed. Twenty mesenteries visible through column wall, hollow papillae on top section of column. Always 20

tentacles, inner shorter than outer with all tips ending in a bulbous swelling or acrosphere. One large siphonoglyph and 10 pairs of macrocnemes. No basilar muscles. Capable of asexual reproduction with juveniles budding from column. Common name: Speckled anemone.

Size

Live: height 12 – 30 mm, diameter of column 3 – 15 mm. Preserved: height 25 mm, diameter of column 10 mm.

Colour

Pale reddish to pink or peach, with white or brown dots on column. Tentacles white with light brown dots a third of the way from the base upwards to the tip. A distinct white line extends from the oral disc to the translucent portion of the tentacle not covered with spots. Verrill (1868) reported the lower part of six of the tentacles as having dark brown colouration, but this was not observed in any of our samples. Oral disc pale. All colour and markings lost after preservation.

Cnidom

Tentacles lacking spirocysts (Verrill 1868).

Habitat and distribution

A burrowing anemone predominantly found in sand, but may also live in mud or amongst crushed shells. Depth ranges from the intertidal to 170 m. Samples collected from Lambert's Bay on the West Coast to Port St. John's on the East Coast; however, highest densities found along the West Coast, particularly in Langebaan Lagoon. Endemic to South Africa. Thirty-six samples housed at SAM.

Genus *Peachia* Gosse 1855

Elongate with a rounded base, cinclides abundant. Column indistinctly divisible into regions, largely without tenaculi. Sphincter absent. Usually 12 tentacles, without acrospheres, inner tentacles shorter than outer. Siphonoglyph extended to form conchula. Total of 10 mesenterial pairs. Only mesenteries of first cycle perfect and fertile, with filaments and strong retractors. Larvae live parasitically on medusa. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Peachia parasitica (Agassiz 1859) – new record

(Plate 4, Figs E – F)

Bicidium parasiticum Agassiz, 1859: 23-24

Peachia parasitica Verrill, 1866: 338-339, 343. **McDermott *et al.*, 1982: 319-321.**

Diagnosis and description

Pedal disc rounded. Column perforated by numerous cinclides and covered with adhesive rugae. No sphincter. Twelve tentacles, inner tentacles shorter than outer, without acrospheres. A single very deep siphonoglyph, oral end of which is drawn out in a lobate conchula. Pairs of mesenteries 10. Only those of first cycle perfect and fertile with filaments and strong retractors. Mesenteries of the second cycle with retractors close to column. No basilar muscles. Larvae and juveniles live parasitically on medusa. Common name: Parasitic anemone.

Size

Live: height 8 mm, diameter of column 4 mm. Preserved: height 5 mm, diameter of column 2mm.

Colour

Column and tentacles pale to dark pink, transparent. Whole anemone occasionally cream in colour. Brown stripes and chevrons become visible as anemone matures.

Cnidom (Sebens 1998)

Actinopharynx, tentacles: basitrichs, spirocysts. Column: basitrichs. Filaments: basitrichs, microbasic *p*-mastigophores.

Habitat and distribution

Juveniles found living on the pelagic jellyfish *Chrysaora fulgida*. Adult settles in sandy substrata. Non-endemic, distributed along the East and West coasts of North America and on the East Coast of Greenland. The sample found in Table Bay is a new addition to the Actiniaria of South Africa. One specimen found in South Africa, housed at SAM.

***Peachia* sp. – new record**

(Plate 4, Figs G – H)

Diagnosis and description

Twenty tentacles, six inner tentacles shorter than outer. A single very deep siphonoglyph, oral end of which is drawn out in a lobate conchula.

Size

Live: diameter of oral disc 20 mm, length of outer tentacles 25 mm, length of inner tentacles 10 mm.

Colour

Tentacles striped with alternate cream, brown and white chevron patterns. Dark brown spots at base of tentacles. Conchula cream, mouth beige and white striped.

Habitat and distribution

A new addition to the anemone fauna of South Africa, found living in sandy substrata at 1 m depth in Langebaan Lagoon and between 8 – 18 m at Port Elizabeth. This anemone is known only from photographs, thus it was impossible to conclusively determine the species to which it belongs. As it has 20 tentacles, and not 12 as in *Peachia parasitica*, it is named *Peachia* sp. and is listed as non-endemic. Samples need to be collected and examined in order to determine the species; however, as these anemones are extremely elusive and burrow deep into the sand it was not possible to resolve this question during the present study.

Infraorder Thenaria Carlgren 1899

Nyantheae with basilar muscles. Base flattened, distinctly differentiated from column. Mesenteries rarely differentiated into macro- and microcnemes. Acontia present or absent (from Carlgren 1949).

Superfamily Acontiaria Stephenson 1935

Thenaria with acontia or acontia-like organs. Sphincter sometimes absent or endodermal, more commonly mesogleal (from Carlgren 1949).

Family Acontiophoridae Carlgren 1938

Acontiaria lacking sphincter. Mesenteries divisible into macro- and microcnemes. Acontia with basitrichs and microbasic amastigophores (from Carlgren 1949).

Genus *Acontiophorum* Carlgren 1938

Acontiophoridae with well-developed base. Column smooth with cinclides. Sphincter absent. Tentacles hexamerously arranged. Two siphonoglyphs. Mesenteries divisible into macro- and microcnemes, more numerous proximally than distally. Two pairs of directives. Macrocnemes, including directives, fertile. Retractors strong, parietobasilar muscles very weak, basilar muscles present. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores and microbasic amastigophores (from Carlgren 1949).

***Acontiophorum mortenseni* Carlgren 1938**

(Plate 5, Figs A – B)

Acontiophorum mortenseni Carlgren, 1938: 65-66; 1947: 15-16; 1949: 87. Hand, 1961: 76-77. Parulekar, 1968a: 529. Fautin *et al.*, 1988: 26, 31-32. England, 1990: 149-150. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Pedal disc broad with thick cuticle. Column smooth towards base, with cinclides through which acontia project when animal is distressed. Acontia sturdy with thick mesoglea. Tentacles may be completely drawn into column. Mesoglea of column strongly stratified into 48 longitudinal furrows, ectoderm thin. Circular muscles of column weak, no sphincter present. Four cycles of tentacles, hexamerously arranged. A total of 48 tentacles with the same number of mesenteries. Two siphonoglyphs and two pairs of directives. Mesenteries divisible into 12 macrocnemes, microcnemes lack acontia and both more numerous proximally than distally. Macrocnemes and directives fertile, bearing ovaries. Retractors strong, parietobasilar muscles extremely weak, basilar muscles distinct. Anemones gonochoric and sexual reproduction frequent. Common name: Pyramid anemone.

Size

Preserved and contracted: height 5 – 15 mm, diameter of column 15 – 25 mm.

Colour

Preserved, actinopharynx red-brown or colourless. Column and tentacles colourless. Has not been observed in life.

Cnidom (Carlgren 1938)

Spirocysts in tentacles. Acontia with basitrichs and microbasic amastigophores. No other nematocysts identified.

Habitat and distribution

A deep-sea species found at depths of 76 – 775 m adhering to gravel or shell fragments. Range from Hondeklip Bay on the West Coast to the Transkei on the East Coast. Species endemic to South Africa, a total of nine trawl and dredge samples kept at SAM.

Family Aiptasiidae Carlgren 1924

Acontia are with basitrichs and microbasic *p*-mastigophores. Uppermost part of column with longitudinal muscles. Cinclides in centre of column, margin tentaculate. Sphincter weak, mesogleal. Mesenteries not divisible into macro- and microcnemes. Usually six pairs of mesenteries perfect and fertile (from Carlgren 1949).

Genus *Aiptasia* Gosse 1858

Aiptasiidae with elongate, smooth column. Cinclides arranged in girdle around centre of body. Sphincter mesogleal, very weak. Margin tentaculate. Tentacles long, simple, and without projections. Siphonoglyphs present. Six pairs of perfect mesenteries. Gonads on mesenteries of first cycle and on strongest imperfect ones. Acontia well developed. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores and microbasic amastigophores (from Carlgren 1949).

Aiptasia parva Carlgren 1938

(Plate 5, Figs C – E)

Aiptasia parva Carlgren, 1938: 72-74, text-figs 34-35; 1949: 107. den Hartog, 1994: 76. Acuña & Griffiths, 2004: 195. Branch *et al.*, 2010: 26, pl. 6.6.

Diagnosis and description

Pedal disc distinct. Column smooth, thin and cylindrical, midsection dotted with non-protruding cinclides. Long acontia may be shot from the numerous cinclides. Clumps of nematocysts prevalent in lower section. Oral disc wide and cup-shaped. Mesogleal sphincter weak, short. Actinopharynx with two broad siphonoglyphs and two pairs of directives. Up to 70 tentacles, very long, smooth and slender. Hexamerously arranged and emerge from column margin. Tentacles cannot be covered entirely by column. Eight pairs of perfect mesenteries, those of the first and second cycle fertile with mature testes. Retractors of the fertile mesenteries concentrated, those of the other mesenteries weak. Parietobasilar muscles weak, basilar muscles present. Reproduce both sexually and by means of pedal laceration. Common name: Trumpet anemone.

Size

Preserved: height 8 – 14 mm, diameter of oral disc 4 – 10 mm, diameter of pedal disc 5 – 8 mm.
Live: height 55 – 60 mm, diameter of oral disc 20 – 40 mm, diameter of pedal disc 15 mm.

Colour

Column, tentacles and oral disc translucent cream, grey, pale yellow or pale olive green, with metallic white or blue flecks. Tentacles white at base, sometimes with olive stripes. Dark olive-coloured mouth with white lips. Column and oral disc yellow-blue in preservation.

Cnidom (Carlgren 1938)

Column: basitrichs (extremely abundant). Tentacles: basitrichs, microbasic mastigophores, spirocysts. Acontia: basitrichs, microbasic mastigophores.

Habitat and distribution

Previously known from the Seychelles and East London, South Africa. The range is now extended to Durban and Sodwana Bay on the East Coast. Non-endemic, found between 1 – 45 m attached to reef walls. Proliferates in tidal pools, where it covers walls in a dense mass. Two specimens housed at SAM.

Family Hormathiidae Carlgren 1932

Acontiaria with strong mesogleal sphincter. Mesenteries not divisible into macro- and microcnemes. Usually six pairs of perfect mesenteries, usually sterile. Acontia with basitrichs only. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Genus *Actinauge* Verrill 1883

Hormathiidae either with flat adherent pedal disc, or with cup-like base which encloses a cavity full of mud or small stones. Column usually elongate, divisible into scapus and scapulus. Scapus with tubercles and cuticle of different texture to scapulus. Arrangement of the tubercles variable, sometimes merging into ridges of scapulus. No cinclides. Sphincter strong, mesogleal. Tentacles approximately 96 in number, hexamerously arranged. Two well-developed siphonoglyphs. Approximately 48 mesenterial pairs, two pairs of directives. Six pairs of perfect, sterile mesenteries. Retractors of mesenteries diffuse. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

This species was previously misnamed *Actinauge richardi*; however, no literature has been published in error and it is not a synonym of *A. granulata*.

Actinauge granulata Carlgren 1928

(Plate 5, Figs F – H)

Actinauge granulata Carlgren, 1928a: 201-203; **1938: 81-82**; 1949: 94. Dunn, 1983: 50. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Adhesive base, may become invaginated and encapsulate mud when anemone contracted. Tough body wall surrounds column, which is divided into scapus and scapulus. Scapus covered with warty projections called tubercles tightly arranged in longitudinal rows. Scapulus distinct, marked by pronounced longitudinal ridges running up to mouth. Acontia abundant, but no cinclides. Mesogleal sphincter strong and anemone can contract strongly, enclosing all tentacles within the body cavity. Always 96 tentacles with the same number of mesenteries. Two siphonoglyphs and two pairs of directives. Six pairs of perfect, sterile mesenteries with concentrated retractors. Parietobasilar muscles weak, basilar muscles present. Most specimens with many small ova on filaments. Common name: White anemone.

Size

A large anemone. Preserved: height 55 – 70 mm, diameter at mid-column 50 – 55 mm. Live: height 80 mm, diameter at mid-column 60 mm.

Colour

Grey scapus and purple actinopharynx when preserved. Live specimen with white column and tentacles. Column may have patches of sand adhering to it. Mouth and actinopharynx deep maroon to brown. Insertions of mesenteries visible on oral disc as translucent white lines.

Cnidom (Carlgren 1938)

Scapulus, actinopharynx and acontia: basitrichs. Tentacles: basitrichs, spirocysts. Filaments: microbasic amastigophores.

Habitat and distribution

A large anemone currently classified as endemic to South Africa. Found from Port Nolloth on the West Coast to Agulhas Bank on the South Coast. It is probable that this species may also be found in Namibia, thus examination of Namibian collections is recommended for future studies. Common in the deep-sea between 81 – 657 m in cold water habitats. Anemones brought up in trawls and 16 specimens housed at SAM.

Genus *Amphianthus* Hertwig 1882

Hormathiidae with broad pedal disc. Column smooth or with mesogleal papillae, arranged in longitudinal rows below margin. Cinclides occurring only over directive endocoels, mounted on papilla. Sphincter mesogleal, usually strong. Tentacles robust, always fewer than mesenteries at limbus. Between 1 – 3 siphonoglyphs, same number of directives. At least six pairs of perfect mesenteries, irregularly arranged. Stronger mesenteries fertile. Retractors rather weak. Acontia well-developed. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Amphianthus capensis* Carlgren 1928**

(Plate 6, Figs A – C)

Amphianthus (Korenia) capensis Carlgren, 1928a: 222-225.

Amphianthus capensis **Carlgren, 1938: 80**; 1949: 99. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Wide, adherent pedal disc which has the ability to wrap around soft corals for purchase. Column smooth, short and covered in cinclides, through which thick acontia exit. Sphincter strong, enabling margin to close over the tentacles. Up to 110 small, thin tentacles. Either one or two siphonoglyphs. Up to nine pairs of perfect mesenteries, however, not all remaining pairs equal in size. Many more mesenteries than tentacles and either one or two pairs of directives. Variation

may be due to laceration as a means of reproduction. Retractors and parietobasilar muscles weak. Basilar muscles present. Common name: Splitting anemone.

Size

Preserved: height 10 – 15 mm, diameter of pedal disc 10 – 20 mm. Live: height 20 mm, diameter of pedal disc 25 mm.

Colour

Column yellow, but appears white when ectoderm removed. Oral disc pale yellow and tentacles dark red.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles, but no nematocysts were identified.

Habitat and distribution

A non-endemic and uncommon deep-sea species. Found in South Africa and around the Alaskan Saint Paul Island, predominantly in trawls on muddy bottoms at depths of between 95 – 623 m. Known from Port Nolloth on the West Coast to Robberg on the South Coast, but one specimen found at 12 m in Sodwana Bay on the East Coast. Seven specimens housed at SAM.

Amphianthus laevis Carlgren 1938

(Plate 6, Figs D – E)

Amphianthus laevis Carlgren, 1938: 78-79; 1949: 99. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Pedal disc thin but broad. May be extended and contorted to clutch onto octocorals. Column smooth and squat, sometimes contracting to form a teat shape above the base. Cinclides with acontia scattered around column. Sphincter extremely strong, diminishing distally. Up to 65 short tentacles, mesenteries more numerous than tentacles and asymmetrically arranged. Actinopharynx ridged with one to two siphonoglyphs. Either one or two pairs of directives. Mesenterial muscles weak. Basilar muscles present. Reproduces asexually by means of pedal laceration. Common name: Polyp anemone.

Size

Preserved: height 4 – 9 mm, diameter of column 6 – 10 mm.

Colour

A uniform yellowish or cream colour when preserved. Appearance in life has not been observed.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles, but no nematocysts were identified.

Habitat and distribution

A tiny, predominantly deep-sea anemone which is usually found wrapped around the branches of octocorals. Endemic to South Africa, where the distribution ranges from Hondeklip Bay on the West Coast to Port Elizabeth on the South Coast. Found at depths of 36 – 970 m. Nine specimens

housed at SAM, all collected from deep sea trawls and dredges. This species is much smaller than other species in this genus.

***Amphianthus natalensis* Carlgren 1938**

(Plate 6, Figs F – I)

Amphianthus natalensis Carlgren, 1938: 79-80; 1949: 99. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Pedal disc wide and may be joined to that of neighbouring individuals in dense populations. Due to strong sphincter, column can completely cover tentacles when anemone contracted. Thirty-six longitudinal lines with minute tubercles visible on column when ectoderm removed. Column dotted with cinclides, through which acontia exit. A maximum of 120 fine, translucent tentacles; fewer than the mesenteries, which are arranged regularly. Actinopharynx slightly creased, two siphonoglyphs. Between six and 12 perfect mesenteries and two pairs of directives. All mesenterial muscles weak. Basilar muscles present. Common name: Patterned anemone.

Size

Preserved: height of column 10 mm, diameter of column 5 mm. Live: height of column 15 mm, diameter of column 15 mm.

Colour

Two different colour variations. Column may be white or cream, with thin black or brown stripes and dots arranged irregularly. Tentacles translucent white, oral disc cream. Alternatively, column may be yellow or white, with thick black or brown stripes and no dots. Tentacles and oral disc white. Anemones lose all patterning when preserved.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles, but no nematocysts were identified.

Habitat and distribution

Closely resembles the genus *Nemanthus* and easily confused with *Nemanthus nitidus* due to its distinct patterning. Known range extends from the Agulhas Bank on the South Coast to Sodwana Bay on the East Coast. Endemic to South Africa, found between 21 – 804 m. Usually found in shallower water than other species of this genus, thus commonly encountered by SCUBA divers. Common in the warmer waters of the East Coast. Eleven specimens housed in SAM.

Genus *Calliactis* Verrill 1869

Hormathiidae with well-developed base. Column smooth, not or only slightly differentiated into scapus and scapulus. Cinclides present proximally. Sphincter strong, mesogleal. Tentacles rather short, conical, more numerous than proximal mesenteries. Two broad siphonoglyphs, two pairs of directives. Six pairs of perfect mesenteries, all sterile. Retractors of mesenteries fairly weak, parietobasilar and basilar muscles usually weak. Often commensal with hermit crabs. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Calliactis algoaensis* Carlgren 1938**

(Plate 7, Figs A – B)

Calliactis algoaensis **Carlgren, 1938: 74-76; 1949: 97.**

Calliactis algoaensis England, 1971: 27-29. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Wide pedal disc may cover entire surface area of the gastropod shells to which anemone attaches. Column thick, with superficial ectodermal invaginations, through which thin acontia

may penetrate. Column divisible into a scapus and scapulus, although this division may not always be clear. Sphincter strong and long, but tapers towards end. Tentacles numerous, may be 290 or more, with inner tentacles shorter than outer. Actinopharynx with eight wide ridges. Up to 48 pairs of mesenteries. Two extra cycles may be present distally. Retractors weak, basilar muscles present. Small ova on filaments. Common name: Hermit anemone.

Size

Live and expanded: height 80 mm, diameter of column 40 mm, inner tentacles 40 mm. Preserved: height 10 – 45 mm, diameter of oral disc 6 – 25 mm, diameter of base 15 – 50 mm.

Colour

Column yellow or white, with 12 or more longitudinal bands of olive or brown dots. Tentacles dark red to purple, but colourless at base. Oral disc white, with red-brown stripes indicating insertion of mesenteries. Actinopharynx pale yellow or white.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles, but no nematocysts were identified.

Habitat and distribution

Mutualistic with gastropods and lives on shells inhabited by the hermit crab *Dardanus venosus*. Found from Port Elizabeth on the South Coast to Sodwana Bay on the East Coast; endemic to South Africa. A deep water species found between 66 – 850 m depth. Fairly uncommon and only four specimens housed at SAM.

Calliactis polypus (Forsskål 1775)

(Plate 7, Figs C – E)

Priapus polypus Forsskål, 1775: 102; 1776: 8.

Actinia decorate Dana, 1846: 139-140.

Adamsia decorata Milne Edwards, 1857: 281. Andres, 1883: 162-163.

Calliactis decorata Carlgren, 1949: 97.

Calliactis polypus Hertwig, 1882b: 74-76, 130. Carlgren, 1900: 55-57; 1938: 76-77; 1949: 97. England, 1971: 23-29, pl. 1, figs A-C. Acuña & Griffiths, 2004: 195. Fautin *et al.*, 2007a: 552, 564-566, text-figs 15-16. Branch *et al.*, 2010: 24, pl. 5.8.

Adamsia miriam Haddon & Shackleton, 1893: 117, 130-131.

Calliactis miriam Haddon, 1898: 398, 457, pl. 23, fig. 25. Carlgren, 1949: 98.

Calliactis armillatas Verrill, 1928: 20-21.

Diagnosis and description

Pedal disc wide and adhesive, characteristically spread across gastropod shells inhabited by hermit crabs. Column smooth, with a row of 24 cinclides circling lower portion, weak division between scapus and scapulus. Acontia may be ejected through cinclides on the lower column in large amounts. Strong mesogleal sphincter narrows towards base. Tentacles may be completely engulfed by column. Column wall extremely thin at pedal disc, with more than 150 septa visible through ectoderm. Long, slender tentacles near margin. Outer tentacles shorter than inner, commonly 384 or fewer, but may be more than 600. Tentacles arranged in cycles of 12 or multiples thereof. Two siphonoglyphs. Forty-eight pairs of mesenteries in total, first cycle consisting of six perfect pairs. Second cycle imperfect and sterile. Reproductive organs visible on septa of third and fourth cycles. Only males have been observed with mature gametes. Mesenteries diminish towards base, but all with diffuse retractors. Parietobasilar muscles weak, basilar muscles strong. May be up to six individuals per gastropod shell. Distinguishable from *C. parasitica* by colour and musculature. Circular muscles of column differentiated into two types in *C. parasitica* and only one type observed in *C. polypus*. Common name: Symbiotic anemone.

Size

Preserved and contracted: height 5 – 30 mm, breadth of pedal disc 40 – 50 mm. Column length and basal diameter generally similar.

Colour

Column mottled brown from margin to cinclides. White and violet lines run from white bulges of cinclides to pedal disc. Acontia pink or purple. Tentacles cream with pale violet, rose or orange spots. Oral disc light brown fading into white around red-lipped mouth.

Cnidom (England 1971)

Acontia: basitrichs. Actinopharynx: basitrichs (small and large). Column: basitrichs, microbasic *p*-mastigophores. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Commonly attach to gastropod shells at depth, forming a symbiotic relationship with resident hermit crabs. Cosmopolitan, with range stretching across the Equator from the Central Pacific off Mexico and Peru to the East Coasts of Australia and South Africa. Found locally from Strandfontein on the West Coast to Sodwana Bay on the East Coast. Four specimens, which were collected from between 18 – 201 m depth, are housed at SAM.

Genus *Phelliactis* Simon 1892

Hormathiidae with well developed base. Body often asymmetrical. Column divisible into scapus and scapulus, former with cuticle and irregularly arranged tubercles of varying size. Sphincter mesogleal. Tentacles more than 100, fewer than proximal mesenteries. Oral disc wide, sometimes forming two lobes. Two well-developed siphonoglyphs. Between 6 – 8 pairs of perfect mesenteries, sterile. Perfect mesenteries may pair with imperfect mesenteries. Retractors

and parietobasilar muscles weak. Acontia well developed. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Phelliactis algoensis* Carlgren 1928**

(Plate 7, Figs F – G)

Phelliactis algoensis Carlgren, 1928a: 208-211; 1949: 96. Riemann-Zürneck, 1973: 295, 301. Acuña & Griffiths, 2004: 195.

Phelliactis algoensis Carlgren, 1938: 82-83.

Diagnosis and description

Upper column irregularly covered with large tubercles, decreasing in size towards pedal disc. Body divisible into scapus and scapulus, the former with a thick cuticle and acontia. Sphincter smooth and broad, decreasing in width towards base. Tentacles thickened at base, 148 in number. Column can enclose all tentacles when anemone contracted. Wide oral disc with high ridges. More than 148 mesenteries arranged irregularly, the seven perfect pairs in second cycle sterile. Basilar muscles present. Common name: Gravel anemone.

Size

Preserved: height 50 – 95 mm, diameter of column 34 – 65 mm.

Colour

Unknown - anemone only observed in preserved state. No live samples photographed or described.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles. Nematocysts were measured, but not identified.

Habitat and distribution

Endemic to South Africa and found at a depth of approximately 40 m. Only two records exist for this species, one off Cape Point and the other from Algoa Bay on the South Coast. One trawled specimen housed at SAM.

***Phelliactis capensis* Carlgren 1938**

(Plate 8, Figs A – C)

Phelliactis capensis **Carlgren, 1938: 83**; 1949: 96. Riemann-Zürneck, 1973: 295, 301. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Column asymmetrical, with thick body wall and acontia, divisible into scapus and scapulus. Large tubercles at margin, decreasing in size towards pedal disc. Sphincter separated from endodermal muscles, broad but tapering proximally. Many tentacles, usually 148, with weak longitudinal muscles. Wide oral disc with radial ridges. Actinopharynx furrowed, two siphonoglyphs. More than 176 mesenteries at base with six perfect pairs in the second cycle, and an additional two single mesenteries perfect. Fewer mesenteries towards the margin. Basilar muscles present. All specimens examined sterile. Common name: Pearl anemone.

Size

Preserved: height 52 – 100 mm, diameter of column 55 – 90 mm.

Colour

Tentacles orange. Grooves between tubercles pale pink to orange. Column white.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles. Nematocysts were measured, but not identified.

Habitat and distribution

A rare, endemic deep-sea species found between 560 – 1200 m depth. Known from three specimens found in False Bay, Agulhas Bank and St. Lucia respectively. One specimen deposited in SAM.

Family Isophelliidae Stephenson 1935

Sphincter mesogleal. Mesenteries divisible into macro- and microcnemes, the latter may have filaments and acontia with basitrichs and microbasic amastigophores (from Carlgren 1949).

Genus *Isophellia* Carlgren 1900

Small pedal disc and cylindrical, elongate body. Column divisible into scapus and scapulus, former with tenaculi and cinclides. Sphincter mesogleal. Tentacles short, inner longer than outer. Hexamerously arranged and more numerous than proximal mesenteries. Two siphonoglyphs. Mesenteries divisible into macro- and microcnemes; those of first cycle, and occasionally of second cycle, macrocnemes. Microcnemes with weaker retractors than macrocnemes. Second cycle with mesenterial pairs of uneven strength. Parietal muscles may be well-developed, basilar muscles distinct. Mesenteries of first cycle and stronger mesenteries of second cycle fertile. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores and microbasic amastigophores (from Carlgren 1949).

Isophellia algoaensis Carlgren 1928

(Plate 8, Figs D – F)

Isophellia algoaensis Carlgren, 1928a: 236-239; 1949: 89. Acuña & Griffiths, 2004: 195.

Isophellia algoaensis Carlgren, 1938: 67.

Diagnosis and description

Smooth, elongated column consisting of scapus with tenaculi and cinclides, and scapulus. Anemone may invaginate at base when removed from substratum. Sphincter mesogleal. Up to 96 short tentacles, more numerous than proximal mesenteries. Acontia well developed. Weak sphincter, two siphonoglyphs and two pairs of directives. Twenty-four pairs of mesenteries at base. Six pairs of perfect mesenteries in both the first and second cycles. Weaker mesenteries of second cycle consist of perfect mesenteries paired with imperfect mesenteries. All mesenteries of the third cycle weak and imperfect. All mesenteries symmetrically orientated with respect to directives. Perfect mesenteries with strong retractors and weak parietobasilar muscles. Basilar muscles present. Common name: Rugby ball anemone.

Size

Preserved: height 20 mm, invagination 5 mm, diameter of column 9 – 12 mm.

Colour

Column translucent white with mesenterial insertions showing through as solid white lines. Filaments visible through column. Tentacles bright orange.

Cnidom

Carlgren (1938) reported spirocysts being present in the tentacles. Nematocysts were measured, but not identified.

Habitat and distribution

Deep-sea species endemic to South Africa. Trawled from depths of up to 1240 m between Hondeklip Bay on the West Coast to East London on the South Coast. Most common on the West Coast, where it is found in great abundance. Eleven trawl specimens in SAM.

Genus *Litophellia* Carlgren 1938

Small but distinct base. Column elongate, smooth, without tenaculi or cuticle. Cinclides present. Margin tentaculate. Sphincter strong, mesogleal. Tentacles and mesenteries octamerously arranged. Only one siphonoglyph and one pair of directives. As many mesenteries at base as at margin. Eight pairs of macrocnemes, two cycles of weak microcnemes. Retractors of macrocnemes restricted, parietobasilar muscles weak. Basilar muscles and acontia present. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores, microbasic amastigophores (from Carlgren 1949).

***Litophellia octoradiata* Carlgren 1938**

(Plate 8, Figs G – H)

Litophellia octoradiata **Carlgren, 1938: 70-71**; 1945: 19; 1949: 91. Grebelny, 1982: 107. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Pedal disc small, flat and strongly adherent to rocks. Column smooth, without projections, but with cinclides and acontia. Tentacles short, 64 in total with half the number of mesenteries. Mesogleal sphincter strong. Actinopharynx long with 16 longitudinal ridges. Only one siphonoglyph. Mesenteries divisible into micro- and macrocnemes. One pair of directives. Only macrocnemes make up first cycle. Macrocnemes with strong, concentrated retractors and weak parietobasilar muscles. Basilar muscles present. Only one specimen examined, sterile. Common name: Elusive anemone.

Size

Preserved: height 8 mm, breadth of pedal disc 3 mm, breadth of oral disc 3 mm.

Colour

Column pale salmon or grey, with red spots scattered sparsely in upper part. Tentacles colourless, with irregular green stripes and white spots towards tips and dark spots at base. Oral disc pale salmon, with mesenterial insertions white and actinopharynx red.

Cnidom (Carlgren 1945)

Acontia: basitrichs, microbasic amastigophores. Column: basitrichs, microbasic *p*-mastigophores. Filaments: microbasic *p*-mastigophores (small and large).

Habitat and distribution

This species was not found during the study and the only record was collected by Carlgren in the intertidal zone at Isipingo, Durban in 1935. Endemic to South Africa. No specimens housed at SAM. Type specimen collected from Durban housed in the Natural History Museum in Stockholm.

Genus *Telmatactis* Gravier 1916

Isophelliidae with elongated column, divisible into scapus and scapulus. Scapus with wrinkled cuticle, lacking tenaculi. Scapulus short. Cinclides absent. Tentacles short, may be swollen at tips, same number as mesenteries. Siphonoglyphs well-developed. Only mesenteries of first cycle macrocnemes, all perfect. Six mesenterial pairs of second cycle and some pairs of third cycle may have filaments and acontia. Retractors of the macrocnemes strong. Acontia slender. Cnidom: spirocysts, basitrichs, microbasic *b*-mastigophores, microbasic amastigophores (from Carlgren 1949).

Telmatactis natalensis Carlgren 1938

(Plate 9, Figs A – B)

Telmatactis natalensis Carlgren, 1938: 68-69; 1949: 90. Chintiroglou *et al.*, 1989: 18-19, 24-29, 35, 37. Acuña & Griffiths, 2004: 195.

Diagnosis and description

Column divided into scapus with rough cuticle, and short scapulus. No tenaculi or cinclides, acontia present. Large oral and marginal stomata associated with macrocnemes. Approximately 72 short tentacles, longitudinally furrowed. May form acrospheres, which are bulbous swellings containing a concentration of nematocysts at tentacle tips. Sphincter long and strong with two well developed siphonoglyphs. Two pairs of directives. Same number of mesenteries as tentacles. Those of the first cycle form macrocnemes with strong retractors. Parietobasilar muscles also well developed. Basilar muscles present. Acontia and filaments holding male gametes present in second and third cycles, remaining cycles sterile. Common name: Fire anemone.

Size

Preserved: height 25 mm, breadth 20 mm, length of tentacles 9 mm.

Colour

When preserved, scapus yellow, with remainder of column and tentacles red. Live specimen red-brown with bold yellow lines running the length of each tentacle and bisecting the oral disc. Lines may be broken in some areas.

Cnidom (Carlgren 1938)

Actinopharynx: microbasic amastigophores, basitrichs, microbasic mastigophores. Acontia: microbasic amastigophores, basitrichs. Tentacles: spirocysts.

Habitat and distribution

A rare species which was not encountered during this study. Tentacles deliver a strong sting. Endemic to Durban, found intertidally attached to rocks. Only three specimens, none of which are housed at SAM. Holotype collected from Durban and housed at the Natural History Museum, Stockholm.

Family Sagartiidae Gosse 1858

Acontiaria with mesogleal sphincter. Mesenteries not differentiated into macro- and microcnemes. Acontia with microbasic amastigophores and basitrichs (from Carlgren 1949).

Genus *Anthothoe* Carlgren 1938

Sagartiidae with well-developed base. Column smooth, with cinclides, usually marked by small elevations. Margin distinct. Mesogleal sphincter strong. Tentacles numerous, short, inner longer than outer. Oral disc broad. Two siphonoglyphs and two pairs of directives. Mesenteries numerous, same number proximally and distally. At least three cycles of perfect mesenteries with first cycle sterile. Retractors of mesenteries diffuse, parietobasilar muscles weak, basilar muscles distinct. Acontia numerous (from Carlgren 1949).

After Verrill (1869a) described *Cereus stimpsonii* from the Cape of Good Hope on the West Coast of the Cape Peninsula, Carlgren (1928a) renamed it *Parathoë stimpsoni*. This name was further altered by Carlgren (1938) to *Anthothoë stimpsoni* after which, it was incorrectly synonymised with *Anthothoe chilensis*. Here I am reverting back to the correct name, *Anthothoe stimpsonii*, based on histology and according to WoRMS.

Anthothoe stimpsonii (Verrill 1869)

(Plate 9, Figs C – H)

Cereus stimpsonii Verrill, 1869a: 53-54.

Anthothoe stimpsoni **Carlgren, 1938: 86-89** (pro parte); 1939: 797; 1941: 8-9, 11; 1941b: 1, 16-17; 1949: 103. Kruger & Griffiths, 1998: 629, 632-639.

Anthothoe chilensis Branch *et al.*, 2010: 24, pl. 5.4.

Diagnosis and description

Well developed pedal disc, wider than oral disc. Smooth column with small bumps around midway, on which cinclides are situated. Longitudinal furrows mark mesenterial insertions and margin distinct. Numerous, long acontia. Sphincter strong, elongate. Between one and three well developed siphonoglyphs, indicating that longitudinal fission may be a method of reproduction. Tentacles short, ranging between 130 and 370 in number, inner longer than outer. Oral disc may be either small or large, with the tendency for larger individuals to have convoluted margins. Actinopharynx furrowed, with two pairs of directives. Mesenteries and tentacles usually equal in number. At least three cycles of perfect mesenteries with the first cycle sterile. Retractors diffuse, basilar muscles apparent and parietobasilar muscles weak. First cycle sterile with most specimens containing filaments in the remaining mesenteries. Gametes often not clear or not present. Common name: Humbug anemone.

Size

Contracted and preserved: height 4 – 20 mm, diameter of column 8 – 65 mm. Individuals larger in deeper water, but majority of animals small.

Colour

Colourless or flesh coloured when preserved, no stripes visible. Live specimens exist in many different colour varieties, ranging from green to orange. Column may be light green, brown, orange, yellow, white, transparent, grey or flesh coloured. All varieties with longitudinal stripes down column. Brown varieties tend to be larger with convoluted margins and elongated columns.

Cnidom (Carlgren 1941)

Acontia: basitrichs. Actinopharynx: basitrichs, microbasic amastigophores. Filaments: basitrichs, microbasic amastigophores, microbasic *p*-mastigophores. Tentacles: basitrichs, microbasic amastigophores, spirocysts.

Habitat and distribution

Abundant in rock pools and on reefs, often appreciated by SCUBA divers. Commonly attach to rocks, shipwrecks and bivalve shells. Non-endemic, occurring in Namibia, South Africa and on Tristan da Cunha Island from the intertidal zone down to 120 m. The range in South Africa stretches from Port Nolloth on the West Coast to Durban on the East Coast. Many specimens housed at SAM.

Genus *Phellia* Gosse 1858

Sagartiidae with pedal disc broader than oral disc. Column divisible into scapus and scapulus, former with thick cuticle and strong tenaculi. Mesogleal sphincter strong. Tentacles considerably fewer than mesenteries. Number of siphonoglyphs variable. Mesenteries and directives usually irregularly arranged and vary in number. More mesenteries proximally than distally. Perfect mesenteries with strong retractors and fairly well-developed basilar muscles. Imperfect mesenteries without retractors. Only perfect mesenteries and strongest imperfect mesenteries with filaments and fertile. Asexual reproduction common. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores, microbasic amastigophores (from Carlgren 1949).

Phellia aucklandica (Carlgren 1924)

(Plate 10, Figs A – C)

Phellia aucklandica Stephenson, 1918: 84-85. **Carlgren, 1938: 84-85**; 1941: 6-8; 1949: 104. Hand, 1976: 505, 530-537. Acuña & Griffiths, 2004: 195.

Synphellia aucklandica Carlgren, 1924b: 230-234, 1928: 263.

Diagnosis and description

Pedal disc usually broader than oral disc. Column divided into scapus, with strong tenaculi and cuticle, and scapulus. Usually 48 tentacles, but sometimes up to 78, inner tentacles longer than outer. Acontia present, no cinclides. Strong mesogleal sphincter. Actinopharynx with deep ridges. Siphonoglyphs and directives asymmetrical, both structures vary in number due to asexual reproduction. More mesenteries than tentacles with additional mesenteries proximally, all irregularly arranged. Up to 12 cycles of perfect mesenteries with strong retractors and well-developed basilar muscles, fertile. Imperfect mesenteries lack retractors and only the strongest have filaments and are fertile. Retractors of directives strong in small specimens and diffuse in large specimens. Parietobasilar muscles distinct, basilar muscles well-developed. Reproduces by means of longitudinal fission, commencing at the oral disc. Common name: Pimpled anemone.

Size

Contracted: height 8 – 12 mm, diameter of pedal disc 5 – 18 mm, diameter of oral disc 4 – 5 mm.

Live: height 75 – 120 mm, diameter of column 50 mm.

Colour

Column beige to yellow, dotted with dark spots indicating adherent tenaculi. Scapulus white, pale pink or orange. Oral disc beige, white, yellow or pale brown, with burnt-red stripes radiating from mouth. Actinopharynx white or pale yellow. Tentacles white, banded by yellow or pale brown. Base translucent white.

Cnidom

Acontia: basitrichs, microbasic amastigophores. Actinopharynx: basitrichs, microbasic amastigophores, microbasic *p*-mastigophores. Column: microbasic amastigophores. Filaments: basitrichs, microbasic *p*-mastigophores. Tentacles: basitrichs, microbasic amastigophores, spirocysts.

Habitat and distribution

Found under stones and amongst conglomerates of sand in the intertidal zone. Grains of sand may adhere to tenaculi on column. Non-endemic to South Africa. Known from Auckland Island (New Zealand), Tristan da Cunha Island, Chile, and only rarely from South Africa. One specimen in SAM from Oudekraal on the West Coast of South Africa.

Genus *Sagartia* Gosse 1855

Column with cinclides and modified adhesive verrucae (suckers). Sphincter mesogleal. Tentacles numerous. Siphonoglyphs variable in number. Same number of mesenteries proximally and distally. More than six pairs of mesenteries perfect. No differentiation of mesenteries into macro- and microcnemes. Gonads present in all mesenteries. Asexual reproduction may occur. Acontia well-developed. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores, microbasic amastigophores.

Sagartia ornata (Holdsworth 1855)

(Plate 10, Figs D – F)

Actinia ornata Holdsworth, 1855: 236-237. Gosse, 1860: 46-47.

Sagartia ornata Gosse, 1858: 415. Wright, 1859a: 178-179; 1859b: 116-117. Gosse, 1860: 54-56, 355. Haddon, 1889: 301-302. Shaw *et al.*, 1987: 21-27. Ates, 1997: 8, 18, 25-26. Ates *et al.*, 1998: 264, 271. **Acuña *et al.*, 2004: 314-317.** Branch *et al.*, 2010: 24, pl. 5.5.

Heliactis ornata Andres, 1883: 150-151.

Sagartia troglodytes var. *ornata* Stephenson, 1928: 111; 1929: 138-167; 1931: 137-138; 1935: 327-341. den Hartog, 1970: 96-97.

Diagnosis and description

Pedal disc adhesive, wider than column. Body elongate, with upper section irregularly dotted with projections, to which sand or shell fragments may adhere. Acontia and mucus extruded in copious amounts from mouth when anemone disturbed. Acontia also emitted from cinclides among the suckers and just above pedal disc. Column slightly ribbed, may appear long and slender when stretched. Up to 190 tentacles. Outer tentacles shorter than inner, the latter may form a fringe around the margin. One inner tentacle, called a catch tentacle, larger than the rest and not used for feeding. Oral disc concave and shaped as a bowl with a gentle slope to margin, which may be wavy. Diameter of pedal disc much smaller than that of oral disc. Sphincter weak. Two siphonoglyphs. Basilar muscles present. Hermaphrodite, one individual able to omit both ova and sperm. Broods young internally and releases them via the mouth. Common name: Rooted anemone.

Size

Live: height 30 – 160 mm, diameter of column 15 – 20 mm, diameter of base 15 mm.

Colour

Column dark orange or brown graduating to cream or pale pink at base. White lines run longitudinally down length of column. Projections pale. Oral disc brown around mouth, sometimes radiating to shimmering purple near margin. Ten pairs of yellow bands run from mouth to margin, marking insertions of mesenteries. Actinopharynx light pink or white. Tentacles translucent beige at tips and brown at base, with a cream-coloured spot at base of the inner two cycles. Three or more cream circles encircle the length of each tentacle and numerous pale spots apparent. Catch tentacle coloured white with yellow stripe down centre and a large white dot at base. Thirteen specimens housed at SAM.

Habitat and distribution

Introduced from Europe (Mead *et al.* 2011a). Found attached to small stones in sandy substrata or attached to *Zostera capensis*. Able to tolerate brackish water in lagoons and estuaries. Occurs in England, Ireland, Scotland, Wales, Spain, the Faroe Islands and South Africa. Common in Langebaan Lagoon on the West Coast of South Africa at an average depth of 1 m. Found up to 56 m depth in Saldanha Bay.

Superfamily Endomyaria Stephenson 1921

Thenaria usually without sphincter. Acontia absent (from Carlgren 1949).

Family Actiniidae Rafinesque 1815

Column smooth or with verrucae, acrorhagi, pseudoacrorhagi or vesicles. Projections never have macrobasic amastigophores. Sphincter absent or endodermal. Tentacles simple, never more than one communicating with each endo- and exocoel. Mesenteries not divisible into macro- and microcnemes. Usually more than six pairs of perfect mesenteries (from Carlgren 1949).

Genus *Actinia* Linnaeus 1767

Very wide pedal disc and smooth column. One ring of acrorhagi in deep fosse, not visible when column contracted. Sphincter present. Perfect mesenteries numerous. All stronger mesenteries, except directives, fertile. More mesenteries proximally than distally. Retractors diffuse. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Schama *et al.* (2012) described the South African '*Actinia equina*' as a new species, *Actinia ebhayiensis*, now the accepted name. It has been referred to as *A. mandelae* after Nelson Mandela, which was the name originally proposed; however, permission for using this name was not granted, thus it is not valid. *Actinia ebhayiensis* is distinguished from *A. equina* by genetics, muscle morphology and nematocyst measurements.

Actinia ebhayiensis Schama *et al.* 2012

(Plate 10, Figs G – I)

Actinia equina: Stephenson, 1935: 113-123. Carlgren, 1938: 29-31; 1949: 49. Kruger & Griffiths, 1998: 633. Acuña & Griffiths, 2004: 195, 198.

Actinia sp. 1 Schama *et al.*, 2005: 441.

Actinia mandelae Branch *et al.*, 2010: 24, pl. 5.6.

Actinia ebhayiensis Schama *et al.*, 2012: 885-892, figs 1-7.

Diagnosis and description

Pedal disk wider than column. Smooth, squat body with parapet. Fosse with striking blue acrorhagi between parapet and tentacles. Approximately 24 spherical acrorhagi with an aperture in each, number of acrorhagi varies with age. May be simple or irregularly lobed. Acrorhagi and tentacles can be covered by column during contraction. Anemone appears dome-shaped when constricted. Tentacles close to edge of oral disc, approximately 90. Tentacles simple and retractable, arranged in five cycles. Inner tentacles longer than outer. Mouth mounted on hypostome. Actinopharynx half the length of column, ribbed. Sphincter diffuse, endodermal.

Two large siphonoglyphs with directive pairs. Usually 48 pairs of mesenteries arranged in four cycles, first three cycles perfect. More mesenteries towards base, no fertile mesenteries observed. Retractors diffuse and long. Parietobasilar muscles diffuse and weak with small pennon attached. Basilar muscles strong. Viviparous, with evidence of asexual brooding. Have been observed bearing live young approximately 1 mm in diameter. Common name: Ripe-plum anemone.

Size

Live: breadth 50 – 70 mm, diameter of oral disc including tentacles 30 – 60 mm, height 4 – 50 mm, length of tentacles 15 – 17 mm. Preserved: diameter of pedal disc 8 – 30 mm, height 15 mm

Colour

Uniformly liver-brown, scarlet, crimson or olive green with blue, red or green acrorhagi. Underneath of pedal disc light pink. Oral disc translucent in comparison to column with faint mesenterial insertions.

Cnidom (Schama *et al.* 2012)

Acrorhagi: holotrichs. Column: basitrichs. Actinopharynx: basitrichs (large and small). Filaments: basitrichs, microbasic *b*- and *p*-mastigophores. Tentacles: basitrichs and spirocysts.

Habitat and distribution

High to low shore on sheltered rocks, in cracks, under overhangs, or in tidal pools. Often found in clusters of five or more individuals spaced two or more centimetres apart. Contracts at low tide, during which they are usually entirely exposed. Desiccation-tolerant and can withstand a range of temperatures and salinities. Rarely found in estuaries. Base adheres very strongly to rocky boulders. This species is distinguished from *A. equina* by having smaller microbasic *b*- and *p*-mastigophores in filaments. Endemic to South Africa, although samples from Western Africa currently identified as *Actinia equina*, may in fact be *A. ebhayiensis*. Fairly common on the West and South Coast of South Africa from Port Nolloth to East London. Green form found on the East Coast around Durban, maximum depth 6 m. Many specimens housed at SAM.

Genus *Anemonia* Risso 1826

Smooth column with acrorhagi, may be absent in smaller individuals. Sphincter present. Tentacles long. Column not able to close completely over tentacles. Siphonoglyphs not always connected to directives. Perfect mesenteries numerous. Retractors diffuse. Gonads on all cycles. More mesenteries at proximally than distally. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Anemonia natalensis Carlgren 1938

(Plate 11, Figs A – C)

Anemonia natalensis Carlgren, 1938: 36-37; 1949: 50. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 24, pl. 5.7.

Diagnosis and description

Wide pedal disc. Short, smooth column. Acrorhagi on margin, small vesicles interspersed between acrorhagi. Fosse shallow. Over 100 long tentacles. Sphincter weak and diffuse, usually long. Wide oral disc, with between two and seven siphonoglyphs, no directives. Between 23 – 28 perfect mesenterial pairs, more at base than at margin. Retractors weak and diffuse, basilar muscles present. Gonads present on filaments belonging to all perfect mesenteries, including those of the first cycle. Common name: Natal anemone.

Size

Live: height 10 – 20 mm, diameter of pedal disc 13 – 20 mm, diameter of oral disc 18 – 40 mm. Carlgren (1938) observed only small specimens of this species, however, larger individuals were found during this study.

Colour

Column brick-red, bright red, dark brown or purple-red. Tentacles red, brown or grey with purple, lilac or cream tips. Sometimes have two cream bands towards the bottom and one white band at base of each tentacle. Oral disc often plain brown, with brown stripes extending between each tentacle. Cream or white colouration at base of tentacles may extend inwards towards mouth, creating a striped effect. Oral disc may also be dark red with pale red stripes. Actinopharynx red, pink or orange; lips may project outwards forming a hypostome. Vesicles pale or red.

Cnidom (Carlgren 1938)

Column, vesicles: basitrichs. Acrorhagi: atrichs. Actinopharynx: amastigophores or mastigophores. Tentacles: basitrichs and spirocysts.

Habitat and distribution

Adheres to rocky reefs and is often found in rock pools. Endemic, restricted to the East Coast of South Africa around Durban, St. Lucia and Sodwana Bay. Common intertidally with a depth range that does not extend below 2 m. Nine specimens house in SAM.

Genus *Anthopleura* Duchassaing de Fonbressin & Michelotti 1860

Well-developed pedal disc. Column with adhesive verrucae arranged in longitudinal rows. Acrorhagi present and sphincter present. Tentacles simple. Strongest perfect mesenteries fertile. Younger mesenteries grow from basal disc upwards. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Anthopleura aneae Carlgren 1940

(Plate 11, Figs D – F)

Anthopleura aneae Carlgren, 1940a: 1-3; 1949: 53. England, 1987: 239. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Pedal disc slightly wider than oral disc. Column with fosse. Column with 6 – 10 longitudinal rows of simple, adhesive verrucae. Each row with 48 widely spaced verrucae. Acrorhagi vary in number and appearance, approximately 20 but may be absent in small individuals. Up to 90 simple tentacles. Sphincter strong. Two siphonoglyphs with two pairs of directives attached. All stronger mesenteries with strong, diffuse retractors and fertile ovaries. Directives sterile. Young mesenteries added at base and have strong, concentrated retractors. Parietobasilar muscles strong, basilar muscles present. Common name: Pale anemone.

Size

Preserved and contracted: height 12 mm, diameter of pedal disc 2 – 3 mm. A relatively small species.

Colour

Colour variable. Column yellow, orange, cream, grey or light pink and usually darker towards margin. Oral disc white, colourless, grey, brown, beige, red or purple and commonly striped. Tentacles either a solid pale colour, or transparent with numerous pale dots. Actinopharynx white, yellow, light brown or cream. Verrucae typically bright red, but may also be pink, grey or brown. Acrorhagi pale brown or cream.

Cnidom (Carlgren 1940a)

Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores. Column: atrichs, basitrichs. Tentacles: basitrichs, spirocysts. Acrorhagi: atrichs.

Habitat and distribution

Attach to rocks in rock pools or on subtidal reef. Also common amongst kelp holdfasts. Sand may stick to verrucae. Differs from *Anthopleura michaelseni* by habitat and a reduced ability to contract column. Endemic, widely distributed around the coastline. Range extends from Langebaan Lagoon on the West Coast to St. Lucia on the East Coast. Found in the intertidal zone down to 15 m. Four specimens housed at SAM.

***Anthopleura insignis* Carlgren 1940**

(Plate 11, Figs G – I)

Anthopleura insignis **Carlgren, 1940a: 3-5**; 1949: 53. England, 1987: 239. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Pedal disc fairly wide when attached to rocks, but relatively narrow when anemone contracts. Between 2 – 3 rows of densely-packed verrucae just below margin, thinning out considerably towards base. Acrorhagi in fosse, number dependant on size of anemone, not easily visible. Up to 96 tentacles. Sphincter very weak. Two siphonoglyphs with two pairs of directives. Mesenteries 96 with diffuse retractors and strong parietobasilar muscles. Basilar muscles present. Common name: Hiding anemone.

Size

Live: height 37 mm, diameter of pedal disc 32 mm, diameter of oral disc 40 – 45 mm. Larger than *Anthopleura aneae*.

Colour

Column either consistently grey or two-toned with orange near the pedal disc and grey near margin. Projections and acrorhagi pale grey. Oral disc brown, grey or white; usually unpatterned. Tentacles translucent white or grey and may have purple tips or a stripe with scattered pale dots.

Cnidom (Carlgren 1940a)

Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores. Column: atrichs, basitrichs. Tentacles: basitrichs, spirocysts. Acrorhagi: atrichs.

Habitat and distribution

May be mistaken for a burrowing species, as they typically attach to stones beneath sand. Very similar to *Anthopleura michaelsoni* but with an unmarked oral disc, a weaker sphincter and a greater number of projections on upper column, which is always covered by coarse sand grains. Endemic, a moderately common species in the intertidal, reaching depths of 26 m. More commonly observed by SCUBA divers. Found on the West, South and East Coasts from Table Bay to Durban. Two specimens housed at SAM.

***Anthopleura michaelsoni* (Pax 1920)**

(Plate 12, Figs A – C)

Actinioides angrae pequenae Pax, 1907: 17, 79-83 (pro parte); 1908: 490-493, 497, 500, pl. 15, figs 5-6.

Phymactis capensis Pax, 1908: 485-488, 497, 500 (pro parte).

Bunodactis michaelsoni Pax, 1920: 31-33; Pax, 1924: 11-12. Carlgren, 1938: 49.

Bunodactis gigas Pax, 1926: 23-26 (pro parte).

Anthopleura michaelsoni **Carlgren, 1938: 45-49** (pro parte); 1939: 792; 1949: 53. Kruger & Griffiths, 1998: 629, 633-636, 638-639, 642. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 26, pl. 6.9.

Diagnosis and description

Column dotted with approximately 15 longitudinal rows of simple, adhesive verrucae, at least 48 verrucae per row. Numerous in first 5 – 6 rows below margin, but diminish towards base. Parapet and fosse present, the latter containing 24 – 28 acrorhagi. Sphincter circumscribed, usually weak. Up to 96 long, thick tentacles. Actinopharynx with two siphonoglyphs, to which two pairs

of directives are attached. Retractors diffuse, basilar muscles present. Common name: Long-tentacle or crevice anemone.

Size

Contracted: height 20 – 60 mm, diameter of column 35 – 55 mm.

Colour

Extensive colour variations occur within the species. Texture of upper column usually appears mossy due to densely packed verrucae. Column dark green, dark brown, light brown, light blue, dull orange, dirty pink, cream, maroon, grey, or a combination of these colours; graduating upwards towards margin. Tentacles white, cream, grey, pale yellow, pink-purple, brown or light blue. Often with solid white stripes running the length of each tentacle. Some with purple tips and others with a bright red or white stripe, or white dots, down length of the tentacle. Actinopharynx orange, grey, colourless, cream or red. Oral disc cream, grey, dirty yellow, brown, orange or maroon. Either unmarked or with stripes on oral disc formed by merging of tentacle colour with that of oral disc. Some with star pattern of red-brown, yellow-brown and dark brown. Verrucae typically blend in with column colour, although may be red on an olive column. Often laden with sand and shell fragments. Acrorhagi pale pink, cream or light brown.

Cnidom (Carlgren 1938)

Column: basitrichs, atrichs. Acrorhagi: atrichs. Tentacles: basitrichs, spirocysts. Actinopharynx, filaments: basitrichs, microbasic amastigophores.

Habitat and distribution

Attached to stones in sand gullies or reef covered in sand. Also found in sandy cracks or gullies from intertidal zone down to 36 m. Solitary. Non-endemic to South Africa. A very common species in Namibia and on the West, South and East Coasts of South Africa from Port Nolloth to Bhangana Nek. Twenty-five specimens in SAM.

Genus *Anthostella* Carlgren 1938

Smooth column with longitudinal rows of spots (nematocyst batteries). Fosse not pronounced. Acrorhagi and pseudoacrorhagi. Sphincter diffuse. Two siphonoglyphs, two pairs of directives. Few mesenteries, not more numerous proximally than distally. Mesenteries of first and second cycles perfect. Besides directives and weak mesenteries, all mesenteries fertile. Retractors diffuse, parietobasilar muscles strong, basilar muscles weak. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Anthostella stephensoni* Carlgren 1938**

(Plate 12, Figs D – F)

Anthostella stephensoni Carlgren, 1938: 38-40; 1945: 9; 1949: 50. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 26, pl. 6.4.

Diagnosis and description

Column smooth with spots arranged in longitudinal rows along the length of the column. Small fosse and large bifurcated acrorhagi with vesicles interspersed. Oral disc wide and spread out on surface of substratum. Actinopharynx longitudinally ridged. Sphincter diffuse, but well developed, two narrow siphonoglyphs and two pairs of directives. Tentacles short and stubby with inverted tips, 48 in total. Only 24 mesenteries, first and second cycles perfect with a constant number throughout. All strong mesenteries fertile except directives. Retractors diffuse, parietobasilar muscles strong, basilar muscles weak. Common name: Violet-spotted anemone.

Size

Preserved: Height 30 mm, diameter of oral disc 20 – 70 mm, diameter of column 15 – 16 mm.

Colour

Base cream or orange. Column dull yellow or scarlet with bright violet or maroon spots, the largest of which may be circled with orange. Orange circles forming lines marking mesenterial insertions near margin and base. Fosse orange or scarlet. Acrorhagi cream with a stripe of bright violet or maroon and orange. Tentacles cream graduating into yellow or violet at tip and sometimes with a thin, light lilac or bold orange longitudinal stripe. May have a grey line encircling each tentacle midway, as well as a bow-shaped pattern at base. Oral disc cream or yellow-cream with (usually thin but sometimes thick) pale orange, red-orange or scarlet streaks marking mesenterial insertions. Mouth cream or orange with two violet spots on either end marking siphonoglyphs. Actinopharynx orange.

Cnidom (Carlgren 1945)

Acrorhagi: atrichs. Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores. Column, vesicles: basitrichs. Tentacles: basitrichs, spirocysts. Acrorhagi: atrichs.

Habitat and distribution

Endemic to South Africa. Found from 0 – 42 m on rocky reef, usually covered in a thin layer of sand. Able to stretch column considerably to reach food. Range extends from Cape Columbine on the West Coast to St. Lucia on the East Coast. Six specimens housed at SAM.

***Anthostella n. sp.* – new species**

(Plate 12, Figs G – I)

Anthostella n. sp. Branch *et al.*, 2010: 26, pl. 6.5.

Diagnosis and description

A very small *Anthostella* species with an elongated body and strongly adhesive pedal disc. Column smooth and short when relaxed. Acrorhagi prominent around margin and 5 – 15 rows of nematocyst batteries arranged in vertical rows on column. Number of batteries dependent on anemone size. Up to 48 short, stubby tentacles hexamerously arranged in four cycles: six tentacles in the first and second cycles, 12 in the third and 24 in the fourth cycle. Tentacle length approximately half of oral disc diameter, outer tentacular cycle slightly longer than inner. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Weak marginal sphincter. Two siphonoglyphs with directives attached. First cycle with all mesenteries perfect; second, third and fourth cycles all with imperfect mesenteries. All specimens examined infertile. Retractor muscles restricted, relatively small. Parietal muscles poorly developed, parietobasilar muscles strong. Basilar muscles extremely weak or not present. Common name: Dwarf spotted anemone.

Size

Live: height 6 – 12 mm, diameter of oral disc 6 – 10 mm. Preserved: height 15 mm, diameter of oral disc 8 mm, diameter of mid-column 11 mm, diameter of pedal disc 10 mm, average length of oral tentacles 5.6 mm, average length of marginal tentacles 7.5 mm.

Colour

Acrorhagi and nematocyst batteries marked by maroon, violet or purple spots on column. Column pale yellow-orange, without sand grains or debris attached. Tentacles white with violet or purple tips. Oral disc most commonly translucent and unmarked, but mesenterial insertions

may be displayed by white stripes radiating from the mouth of larger specimens. Mouth white or pale yellow, occasionally marked by a purple ring. Siphonoglyphs marked by purple spots.

Cnidom

Spirocysts, basitrichs, microbasic *p*-mastigophores, holotrichs. Both small and large basitrichs found in mesenterial filaments.

Habitat and distribution

Attaches to exposed rocky reef and typically extends column up to four times its body length to reach food. A new species endemic to South Africa. Found from Cape Columbine on the West Coast to Aliwal Shoal on the East Coast from 9 – 29 m depth. Slides of holotype deposited in SAM. See description of *Anthostella* n. sp. in Chapter 2 for details of material examined.

Genus *Bolocera* Gosse 1860

Column smooth, without acrorhagi or verrucae. Sphincter diffuse. Tentacles long, hexamerously arranged near margin. Each tentacle with endodermal sphincter at base, allowing tentacle to be shed. Siphonoglyphs well-developed. Perfect pairs of mesenteries numerous. Two pairs of directives. Retractors diffuse. Mesenteries equal proximally and distally. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Bolocera kerguelensis was first described by Studer (1879). Carlgren described the South African specimen he found in 1928 as *Bolocera capensis*; however, this species was found to be a synonym of *B. kerguelensis* by Carlgren (1949).

***Bolocera kerguelensis* Studer 1879**

(Plate 13, Figs A – B)

Bolocera kerguelensis Studer, 1879: 544. Kwietniewski, 1896: 592-595, 602, table 25, fig. 7, table 26, figs 9-11. Carlgren, 1927b: 97; 1928a: 144-146; 1949: 54. Acuña & Griffiths, 2004: 196. Rodríguez *et al.*, 2007: 1879, 1890, 1899.

Bolocera longicornis Stephenson, 1918a: 20-23; 1918b: 116-117.

Bolocera capensis **Carlgren, 1928a: 146-148**; 1938: 41; 1949: 54.

Bolocera tuediae subspecies *occidua* Riemann-Zürneck, 1980: 20-24. Häussermann & Försterra, 2005: 96.

Liponema capensis Doumenc, 1984: 149.

Bolocera tuediae subspecies *kerguelensis* Riemann-Zürneck, 1986: 115, 119, 121-125.

Diagnosis and description

Pedal disc adhesive. Column smooth, cylindrical with base and margin of equal diameter. Up to 160 long tentacles arranged close to margin. Each tentacle with an endodermal sphincter allowing tentacles to be shed from the base. Sphincter diffuse. Large siphonoglyphs with two pairs of directives. Perfect pairs of mesenteries numerous, all fertile. Number of mesenteries constant from margin to base. Retractors diffuse, basilar muscles present. Common name: Tentacle-shedding anemone.

Size

Preserved: height 40 – 50 mm, diameter of column 30 – 35 mm.

Colour

Uniformly pink or orange from base to oral disc. Tentacles matching the column, also unmarked.

Cnidom

Dimensions measured by Carlgren (1938), but nematocysts were not identified. Spirocysts were reported in the tentacles.

Habitat and distribution

Non-endemic to South Africa. A deep-sea species restricted to the Southern Hemisphere. Found in Antarctica, South America and South Africa, where it is common on the West and South Coasts in depths of 81 – 750 m. Local range extends from Port Nolloth near the Namibian border to the Agulhas Bank on the South Coast, where they are commonly caught as bycatch in trawl nets. It is probable that this species may also be found in Namibia, thus examination of Namibian collections is recommended for future studies. Twenty-seven samples at SAM.

Genus *Bunodactis* Verrill 1899

Majority of column with usually simple, adhesive verrucae. Sometimes arranged in vertical rows. Acrorhagi absent, sometimes pseudoacrorhagi. Sphincter present. Tentacles short and simple. Usually two pairs of directives. All stronger mesenteries fertile, directives may be sterile. Retractors strong. Mesenteries more numerous proximal than distally. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Dunn *et al.* (1980) argues that Carlgren's (1949) *Bunodactis reynaudi* should in fact be *Aulactinia reynaudi* due to the adhesive verrucae on the column and the acrorhagi found around the margin. However, Carlgren's species has pseudoacrorhagi, which *Aulactinia* lacks by definition. Therefore, along with other authors (England, 1987; Acuña *et al.*, 2007; Rodríguez *et al.* 2007), I maintain Carlgren's *Bunodactis reynaudi* as a valid species.

***Bunodactis reynaudi* (Milne Edwards 1857)**

(Plate 13, Figs C – E)

Cystiactis reynaudi Milne Edwards, 1857a: 276. Carlgren, 1938: 44. Dunn *et al.*, 1980: 207.

Phymactis capensis Pax, 1908: 485-488, 497, 500; 1920: 30.

Bunodactis gigas Pax, 1926: 23-26. Carlgren, 1938: 44-45, 48 (pro parte).

Bunodactis michaelsoni Pax, 1926: 4-5, 21-26.

Bunodactis reynaudi **Carlgren, 1938: 42-45**; 1939: 792 (pro parte); 1949: 65. Zamponi, 1977: 149-151. England, 1987: 255. Fautin, 1988a: 231. Zamponi, 1989: 1-43. Kruger & Griffiths, 1998: 629, 632, 633-639, 641-642. Acuña & Griffiths, 2004: 193, 196.

Aulactinia reynaudi Patronelli *et al.*, 2005: 101, 103-107. Branch *et al.*, 2010: 26, pl. 6.3.

Diagnosis and description

Pedal disc wide and extremely adhesive. Entire column covered with multitudes of tightly packed, simple, adhesive verrucae. Verrucae near the margin lobed and flattened, the uppermost rising above parapet. No acrorhagi at margin, but pseudoacrorhagi present. Tentacles short in comparison to large oral disc, up to 384 in number. Inner tentacles tear-drop shaped, narrowing towards tip. Sphincter strong. Two large siphonoglyphs and two pairs of directives. Perfect mesenteries fertile, numerous. Directives usually sterile. Mesenteries added from base, therefore, fewer mesenteries at margin. Retractors strong and concentrated, basilar muscles present. Common name: Sandy anemone.

Size

Live: height 55 mm, diameter of column 80 mm, length of inner tentacles 10 mm.

Colour

Extremely variable with regards to colour. Column green, grey, brown, pale blue, dark purple or orange. Tentacles brown, grey, pink, pale blue, purple, cream, white or orange, either with opaque white spots running from base to tips, or unmarked. Oral disc brown, rust, pale blue, yellow or brown. Verrucae on column create the appearance of a mossy texture, mostly dark green, grey or brown, but also pale.

Cnidom

Only the atrichs of the column were identified by Carlgren (1938). Spirocysts were present in the tentacles.

Habitat and distribution

Often covering large areas of flat rock on the shore, forming anemone carpets. Shell fragments often adhere to verrucae. Mass spawning events have been observed. Non-endemic, found in Namibia and South Africa, where it is a common rocky shore species. In South Africa it is found around the entire coastline from Port Nolloth on the West Coast to St. Lucia on the East Coast. Much more abundant on the West Coast, where it adheres to rocks or mussel shells at depths of 0 – 30 m. Forty-one specimens housed at SAM.

Genus *Bunodosoma* Verrill 1899

Column with rounded vesicles forming weak nematocyst batteries. Fosse with ring of acrorhagi. Sphincter well-developed. Tentacles and mesenteries hexamerously arranged. Two siphonoglyphs and two pairs of directives. Perfect pairs of mesenteries numerous. Apart from directives, all stronger mesenteries fertile. More mesenteries proximally than distally. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Bunodosoma capense* (Lesson 1830)**

(Plate 13, Figs G – I)

Actinia capensis Lesson, 1830: 76, pl. 2, fig. 4.

Actinia clematis Drayton in Dana, 1846: 130-131. Dana, 1848: 130-131; 1859: 6.

Actinia florida Drayton in Dana, 1846: 131-132.

Bunodosoma capensis Carlgren, 1928a: 169-172; **1938: 51-53** (pro parte); 1939: 794; 1945: 9; 1949: 51 (pro parte). Kruger & Griffiths, 1998: 633-636, 638-639, 641. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 26, pl. 6.2.

Diagnosis and description

Wide pedal disc, often corrugated over uneven substratum. Column tall with longitudinal rows of simple, round, non-adhesive vesicles, arranged horizontally. Vesicles forming weak nematocyst batteries. A single ring of large acrorhagi in fosse. Up to 192 short tentacles. Oral disc wide, with long, ridged actinopharynx. Mouth occasionally lobed. Sphincter strong. Two large siphonoglyphs and two pairs of directives. Many pairs of perfect mesenteries, all fertile. Mesenteries increase in number from 96 pairs in the margin to about 186 in the lower column. Retractors diffuse, basilar muscles present. Common name: Knobbly anemone.

Size

Live: height 35 mm, diameter at base 13 mm.

Colour

Many colour variations occur, usually with base colour contrasting with vesicle colour. Typical colours for the column include red, blue, orange, white, butter yellow, bright yellow, pink or pale rose. Column may be a mottled mixture of two colours, for example blue and white. Vesicles may be blue, purple, pink, grey or brown. Tentacles typically blue, red, orange, grey, lilac or red-brown, usually darkening towards tips. Inner tentacles often lighter than outer tentacles. Oral disc usually unmarked and of the same hue as column. Pale stripes sometimes visible.

Cnidom (Carlgren 1945)

Acrorhagi: atrichs. Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores. Column: atrichs (small and large), basitrichs. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Common in rocky areas and often attached to the ascidian *Pyura stolonifera* or found on reef walls. Distinguished from *Bunodactis reynaudi* by sand-free column, also never found in close proximity to other anemones. Non-endemic, found in South America (Chile), Namibia and South Africa. Locally found from Port Nolloth on the West Coast to Durban on the East Coast. This species is common on the West Coast from the intertidal zone down to 100 m. Commonly recorded by SCUBA divers, 49 specimens housed at SAM.

Genus *Entacmaea* Ehrenberg 1834

Well-developed pedal disc. Column smooth, fosse deep. Inner tentacles longer than outer. Sphincter diffuse, sometimes weak. Siphonoglyphs variable in number, usually with a pair of directives attached. Many perfect mesenteries, fertile. Retractors diffuse. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Dunn 1981).

***Entacmaea quadricolor* (Leuckart in Rüppell & Leuckart 1828)**

(Plate 14, Figs A – B)

Actinia quadricolor Rüppell & Leuckart, 1828: 4-5.

Entacmaea quadricolor **Dunn, 1981a: 15-28, 106-108.** Fautin *et al.*, 2009: 121, 123, 128, 139-140. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Base adheres to coral reefs, conforming to uneven topography. Edge slightly lobed due to radial furrows along mesenterial insertions. Pedal disc narrower than oral disc, which is very wide and usually flat. Column smooth, tall, widening towards the oral disc and flared at the top, lighter lines marking mesenterial insertions. Deep fosse and large marginal stomata, oral stomata not always present. Oral disc not usually able to contract fully, pale lines on surface marking mesenteries. Endoderm of oral disc with dense zooxanthellae. Mouth oval, either flush with disc, or mounted on hypostome. Tentacles clustered near margin, but not reaching mouth. Typically swollen near tip and shaped as a teat, usually simple with the odd bifurcate tentacle. Swollen bulb not as accentuated in marginal tentacles, and some individuals lack swollen tentacles. Outer tentacles shorter than inner. Sphincter most commonly diffuse. Up to eight siphonoglyphs irregularly distributed in clustered individuals. Solitary individuals usually symmetrical with only two siphonoglyphs. Each siphonoglyph attached to a pair of directives, although directives may occur freely as well. Large individuals with five mesenterial cycles and the start of a sixth. All mesenteries with filaments. All perfect mesenteries as well as the imperfect mesenteries belonging to the lowest order fertile. Gonochoric. May reproduce asexually by means of longitudinal fission to create clusters of cloned individuals. Retractors restricted and diffuse, basilar muscles weak, parietobasilar muscles short, sometimes with a detached pennon. Common names: Bubble-tipped or bulb-tipped anemone.

Size

Live: height 50 – 500 mm, diameter of column 50 – 100 mm, depth of fosse 3 – 5 mm, length of inner tentacles 5 – 100 mm, diameter of tentacle bulb 15 mm, diameter of mouth 10 mm, maximum diameter of oral disc 400 mm.

Colour

Base usually a lighter shade of the column colour. Column and tentacles green, brown, grey, pink, red or purple, very rarely streaked or spotted with green. Oral disc light brown, pink, green or grey. Mouth yellow or pink. Actinopharynx yellow, white or pink. Tentacles green, brown, beige or cream, occasionally with purple tips and a white band towards top. Green colouration in tentacle attributable to zooxanthellae. Upper part of tentacle lighter than lower half, seldom with pale flecks.

Cnidom (Dunn 1981a)

Tentacles: basitrichs (small and large), spirocysts. Actinopharynx, filaments, column: basitrichs, (small and large), microbasic *p*-mastigophores, spirocysts.

Habitat and distribution

Commonly found in cracks between coral or in holes, with oral disc flush with substratum. Column able to stretch considerably. When disturbed anemone retracts completely into hole. Associated with 13 species of symbiotic clownfish, which protect anemone from butterfly fish (family Chaetodontidae). Two forms: large solitary forms, usually found at deeper depths and small clustering forms, usually shallower. Cosmopolitan in tropical waters, occurring in Indonesia, Thailand, Maldives, Seychelles, Australia, the Red Sea, Japan, Singapore, Vietnam, Papua New Guinea and South and East Africa. Found on the East Coast of South Africa at Aliwal Shoal and Sodwana Bay. Occurs on coral reefs from 14 to 18 m deep. No specimens at SAM due to restriction of collection permits.

Genus *Gyractis* Boveri 1893

Well-developed pedal disc. Column with longitudinal rows of adhesive verrucae, pseudoacrorhagi at margin. Sphincter weak. Tentacles and mesenteries irregularly arranged. More than two siphonoglyphs, occasionally connected to directive mesenteries. Retractors weak. Equal number of mesenteries proximally and distally (from Carlgren 1938).

Gyractis sesere (Haddon & Shackleton 1893)

(Plate 14, Figs C – D)

Actiniooides sesere Haddon & Shackleton, 1893: 117, 126-127. Carlgren, 1896: 174. Haddon, 1898: 398, 424, 428, pl. 22 & 28, figs 1-2, 8-9. Carlgren, 1900: 43; 1949: 62.

Gyractis excavata Boveri, 1893: 250-251. Acuña & Griffiths, 2004: 196. Fautin, *et al.*, 2007b: 205. Branch *et al.*, 2010: 28, pl. 7.5.

Actinooides sultana Carlgren, 1900: 43-44.

Anthopleura excavata Carlgren, 1949: 53.

Actiniogeton sultana Carlgren, 1949: 62. Parulekar 1968a: 138-139, 143, 145, pl. 2, fig. 11.

Actiniogeton sesere Carlgren, 1954: 579-580. Dunn, 1974: 181-188. Cutress, 1977: 136-137. Cutress & Arneson, 1987: 53, 56, 60, pl. 3e.

Gyractis sesere **Fautin, 2005: 379-380, 389.** Fautin *et al.*, 2008: 39-40, 48.

Diagnosis and description

Column with longitudinally arranged adhesive verrucae. Verrucae more numerous at margin, where a row of pseudoacrorhagi are situated. Shallow fosse. Weak sphincter. Tentacles short and stubby, over 200. Number of siphonoglyphs variable, ranging between four and 10, no directives. Mesenteries irregularly arranged, with approximately half perfect and fertile with small ova. Mesenteries attached to siphonoglyphs infertile. Equal number of mesenteries at margin and base, usually about 180. Retractors diffuse, parietobasilar muscles weak, basilar muscles strong. Asexual reproduction by means of longitudinal fission. Common name: Colonial anemone.

Size

Live: height 10 mm, diameter of oral disc 20 mm.

Colour

Column grey, green, cream, brown or pink. Verrucae pale lime green or purple and often have sand adhering to them. Pseudoacrorhagi pale lime green to white. Tentacles pale green or brown, fading to cream at the base, outer tentacles paler than inner tentacles. Oral disc white, streaked with brown. Actinopharynx bright pink, lime green or white.

Cnidom (Dunn 1974)

Actinopharynx, tentacles: basitrichs, spirocysts. Column: basitrichs, microbasic *p*-mastigophores. Filaments: basitrichs (small and large), microbasic *p*-mastigophores. Pseudoacrorhagi: basitrichs.

Habitat and distribution

Sometimes mistaken for zoanthids as they often form sheet-like expanses on the shore; however they are not joined at the base. Usually solitary in deeper water. Sand and gravel often stuck to verrucae. Cosmopolitan in tropical seas, occurring in Australia, Sri Lanka, Maldives, Singapore, Hawaii, Papua New Guinea, India, Seychelles, Tanzania and South Africa. Found only on the East Coast of South Africa from Port Edward to Sodwana Bay between 0 – 20 m deep. Three specimens at SAM.

Genus *Korsaranthus* Riemann-Zürneck & Griffiths 1999

Smooth column, without acrorhagi. Sphincter absent. Actinopharynx short, divided into regions, folded distally. Two large siphonoglyphs, with 'reticulated pads'. Between 1 – 2 mesenterial cycles perfect. Cnidom: spirocysts and basitrichs (from Riemann-Zürneck & Griffiths 1999).

Korsaranthus natalensis (Carlgren 1938)

(Plate 14, Figs E –H)

Condylactis natalensis Carlgren, 1938: 31-32, 142, text-fig. 12; 1949: 63.

Korsaranthus natalensis Riemann-Zürneck & Griffiths, 1999: 190-196. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 26, pl. 6.8.

Diagnosis and description

Pedal disc highly extendible and commonly inflated when anemone detached. Column tall and smooth, not able to fully contract. Longitudinal furrows visible in preserved specimens. Margin forming a collar, without acrorhagi. No sphincter. Tentacles long, longitudinally furrowed, 48 – 50 in number. Arranged horizontally, close to the margin, leaving area around mouth free of tentacles. Tips blunt and a few tentacles may be flaccid, with the remainder inflated. Vacuolated endoderm of tentacles and 'reticulated pads' on siphonoglyph edges may function as nutrient storage areas during feeding. Two directive tentacles vertically orientated. Mouth round with large lips used for feeding on animals attached to substratum. Actinopharynx short, ridged in lower half and irregularly folded in upper half. Folds and mesenterial filaments may be extruded to cover prey during feeding. Two large siphonoglyphs attached to two pairs of directives. Between 24 and 50 pairs of mesenteries, 6 – 12 perfect. A few tiny mesenterial pairs only found close to oral disc. Retractors diffuse, parietobasilar muscles weak, basilar muscles strong. Trilobate mesenterial filaments below oral disc, becoming unilobate proximally. Filaments long, with ova. Common name: Candy-striped anemone.

Size

Live: height 30 – 100 mm, breadth 20 mm, diameter of pedal disc 35 – 40 mm, diameter of oral disc 45 mm, length of tentacles 15 – 30 mm.

Colour

Column bright red with longitudinal white lines corresponding to mesenterial insertions running from margin to pedal disc. Tentacles bright red, with a white stripe on oral surface and darker tips. Oral disc bright red with white stripes. Actinopharynx bright red and mesenterial filaments orange outlined with white. A variety of different colour forms exist on the East Coast, although Riemann-Zürneck & Griffiths (1999) recognised only the red variety. These other varieties are also striped, but have a few bright dots in some of the colourful column stripes. Colours include pink, peach, cream, yellow and orange, with dark pink dots and tentacles with lilac tips. Pale brown in preservation.

Cnidom (Riemann-Zürneck & Griffiths 1999)

Column, actinopharynx, filaments: basitrichs (small and large). Tentacles: basitrichs, spirocysts. The lack of basitrichs and *p*-mastigophores is a distinguishing factor between other species within this family.

Habitat and distribution

Found either attached to the rocky substratum of subtidal reefs, or feeding on gorgonians, around which they wrap. Also observed detached, lying horizontally on substratum during feeding, or attached and stretching for food. May feed by extruding digestive structures; however, typical actinian feeding behaviour has also been observed. Endemic to South Africa, being found from Miller's Point in False Bay to Durban on the East Coast. Found between 12 – 32 m, mainly by SCUBA divers. Five specimens housed at SAM.

Genus *Pseudactinia* Carlgren 1928

Column smooth with 1-5 horizontal rows of vesicles at margin, forming weak nematocyst batteries. Acrorhagi in fosse of larger specimens. Sphincter diffuse. Tentacles long, cannot be entirely covered by column. Actinopharynx well-developed. Number of siphonoglyphs variable. Mesenteries usually hexamerously arranged. Many perfect mesenteries, directives mesenteries sometimes present. Retractors diffuse, parietobasilar and basilar muscles distinct. Distribution of reproductive organs variable, mesenteries of the first cycle always sterile. More mesenteries proximally than distally. Cnidom: spirocysts, atrichs, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

In 1846 Dana described *Actinia flagellifera* and in 1882 Hertwig described *Comactis flagellifera*. In both cases, the species were moved to the genus *Pseudactinia*. This makes the names secondary homonyms, as they are not the same species, although they have the same specific name.

Pseudactinia flagellifera (Hertwig 1882)

(Plate 15, Figs A – C)

non *Actinia flagellifera* Dana 1846: 126-128.

Comactis flagellifera Hertwig, 1882b: 32-34, 130, pl. 3, fig. D, pl. 6, fig. 6, pl. 8, fig. 9.

Anemonia flagellifera Hertwig, 1888b: 5.

Anemonia infecunda McMurrich, 1893: 146-147, 153, 206. Haddon, 1898: 416. Pax, 1908: 489-490, 497, 500.

Pseudactinia plettenbergensis Carlgren, 1928a: 157-160; 1938: 53-54.

Pseudactinia flagellifera Carlgren, 1928a: 153-157 (pro parte); **1938: 54-57** (pro parte); 1939: 792; 1945: 9; 1949: 52. Kruger & Griffiths 1998: 629, 633-636, 638-639. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 26, pl. 6.1.

Diagnosis and description

Pedal disc broad with undulating edges. Column tall in large individuals, but squat in smaller specimens. One to five rows of vesicles containing nematocyst batteries encircling the upper column just below margin. Acrorhagi dotted between upper row of dense vesicles, abundant in

large individuals, but may be absent in small individuals. Sphincter weak, diffuse. Tentacles long, approximately 230 in total. Carlgren (1938) reported that column is not able to contract entirely to cover tentacles; however, I have observed a few individuals in complete contraction. A variable number of directives, between one and three. Actinopharynx well developed and longitudinally ridged; usually with two wide, symmetrical siphonoglyphs connected to directives. Up to 144 pairs of mesenteries, increasing in number proximally. Perfect mesenteries roughly 48 in large individuals. Retractors diffuse, parietobasilar and basilar muscles distinct. First and second cycles sterile, gonads typically only on filaments of two youngest cycles. Common name: False plum anemone.

Size

Live: height 8 – 20 mm, diameter of oral disc 18 – 75 mm, diameter of pedal disc 10 – 75 mm. Larger than *Pseudactinia varia*.

Colour

Column a solid colour from margin to pedal disc. Ranging from red to yellow, most commonly dirty orange. Oral disc matching column colour, but with pale lines marking mesenterial insertions in some individuals. Mouth and actinopharynx match oral disc. Tentacles a lighter hue of column colour, generally ending in purple tips. Verrucae and acrorhagi identical colour to column, but appear pale when inflated.

Cnidom (Carlgren 1945)

Column: basitrichs (small and large). Vesicles: basitrichs. Acrorhagi: atrichs. Actinopharynx, filaments: basitrichs, microbasic *p*-mastigophores. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Extremely territorial and use acrorhagi in intraspecific battles for space. Cosmopolitan, known from Brazil, Norway, the Azores, Namibia and common in South Africa. South African distribution from Port Nolloth on the West Coast to St. Lucia on the East coast, although more

frequently found on the South Coast. Found intertidally down to 46 m, with one individual found at 102 m. Thirty-six specimens housed at SAM.

***Pseudactinia varia* Carlgren 1938**

(Plate 15, Figs D – F)

Pseudactinia flagellifera Carlgren, 1928a: 153-157.

Pseudactinia varia **Carlgren, 1938: 57-59**; 1941: 5; 1949: 52. Kruger & Griffiths, 1998: 629, 633-634, 636-639. Häussermann & Försterra, 2001: 218, 221. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Pedal disc wider than column. Column squat in smaller individuals. A single row of vesicles just below margin, very rarely two rows. Large acrorhagi scattered among vesicles. Tentacles long, often displayed sticking out perpendicular to column. Number between 72 – 174. Sphincter diffuse, may be weak to strong. Actinopharynx longitudinally ridged. Usually 3 – 5 siphonoglyphs; however, specimens with one to nine siphonoglyphs have been observed. No directives. Up to 36 pairs of perfect mesenteries, only some of which may be fertile, numbers vary greatly between individuals. Retractors weak, diffuse. Basilar muscles present. Common name: Apricot anemone.

Size

Live: height 30 mm, diameter of oral disc 30 mm, length of tentacles 15 mm. Smaller than *P. flagellifera*.

Colour

Column rose, scarlet, red-brown or pale orange. Tentacles match column colour, but are slightly translucent and lighter in hue. May be paler towards tips. Tentacles occasionally with white dorsal stripe. Oral disc matching column, generally unmarked, but may show faint stripes

marking insertions of mesenteries. Actinopharynx, acrorhagi and vesicles similar colour to column.

Cnidom (Carlgren 1938)

Column, vesicles, actinopharynx: basitrichs. Acrorhagi: atrichs. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Non-endemic, specimens from St. Helena Island and South Africa. Within South Africa, found from Cape Columbine on the West Coast to Durban on the East Coast. Common at Kommetjie in intertidal zone. Largely an intertidal species, but specimens have been recorded down to a depth of 27 m. Twenty-two specimens housed at SAM.

***Pseudactinia* sp. – new record**

(Plate 15, Figs G – I)

Diagnosis and description

Pedal disc broad with undulating edges. Column wide and low, with one row of vesicles below margin. Acrorhagi dotted between vesicles. Sphincter weak, diffuse. Tentacles long and tapered to a pointed tip, approximately 100. Mouth mounted on hypostome. Actinopharynx strong, longitudinally ridged and usually with two wide, symmetrical siphonoglyphs. Up to three directive pairs. More mesenteries than tentacles. Retractors diffuse, parietobasilar and basilar muscles distinct.

Size

Live: height 50 mm, diameter of oral disc 100 mm.

Colour

Column colours include red, orange or yellow marbled with white. Tentacles similar colour to column with a thick white oral stripe. White column with white purple tipped tentacles also common. Oral disc usually with white stripes.

Habitat and distribution

Found on rock reef or attached to octocorals. External morphology similar to that of *P. flagellifera*. Molecular studies show that this species is neither *P. flagellifera* nor *P. varia* (Heestand 2009), thus it has been classified here as a new record to South Africa. Due to a lack of samples, the species name has not yet been verified, thus I currently list this species as non-endemic. In South Africa, range extends from the East side of the Cape Peninsula in False Bay to Aliwal Shoal, being more frequent around Plettenberg Bay. Although it is found intertidally, it is most common deeper and its depth range exceeds down to 29 m.

Genus *Urticinopsis* Carlgren 1927

Column smooth without verrucae or acrorhagi. Sphincter strong. Tentacles hexamerously arranged, short, approximately half as numerous as proximal mesenteries. Actinopharynx and siphonoglyphs well-developed. Mesenteries hexamerously arranged, more numerous proximally than distally. At least two cycles of mesenteries perfect. Retractors weak, parietobasilar muscles folded. First two cycles of mesenteries sterile. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Urticinopsis crassa Carlgren 1938

(Plate 16, Figs A – C)

Urticinopsis crassa Carlgren, 1938: 49-50; 1949: 60. Excoffon & Acuña, 1995: 125-127. Genzano *et al.*, 1996: 119. Zamponi *et al.*, 1998: 9-10, 12-13. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Broad pedal disc. Column conical and unevenly wrinkled when contracted, no vesicles. Tentacles simple and short, more than 40. Sphincter strong, actinopharynx long and well-developed. Siphonoglyphs present, directives symmetrical. Usually 48 pairs of mesenteries distally, but more mesenteries towards pedal disc. Additional mesenteries weak and without filaments. First three mesenterial cycles perfect, with first two cycles sterile. Specimen examined by Carlgren (1938) male. Retractors weak, diffuse. Parietobasilar muscles folded, basilar muscles well-developed. Common name: Volcano anemone.

Size

Preserved and contracted: height 35 mm, diameter of pedal disc 35 – 45 mm, diameter of upper column 23 mm.

Colour

Column white with red colouration in grooves between wrinkles.

Cnidom

Nematocysts measured, but majority not identified (Carlgren, 1938). Spirocysts found in tentacles and microbasic amastigophores found in actinopharynx.

Habitat and distribution

Non-endemic, also found on the South Antarctic Island of Saint Georgia. Found in trawl samples from Hondeklip Bay on the West Coast of South Africa to the Agulhas Bank off the South Coast. A deep-sea species found between 143 – 1024 m depth. One specimen found attached to mollusc shell. Five samples housed at SAM.

Family Actinodendronidae Haddon 1898

Column smooth. Sphincter absent. Up to 48 cyclically arranged arms, with either dendritic tentacles or conical, simple tentacles, both with large nematocysts. Two well-developed siphonoglyphs. Up to 48 mesenterial pairs, mostly perfect. Only directives infertile. Retractors diffuse, parietobasilar and basilar muscles distinct. Cnidom: spirocysts, basitrichs (from Carlgren 1949).

Genus *Megalactis* Hemprich & Ehrenberg 1834 in Ehrenberg 1834

Extremely long arms with dorsal surface free of tentacles. Tentacles simple with pointed tips, found only on sides of arms (from Carlgren 1949).

This species is a new record to the South African sea anemone fauna. Based on external morphology, the sample was initially thought to be *Actinodendron hansingorum*; however, after observing the behaviour of the live anemone I identified it as *Megalactis griffithsi*.

Megalactis griffithsi Saville-Kent 1893 – new record

(Plate 16, Figs D – F)

Megalactis griffithsi Saville-Kent, 1893: 35, 147. Carlgren, 1896: 175. Haddon, 1898: 399, 493-494. Stephenson, 1922: 295. Carlgren, 1949: 68. Uchida *et al.*, 1975: 34-35. Fautin, 1988b: 25. Ardelean & Fautin, 2004: 488, 491, 494, 500-501.

Diagnosis and description

Limbus not apparent, size of pedal disc differs dramatically between species. Column lacking fosse. Very long tentacles with distinct bipinnate branches perpendicular to main stem, but mostly lacking on dorsal surface. Up to 48 tentacles in four cycles. Approximately 35 secondary branches, short and constricted proximally resembling polyps. Secondary branches split further to form end branches terminating in globular acrospheres, which are dense with nematocysts and spirocysts. Oral disc clearly visible. Two broad siphonoglyphs. Half the number of mesenterial pairs as tentacles. All mesenteries perfect and fertile in most specimens. Directives infertile. Lacking sphincter. No basilar muscles, retractors broad and diffuse, parietobasilar muscles absent. Common name: Grape-tentacle anemone.

Size

Live: height 50 mm, diameter of tenticular crown 250 mm. A large species with extremely long tentacles.

Colour

Elaborate colour pattern. A white line runs from mouth to tip of each of the 12 tentacles of first two cycles. A further 24 white lines run between tentacles. Base of tentacles alternate between lilac and green. Tentacles grey, pale yellow-brown or green. Oral disc divided into rays radiating outwards from mouth. Each ray separated by white protuberances on either edge. Inner section of each ray white, pale yellow or grey, outer section dark brown or dark green. Column beige.

Cnidom (Ardelean & Fautin 2004)

Acrospheres, filaments: basitrichs, spirocysts. Main tentacle, actinopharynx, column: basitrichs.

Habitat and distribution

Burrowing anemone found lodged in shallow cracks in coral reef or attached to hard substrata in sand, with tentacles spread out flush with sand. Does not possess toxins that cause skin irritation, unlike *Actinodendron hansingorum*, which should be handled with caution. Tentacles may regenerate if damaged. Non-endemic, recorded from Australia, Fiji, Japan, Papua New Guinea and South Africa. Found between 18 – 20 m at Sodwana Bay and Rocktail Bay on the East Coast of South Africa. A new record for South Africa. Voucher specimens from Papua New Guinea housed at the University of Kansas Natural History Museum. Permits for collection of this species could not be obtained, thus there are no South African specimens lodged in SAM.

Family Aliciidae Duerden 1895

Column with simple or compound vesicles, or with branched outgrowths. Vesicles sometimes found on branches and peduncles of outgrowths, always with macrobasic amastigophores. Smooth upper column may have weak longitudinal muscles, and spots containing spirocysts. Sphincter absent. Margin tentaculate, tentacles very long also with nematocyst. Two siphonoglyphs and two pairs of directives. Six pairs of perfect mesenteries, occasionally fertile. Retractors diffuse, basilar muscles present (from Carlgren 1949).

Genus *Alicia* Johnson 1861

Column delicate, divisible into scapus and capitulum. Scapus with vesicles, simple or stalked, containing microbasic and macrobasic amastigophores. Capitulum without cuticle, with spots of spirocysts and nematocysts. Margin tentaculate. Sphincter absent. Tentacles numerous, long and slender with nematocyst spots. Two weak siphonoglyphs. two pairs of directives. Six pairs of perfect mesenteries, sterile. Retractors weak, parietobasilar and basilar muscles very weak. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores, micro- and macrobasic amastigophores (from Carlgren 1949).

Alicia sansibarensis Carlgren, 1900 – new record

(Plate 16, Figs G – I)

Alicia sansibarensis Carlgren, 1900: 28-30. Parulekar, 1990: 219-220, 223, 225. Pax, 1909: 402. Stephenson, 1922: 280. Carlgren, 1927b: 444; 1949: 43.

Diagnosis and description

Large pedal disc with uneven edges, only weakly adherent. Mesenterial insertions visible through thin base. Column separated into scapus and smooth capitulum. Scapus with numerous outgrowths, each with bunches of 10 – 25 vesicles. Column delicate, but able to lengthen dramatically. Most vesicles compound and stalked with many large stinging cells, several simple. Stalks more pronounced distally. Outgrowths irregularly distributed over column surface, larger and denser proximally than distally. Oral disc furrowed. Actinopharynx long with transverse wrinkles, about two-thirds of body length. Tentacles simple, but very long and slender. Arranged close to margin and able to retract. Typically 48 tentacles arranged in three or four cycles; however, larger specimens may have up to 96 tentacles. No acontia. Sphincter most commonly absent, two weak siphonoglyphs and two pairs of directives. Three to four cycles of mesenteries, 24 pairs in total. Mesenteries not divided into micro- and macrocnemes. Six pairs of mesenteries perfect, sterile. First mesenterial cycle always sterile, remainder with gametes.

Gonochoric, being either female or male. Retractors weak, diffuse. Parietobasilar muscles and basilar muscles weak. Common name: Turbulate-night anemone.

Size

Live: height 60 – 80 mm, diameter of pedal disc 50 – 70 mm, diameter of column 25 mm, tentacle length 25 – 70 mm, diameter of tentacles 1 – 4 mm, diameter of bunched vesicles 3 – 15 mm, height of vesicles 15 mm.

Colour

Vividly coloured. Black and white radial striations on oral disc. Actinopharynx brown-red. Column translucent, yellow to flesh-coloured with light pink longitudinal stripes. Proximal part of column speckled. Vesicles predominantly violet, but may be brown, red or pink. Tentacles translucent pink and slightly rust-coloured at base.

Cnidom (Carlgren 1949)

Cnidom: basitrichs, microbasic *p*-mastigophores, micro- and macrobasic amastigophores, spirocysts.

Habitat and distribution

Found attached to coral reefs. Non-endemic to South Africa, but previously considered endemic to Zanzibar. A new South African record from Sodwana Bay on the East Coast of South Africa found at 105 m. Extremely rare in South Africa and most active at night. One specimen housed at SAM.

Genus *Triactis* Klunzinger 1877

Column smooth, with a ring of stalked outgrowths in centre. Stalked outgrowths few and with restricted branches in younger specimens, close-set and dichotomously ramified in older specimens. Hemispheric vesicles on stalk and on column close to stalk, contain micro- and macrobasic amastigophores. Upper part of column with spots of spirocysts and nematocysts. Sphincter absent. Margin tentaculate. Few tentacles, hexamerously arranged, with an abundance of microbasic amastigophores distally and nematocyst spots proximally. Two siphonoglyphs, two pairs of directives. Six pairs of perfect mesenteries. Retractors weak, parietobasilar muscles very weak. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores, micro- and macrobasic amastigophores (from Carlgren 1949).

Triactis producta Klunzinger 1877 – new record

(Plate 17, Figs A – C)

Triactis producta Klunzinger, 1877: 85-86, pl. 6, fig. 8. Carlgren, 1947: 14; **1949: 44**. Fishelson, 1970: 107-108, fig. 5. Fautin *et al.*, 2008: 39-40, 51-52.

Hoplophoria cincta Haddon, 1898: 398, 438-439; pl. 23, figs 11-15. Carlgren, 1947: 14.

Triactis cincta Carlgren, 1945: 7; 1949: 44; 1950: 427, 433.

Diagnosis and description

Pedal disc strong. Approximately 40 short, true tentacles concentrated around margin. Column smooth with hollow, stalked pseudotentacles extending midway from column wall exposing an increased number of zooxanthellae to light. Pseudotentacles swell in daylight hours to maximise photosynthesis, while true tentacles and oral disc retract. Reverse happens at night, during which time anemone actively feeds. Stinging vesicles on pseudotentacles. Sphincter absent. Two large siphonoglyphs and two pairs of directives. Six pairs of perfect mesenteries. Retractors weak and parietobasilar muscles extremely weak. Basilar muscles present. Common name: Bobble anemone.

Size

Live: height 6 – 60 mm, diameter of pedal disc 10 mm.

Colour

Pseudotentacles usually brown or dark yellow due to presence of zooxanthellae. Tentacles and oral disc pale brown, but usually not visible during the day. Vesicles grey, light brown, dull pink or dark green with frosty white edges. Upper column may be mistaken for oral disc, as upper column contracts completely into coelenteron in daylight hours. Upper column dark brown in centre, graduating into light brown towards margin.

Cnidom (Carlgren 1945)

Actinopharynx, pseudotentacles: microbasic amastigophores (small and large). Branches: basitrichs, microbasic amastigophores (small, medium and large), spirocysts. Column: basitrichs, microbasic amastigophores (small and large), microbasic *p*-mastigophores. Filaments: microbasic amastigophores (small and large), microbasic *p*-mastigophores. Peduncle, vesicles: microbasic amastigophores. Tentacles: basitrichs, microbasic amastigophores (small, medium and large), spirocysts (small and large).

Habitat and distribution

A new record for South Africa. Usually found in aggregations formed by cloning. Cryptic and found in cracks of coral reef pavements. Sting venomous and may cause welts on human skin. Cosmopolitan in tropical seas, found in the Red Sea, Australia, Micronesia, Polynesia, Maldives, Mauritius, Seychelles, Japan, Hawaii, Singapore, East Africa and the East Coast of South Africa at Aliwal Shoal. Found in 1 – 30 m of water and often observed by SCUBA divers. No specimens at SAM as collection prohibited in marine reserve.

Family Condylanthidae Stephenson 1922

Column usually divisible into scapus and scapulus. Pseudoacrorhagi occasionally present. Sphincter usually absent. Tentacles few. Two siphonoglyphs. Mesenteries divisible into macro- and microcnemes, latter often present only proximally. Six pairs of macrocnemes. Retractors strong, parietobasilar muscles very strong, basilar muscles distinct (from Carlgren 1949).

Genus *Condylanthus* Carlgren 1899

Column divisible into scapus and scapulus, former with cuticle. Pseudoacrorhagi absent. Ectoderm of scapulus with spirocysts. Sphincter weak. Tentacles short, fewer than mesenteries. Retractors circumscribed, parietobasilar muscles very strong, basilar muscles well-developed. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Condylanthus magellanicus Carlgren 1899

(Plate 17, Figs D – E)

Condylanthus magellanicus Carlgren, 1899b: 15-16. McMurrich, 1904: 232. Pax, 1907: 43. Stephenson, 1922: 262. Pax, 1923: 26. Carlgren, 1924a: 191; 1927a: 19-22; 1928a: 140; **1938: 28**; 1945: 8; 1949: 46. Grebelny, 1975: 5-7. Sanamyan, 2001: 6, 8. Acuña & Griffiths, 2004: 196. Fautin *et al.*, 2007b: 198.

Diagnosis and description

Broad, strong pedal disc. Body usually squat and cylindrical, but may appear thin and tube-like when extended. Column divisible into scapus with cuticle, and scapulus. No acrorhagi, verrucae or acontia. Sphincter weak, diffuse. Tentacles short, simple and retractile, 24 – 48 in number. Only one tentacle per endo- and exocoel. Actinopharynx long with large siphonoglyphs. Mesenteries divisible into macro- and microcnemes. Five mesenterial cycles with 12 – 24 pairs near oral disc, with younger mesenteries proximally. Six pairs of macrocnemes, all fertile and with strong retractors. Microcnemes without gonads or retractors. Parietobasilar muscles very

large, basilar muscles strong. Retractors large, present along entire length of mesenteries.
Common name: Mystery anemone.

Size

Preserved and contracted: height 15 – 25 mm, diameter of base 37 – 40 mm, diameter of oral disc 10 mm.

Colour

Unknown in life. Uniform flesh colour when preserved.

Cnidom (Carlgren 1945)

Actinopharynx: basitrichs, microbasic *p*-mastigophores. Column: basitrichs. Scapulus: spirocysts. Filaments: basitrichs (small and large), microbasic *p*-mastigophores. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Non-endemic to South Africa, also found in Chile, Patagonia and Antarctica. South African distribution very narrow, found between Cape Point and the Agulhas Bank on the South Coast. A rare deep-sea species, brought up in trawls between 76 – 500 m depth. No specimens housed at SAM, voucher specimen from Agulhas Bank housed at the Museum of Natural History, Humboldt University.

Family Liponematidae Hertwig 1882

Genus *Liponema* Hertwig 1888

Column low, smooth, without projections. Sphincter typically diffuse. Many short tentacles, densely covering majority of oral disc. Each tentacle with endodermal sphincter at base, allowing tentacles to be shed. Siphonoglyphs well-developed. Perfect pairs of mesenteries numerous. Two pairs of directives. More mesenteries distally than proximally. Retractors diffuse. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Liponema multiporum Hertwig 1882

(Plate 17, Figs F – G)

Liponema multiporum Hertwig, 1882a: 114-116; 1882b: 129-130, 132; 1888: 17-21. Dunn, 1983: 60-64.

Bolocera multipora McMurrich, 1893: 160; 1904: 257-258. Stephenson, 1922: 276. Carlgren, 1949: 54. Dunn & Bakus, 1977: 77, 84.

Bolocera multiforum Duerden, 1902: 306.

Liponema brevicirrata Carlgren, 1928a: 149; **1938**: 42; 1945: 12; 1949: 55.

Liponema multipora Acuña & Griffiths, 2004: 196. Rodríguez *et al.*, 2007: 1881, 1887, 1890-1891, 1897, 1899.

Diagnosis and description

Pedal disc flat and strong with circular grooves. Column smooth and squat, no fosse. Up to 400 short, simple tentacles crowded on oral disc. Each tentacle longitudinally furrowed with an endodermal sphincter at base, allowing tentacles to detach from animal in large numbers. Circles surrounded by raised rims resembling pores remain after tentacle shedding. Some tentacles found to bulge in centre, but generally they are of constant diameter from base to tip. Inner tentacles longer than outer. Oral disc convex, much wider than pedal disc, with margin sagging downwards towards pedal disc. Mouth large and elongate, with thick, conspicuous lips. Sphincter broad but weak. Actinopharynx half column length and deeply furrowed. Two strong siphonoglyphs attached to two pairs of directives, arranged symmetrically. Mesenteries not divisible into macro- and microcnemes, increase in number towards oral disc. Seven to eight

mesenterial cycles. Many mesenterial pairs perfect. All pairs fertile, with the exception of directives and high order mesenterial cycles, which occasionally lack filaments. Retractors weak and diffuse, parietobasilar muscles barely visible. Basilar muscles present. Common name: Bald anemone.

Size

Preserved and contracted: height 15 mm, diameter of oral disc 50 – 80 mm, length of inner tentacles 14 – 20 mm, diameter of inner tentacles 4 mm, diameter of base of inner tentacles 2 mm.

Colour

Actinopharynx and lips dull red, tentacles and column bright orange.

Cnidom (Dunn 1983)

Actinopharynx, filaments: basitrichs (small and large), microbasic *p*-mastigophores. Column: basitrichs. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Cosmopolitan, found off the coasts of Japan, Chile, Argentina, Antarctica, Crozet Islands, New Zealand, Tasmania and South Africa. In South Africa, occurs from Hondeklip Bay on the West Coast to St. Francis Bay on the South Coast. A deep-sea species that ranges in depth from 110 – 500 m. According to trawl data, this species is usually associated with muddy bottoms. Moderately scarce, with seven specimens housed in SAM.

Family Stichodactylidae Andres 1883

Column usually with verrucae. Sphincter weak. Tentacles short. May be more than one row of tentacles per endocoel, only one communicates with each exocoel. Pairs of perfect mesenteries numerous, usually all fertile. Retractors diffuse. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Genus *Heteractis* Milne Edwards & Haime 1851

Base well-developed, adhesive. Tentacles either long and slender, or short and stout. Only one tentacle type per species. More than one tentacle connected with each endocoel. Oral disc not lobed (from Dunn, 1981a).

Heteractis aurora (Quoy & Gaimard 1833) – new record

(Plate 18, Figs A – C)

Actinia aurora Quoy & Gaimard, 1833: 141-142, pl. 12, fig. 1-4.

Heteractis aurora Milne Edwards, 1857a: 261. Carlgren, 1949: 108. **Dunn, 1981a: 39-40, 56-66, 105, 107-108.** Hirose, 1985: 114, 116-121, 123-125. Cutress & Arneson, 1987: 54, 55, 57, 59, pl. 2, fig. 2f. England, 1988: 45-54. Badsha, 1991: 139-144. den Hartog, 1994: 75, 77-78.

Antheopsis koseirensis England, 1987: 207, 273, 276.

Bunodes koseirensis England, 1988: 53.

Diagnosis and description

Base thin and weakly adherent. Body wall tough. No acontia. Upper column with adhesive verrucae, lower column smooth. Distinct fosse. Verrucae arranged in horizontal rows, largest in row closest to margin. Rows below with small verrucae and the next few rows down with larger verrucae. Zooxanthellae may be present in upper column and oral disc. Oral disc with central mouth, lacking lips. Oral disc broad with uneven edge, lies outstretched over sandy substratum. Up to 800 highly retractile tentacles, with approximately 20 swellings on each, resembling a

beaded necklace. Outer tentacles shorter than inner, scattered sparsely around oral disc, with majority crowded around margin. Sphincter weak. Two siphonoglyphs arranged symmetrically, each attached to a pair of directives. Mesenteries of the second highest order have filaments, but are infertile; while those of the highest order also lack filaments. Perfect mesenteries, directives and imperfect mesenteries of the lowest order fertile. Gonochoric. Retractors strong, parietobasilar muscles and basilar muscles fairly well-developed. Common name: Beaded or digging anemone.

Size

Live: height 20 mm, diameter of oral disc 50 – 250 mm, diameter of mouth 5 – 15 mm, length of tentacles 40 – 50 mm, basal diameter of tentacles 2 – 3 mm. Preserved: height 10 mm, diameter of oral disc 25 – 75 mm, length of tentacles 10 mm.

Colour

Upper column purple, maroon, brown, grey or green, with pale verrucae. Lower column orange, without verrucae. Oral disc brown, purple or grey, with cream coloured lines radiating outwards from mouth. Lines prominent around inner section of oral disc, fading towards tentacles. Tentacles purple maroon, red, brown, green or grey, with swellings usually of a paler colour, such as cream or white. Actinopharynx off-white or brown.

Cnidom (Dunn 1981a)

Actinopharynx, column: basitrichs, microbasic *p*-mastigophores, spirocysts. Filaments: basitrichs (small and large), microbasic *p*-mastigophores (small and large), spirocysts. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Attaches to stones or reef buried in sand. May contract column, allowing animal to become covered by sand, although it is not a true burrowing anemone. Hosts up to nine species of anemone fish. Cosmopolitan in tropical seas, a new record for South Africa. Found in the Red

Sea, Hawaii, Japan, Australia, Indonesia, India, Iran, East Africa and the East Coast of South Africa between Aliwal Shoal and Rocktail Bay. Common from 12 – 22 m depth. Only two specimens in SAM, as live animals are valuable to ecotourism and the diving industry, so collection is discouraged.

***Heteractis crisper* (Hemprich & Ehrenberg in Ehrenberg 1834) – new record**

(Plate 18, Figs D – F)

Actinia Entacmaea crisper Ehrenberg, 1834: 260, pl. 8, fig. 1.

Entacmaea crisper Carlgren, 1899a: 14.

Heteractis crisper **Dunn, 1981a: 47-57, 65, 71.** Hirose, 1985: 114, 116-125. Fautin, 1986:172-173, 179. Richardson *et al.*, 1997: 60-65. Hattori, 2006: 51-56. Scott & Harrison, 2007a:163-169; 2007b: 110-119; 2008: 833-838. Fautin *et al.*, 2009: 121, 123, 134-135, 136, 139, 140.

Heteractis macrodactylum Cutress & Arneson, 1987: 54-55, 57, 59, pl. 2, fig. 2d.

Radianthus crisper Uchida & Soyama, 2001: 91, 151, 155

Diagnosis and description

Base flat, leathery and slightly adherent. Column tough, lower half without verrucae, but rough in texture. Upper column with adhesive verrucae arranged in longitudinal rows below margin. Verrucae convex with raised edges, those just below margin larger and sometimes incorrectly identified as acrorhagi. Column increases dramatically in diameter from base to margin, fosse usually absent. Zooxanthellae present in upper column, oral disc, tentacles and top of mesenteries. Oral disc typically cup-shaped, but may be flattened against substratum in relaxed individuals; cannot retract entirely into column. Oval mouth without lips positioned in centre of oral disc; often concealed by the long, snake-like tentacles. Actinopharynx with a deeply penetrating siphonoglyph on either end; each attached to a pair of directives with filaments. Sphincter weak. Up to 800 simple tentacles which taper towards tips, higher density towards margin. Outer tentacles characteristically lying horizontal on substratum and curling up at tips. Very small tentacles usually present between the more visible larger ones. Up to eight mesenterial cycles, all perfect mesenteries fertile. Gonochoric, only females observed. Stages of

oocyte fertility may differ within a mesentery. Each oocyte with a nutritive sac called a trophonema. Retractors weak, basilar and parietobasilar muscles strong. Common name: Leathery anemone.

Size

Live: height 40 mm, diameter of pedal disc 75 – 80 mm, diameter of verrucae 1 – 5 mm, diameter of oral disc 150 – 500 mm, length of mouth 15 – 20 mm, diameter of tentacles 3 – 5 mm. Preserved: height 30 mm, diameter of pedal disc 60 – 80 mm, diameter of oral disc 110 mm.

Colour

Lower column white, cream, brown or grey, with upper section graduating into darker grey, brown or violet. May also be orange at base, fading into cream towards margin. Base generally same colour as lower column. Actinopharynx white, grey or yellow, siphonoglyphs white. Oral disc violet-grey, white-grey or green-brown, occasionally striped. Colouration of oral disc typically extends part way up base of each tentacle. Tentacles either pale purple with frosty grey horizontal stripes, or dark brown with frosty green stripes; sometimes with purple tips. Edges of outermost tentacles where they lie over oral disc cloudy white, creating a distinct white band around circumference of oral disc. Tentacles dense over entire area of oral disc.

Cnidom (Dunn 1981a)

Actinopharynx: basitrichs, microbasic *p*-mastigophores, spirocysts. Column, filaments: basitrichs (small and large), microbasic *p*-mastigophores, spirocysts. Tentacles: basitrichs, spirocysts.

Habitat and distribution

A new addition to the South African anemone fauna. Associated with 14 species of anemone fish and some shrimp species. Found on coral reefs, where they attach to reef or to small stones covered by sand. Cosmopolitan in tropical seas. Found in the Red Sea, Japan, Singapore, Indonesia, Polynesia, Micronesia, Melanesia, Malaysia, Vietnam, Philippines, Australia, East

Africa and the East Coast of South Africa from Aliwal Shoal to Rocktail Bay. Common from a depth of 15 – 22 m. Only one specimen is SAM due to the limitations on collection associated with the ecotourism value placed on the species in terms of SCUBA diving.

***Heteractis magnifica* (Quoy & Gaimard 1833)**

(Plate 18, Figs G – H)

Actinia magnifica Quoy & Gaimard, 1833: 140-141, pl. 9, fig. 1.

Heteractis magnifica **Dunn, 1981a: 3-6, 27, 39-48, 103-106-108.** Hirose, 1985: 114, 116, 118. Fautin, 1985: 373-377. Acuña & Griffiths, 2004: 196. Holbrook & Schmitt, 2005: 67- 68, 70-73. Fautin *et al.*, 2009: 135-136, 140.

Heteractis Ritteri Cutress & Arneson, 1987: 54-55, 57, 59, pl. 2, fig. 2b.

Radianthus magnifica England, 1987: 208.

Diagnosis and description

A large anemone with a tall, thick, robust column. Column tapers slightly from weakly adherent base and then widens into extensive oral disc. Fosse moderate in size. Anemone able to contract completely, although this is a rare occurrence. Edge of base and oral disc wavy, wider than column. Zooxanthellae in oral disc and tentacles. Column thin and puckered where mesenteries join column. Inconspicuous verrucae near margin. Tentacles long, blunt, extremely numerous, concentrated at margin. Tentacles generally simple, but may be sporadically bifurcated, tip always rounded in expanded specimens, wavy when flaccid. Mouth narrow, may be raised on hypostome. Solitary anemones with two large symmetrical siphonoglyphs, while colonial specimens have up to 19 asymmetrically arranged siphonoglyphs. All siphonoglyphs connected to a pair of fertile directives. Arrangement of mesenteries in solitary individuals regular, those in clustered animals random. Retractors weak, basilar muscles strong, parietobasilar muscles short but strong. Mesenteries of highest cycle imperfect and sterile, but equipped with filaments. All perfect mesenteries fertile. Gonochoric. May reproduce sexually or asexually. Common name: Magnificent or giant anemone.

Size

Live: height 150 mm, diameter of oral disc up to 200 – 1000 mm, diameter of mouth 50 mm, diameter of base 100 – 200 mm, diameter of verrucae 5 – 6 mm, length of tentacles 75 mm, diameter of tentacle base 5 – 7 mm.

Colour

Base pale pink, tan or yellow with mesenterial insertions visible. Column and verrucae one shade of red, green, dark brown, tan, purple or pink. Oral disc brown, grey or light purple. Mesenterial insertions clearly marked as stripes on surface of disc. Tentacles brown, dirty green or grey, ending in bright red, green or purple. Area around mouth yellow, actinopharynx cream.

Cnidom (Dunn 1981a)

Actinopharynx: basitrichs, microbasic *p*-mastigophores, spirocysts. Column: basitrichs (small and large), microbasic *p*-mastigophores. Filaments: basitrichs (small and large), microbasic *p*-mastigophores, spirocysts. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Typically found on high outcrops of coral reef. Known host to up to 12 species of anemone fish, a species of porcelain crab (family Porcellanidae) and shrimp. Sting may be slightly toxic to humans – poison may cause welts. A cosmopolitan species in tropical seas, often observed by SCUBA divers off the coasts of East Africa, Zanzibar, Madagascar, Comores, Singapore, the Red Sea, Malaysia, Indonesia, Melanesia, Micronesia, Polynesia, Thailand, Vietnam, China, Japan, Maldives, Seychelles, Australia and South Africa. Commonly distributed from Sodwana Bay to Rocktail Bay on the East Coast of South Africa from 14 – 25 m. Two specimens housed in SAM.

***Heteractis malu* (Haddon & Shackleton 1893) – new record**

(Plate 19, Figs A – B)

Discosoma Malu Haddon & Shackleton, 1893: 117, 120.

Heteractis malu **Dunn, 1981a: 35, 40, 47, 57, 66-71, 104, 107-108.**

Radianthus malu England, 1988: 53.

Diagnosis and description

Base fairly adherent. Lower column smooth; upper column with rows of adhesive verrucae, which may burst when anemone contracts. Verrucae with raised edges and occasionally convex, larger towards pedal disc. Upper column flares dramatically, fosse narrow. Zooxanthella present in column, oral disc and tentacles. Oral disc circular, usually spread out flat over substratum, but able to contract fully if necessary. Edges of oral disc rippled when anemone slightly contracted. Actinopharynx with between two and four siphonoglyphs, each attached to a pair of directives. Sphincter weak. Tentacles arranged in concentric circles around mouth, but narrow area around mouth devoid of tentacles. Numerous short, stubby tentacles of inconsistent length, bulged ends coming to a point at tip. Retractors, basilar muscles and parietobasilar muscles strong. Up to four cycles of perfect mesenteries; all fertile, including directives. All mesenteries with filaments. Gonochoric. Common name: Delicate anemone.

Size

Live: height 30 mm, diameter of base 50 – 70 mm, diameter of oral disc 200 mm, diameter of mouth 10 – 20 mm, diameter of verrucae 1 – 2 mm, length of tentacle 10 – 40 mm, diameter of tentacle 2 – 3 mm.

Colour

Base colourless with mesenterial insertions clearly visible. Column with faint lines marking mesenterial insertions, lower section pale yellow or white and upper section purple-brown. Verrucae lighter than column. Oral disc purple-brown, with a metallic green tinge. Either faintly

striped, or with white lines running outwards from mouth. Tips of tentacles brown, encircled by thin, pale, frosted circles. Brown colouration fades into purple and white at base. Actinopharynx pale.

Cnidom (Dunn 1981a)

Tentacles: basitrichs, spirocysts. Actinopharynx, filaments, column: basitrichs (small and large), microbasic *p*-mastigophores, spirocysts.

Habitat and distribution

A new record for South Africa. Column typically covered in shell fragments, base either unattached or attached to debris buried below sand. Associated with two species of anemone fish worldwide, as well as an unknown species of crab. Cosmopolitan in tropical seas, found in Hawaii, Japan, Vietnam, Indonesia, Melanesia, Australia and South Africa. Not a common species in South Africa and reported exclusively from Sodwana Bay on the East Coast between 15 – 20 m. Due to their importance to the ecotourism industry, this species is not commonly collected, thus no specimens housed in SAM.

Genus *Stichodactyla* Brandt 1835

Pedal disc well-developed, adhesive. Numerous short, blunt tentacles. Tentacles communicating with endocoels arranged in radial rows. Oral disc wider than pedal disc, may undulate considerably, densely covered by tentacles. Fosse slight, or absent. Usually two siphonoglyphs, each attached to a pair of directive mesenteries (from Dunn, 1981a).

Stichodactyla haddoni (Saville-Kent 1893) – new record

(Plate 19, Figs C – E)

Discosoma Haddoni Saville-Kent, 1893: 32-33. Carlgren, 1896: 174.

Stichodactyla haddoni **Dunn, 1981a: 82-91**. Fautin & Allen, 1992: 40-41. Fautin *et al.*, 2009: 133.

Diagnosis and description

Pedal disc weakly adherent, edge curvilinear. Upper column flared, tapering towards base. Small, adhesive verrucae on column; often lacking fosse. Oral disc wide, margin wavy, especially in preservation. Zooxanthellae in oral disc and tentacles. Over a hundred tentacles crowded on oral disc, with highest concentration at margin. Area around mouth free of tentacles, mouth without lips. Tentacles thick, stout and rounded at tips; arranged in rows radiating outwards from mouth. Exocoelic tentacles pale and longer than endocoelic tentacles. Two large siphonoglyphs positioned opposite each other, each attached to a pair of sterile directives. Actinopharynx long and furrowed, sphincter weak. All mesenteries with filaments, youngest mesenterial pairs sterile. Anemones gonochoric. Retractors long, basilar muscles weak, parietobasilar muscles very weak. Common name: Carpet anemone.

Size

Preserved: height 50 mm, diameter of pedal disc 70 – 100 mm, diameter of oral disc 100 – 150 mm. Live: diameter of oral disc 300 – 500 mm, diameter of mouth 25 – 30 mm, diameter of verrucae 1 mm, length of tentacle 3 – 8 mm, diameter of tentacle 1 mm.

Colour

Column translucent purple or green, darkening towards margin. Mesenterial insertions visible as pale lines. Verrucae same colour as column. Oral disc purple or brown, with mesenterial insertions visible, mouth yellow. Tentacles brown, dark purple, lilac or light green. Pale tentacles usually distributed between darker tentacles, all with white tips. Some specimens with tips of

long tentacles white and those of short tentacles pale green, creating pattern of radial lines running either from mouth to margin, or mouth to mid-disc.

Cnidom (Dunn 1981a)

Actinopharynx, column: basitrichs, microbasic *p*-mastigophores, spirocysts. Filaments: basitrichs (small and large), microbasic *p*-mastigophores, spirocysts. Tentacles: basitrichs (large and small), spirocysts.

Habitat and distribution

A new addition to the anemone fauna of South Africa. Lives with column buried in coarse sand, into which anemone is able to only partially contract. Commonly associated with commensal shrimp (*Periclimenes brevicarpalis*) and porcelain crabs (*Neopetrolisthes maculatus*). Known to host a total of seven species of anemone fish. Tentacles extremely sticky and contact may cause welts. Cosmopolitan in tropical seas, found in Australia, Japan, Indonesia, the Red Sea, India, Singapore, Melanesia, Seychelles, Mozambique, and Sodwana Bay in South Africa. Most commonly observed by SCUBA divers at depths of 14 – 20 m. One specimen in SAM from Maputo Bay, Mozambique.

***Stichodactyla mertensii* Brandt 1835**

(Plate 19, Figs F – G)

Stichodactyla mertensii Brandt, 1835: 16. **Dunn, 1981a: 99-105.** Fautin & Allen, 1992: 42-43.

Diagnosis and description

Pedal disc curvilinear, extremely adhesive. Margin typically wavy, but able to lie flat. Lower column narrower than pedal disc, upper column with fosse. Column short in comparison to widely flared oral disc. Zooxanthellae in upper column, oral disc and tentacles. Verrucae on column adhere to rocky substrate, but do not collect debris. Numerous tentacles, dense, not adhesive, all of similar length and with blunt tips when contracted. Tentacle rows reach all the

way to mouth. Mouth small, sometimes on hypostome. Two symmetrical siphonoglyphs with a pair of sterile directives attached to each. Sphincter circumscribed, weak. All mesenteries with filaments. Smallest mesenteries infertile, anemones gonochoric. Retractors weak, basilar muscles strong, parietobasilar muscles narrow. Common name: Mertens' anemone or saddle anemone.

Size

Live: height 150 – 200 mm, diameter of lower column 100 mm, diameter of oral disc 130 – 1500 mm. Preserved: height 100 mm, length of tentacles 2 – 8 mm, diameter of tentacles 0.5 – 2 mm.

Colour

Column, verrucae and oral disc bright pink to purple. Mesenterial insertions visible through column wall. Mouth bright green with white actinopharynx. Tentacles typically green or grey in South African specimens.

Cnidom (Dunn 1981a)

Actinopharynx: basitrichs (small and large), spirocysts. Column: basitrichs, microbasic *p*-mastigophores, spirocysts. Filaments: basitrichs (small and large), microbasic *p*-mastigophores. Tentacles: basitrichs, spirocysts.

Habitat and distribution

Attaches to sections of coral reef, sometimes covered in sand. Able to slowly retract, but column may tear easily; thus collection is difficult. Associated with 11 species of anemone fish and may harbour large densities of more than one fish species. Symbiotic with shrimps and the porcelain crab *Neopetrolisthes maculatus*. Cosmopolitan in tropical seas, found in Australia, Seychelles, Indonesia, Micronesia, Melanesia, Maldives, Malaysia, Thailand, Japan, Vietnam and Sodwana Bay in South Africa. A relatively rare species, found between 15 – 20 m. As these depths lie in the range of SCUBA divers, they are most commonly recorded from photographs. No species housed at SAM due to the restriction on harvesting of these anemones in marine reserves.

Family Thalassianthidae Milne Edwards 1857

Column with verrucae distally. Sphincter weak. Oral disc sometimes with numerous short, lobes, which may bear dorsal dendritic tentacles. Tentacles radially arranged, with nematospheres. One cycle of dendritic exocoelic tentacles at margin. Usually two siphonoglyphs, not necessarily connected to directives. Many pairs of perfect mesenteries. Retractors well-developed, parietobasilar muscles weak, basilar muscles well-developed. Distribution of gonads vary, mesenteries of first cycle may be fertile, directives infertile. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Genus *Cryptodendrum* Klunzinger 1877

Upper part of column with small verrucae. Sphincter weak, to very weak. Margin wavy. Oral disc wide, irregularly folded. Tentacles of two kinds, either short or dendritic. One row of dendritic, exocoelic tentacles at margin, with globular nematospheres. Inner part of oral disc with short branched endocoelic tentacles, radially arranged. Two well-developed siphonoglyphs. Pairs of mesenteries numerous, at least first three cycles perfect. All stronger mesenteries except directives, fertile. More mesenteries distally than proximally. Retractors well-developed, parietobasilar muscles weak, basilar muscles distinct. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

Cryptodendrum adhaesivum Klunzinger 1877 – new record

(Plate 20, Figs A – B)

Cryptodendrum adhaesivum Klunzinger, 1877: 86.

Cryptodendrum adhaesivum Haddon, 1898: 399, 483-484, pl. 25, figs 4-6, pl. 32, figs 5-6. Carlgren, 1940a: 7, 32-34, figs 9&13; 1949: 70. **Dunn, 1981a: 7-13**. Cutress & Arneson, 1987: 54, 55, 57, 59, pl. 2, fig. 2c. Richardson *et al.*, 1997: 61-62, 64. Fautin, 2009: 131-132, 140, fig. 11.

Diagnosis and description

Pedal disc adhesive with uneven edges, wider than lower column. Column tough. Upper column expands into extremely wide oral disc, fosse low. Oral disc with thick, convoluted margin formed by short, stubby tentacles. Longitudinal rows of adhesive verrucae prominent on upper column, characteristically with concave centre and decreasing in size distally. No debris attached to verrucae. Tentacles adhesive, extremely dense; only mouth visible between them. Some marginal tentacles minutely branched, otherwise simple. Remainder of oral disc covered in highly branched tentacles if viewed under magnification, typically five small branches which originate very close to tentacle base. Concentric band of nematospheres observed just within circle of marginal tentacles, appear as swollen tentacles (Dunn, 1981). Zoxanthella in oral disc and tentacles. Sphincter circumscribed, weak. Actinopharynx with deep furrows and two siphonoglyphs with directive pairs attached. Minimum of two complete mesenterial cycles, all except directives with filaments carrying gametes. Anemone gonochoric. Retractors branched, basilar muscles of intermediate size, parietobasilar muscles weak. Common name: Adhesive anemone or pizza anemone.

Size

Preserved: height 50 mm. Live: height 100 mm, diameter of oral disc 200 – 300 mm, diameter of verrucae 2 mm, diameter of mouth 10 mm, length of tentacles 5 mm, diameter of nematospheres 1 mm.

Colour

Colour greatly variable. South African specimens with yellow-cream pedal disc and column. Mesenterial insertions feint. Verrucae slightly darker shade of yellow. Oral disc grey or purple-grey. Mouth bright yellow. Nematospheres and marginal tentacles form a conspicuous thick cream-coloured band. Inner tentacles purple-grey or dark brown-grey. Patches of pale tentacles may occur within the pale outer ring, although this patterning has not been observed in South African specimens.

Cnidom (Dunn 1981a)

Actinopharynx: basitrichs (small and large), spirocysts. Column: basitrichs (small and large). Filaments: basitrichs (small and large), microbasic *p*-mastigophores. Nematospheres: basitrichs, spirocysts. Tentacles: basitrichs (small, medium and large), spirocysts (small and large).

Habitat and distribution

Pedal disc attaches to hard substrata in deep holes in coral reef; anemone able to retract into hole when disturbed. Mutualistic relationship with only one species of anemone fish, association not common. Cosmopolitan in tropical seas, found in Australia, Micronesia, Melanesia, Polynesia, Indonesia, Maldives, Seychelles, Japan, Vietnam, the islands off South America, Singapore, Philippines, the Red Sea and Sodwana Bay in South Africa. This is the first record of *Cryptodendrum adhaesivum* from South Africa, found between 10 – 15 m lodged in a crack between the reef. An extremely rare species in South Africa, thus collection was not authorised and no specimens exist in SAM.

Superfamily Mesomyaria Stephenson 1921

Thenaria without acontia. Sphincter mesogleal (from Carlgren 1949).

Family Actinostolidae Carlgren 1932

Column typically smooth, rarely tuberculate or with papillae, never with verrucae or other hollow outgrowths. Sphincter mesogleal. Tentacles sometimes with nematocyst-batteries on aboral sides. Mesenteries not divisible into macro- and microcnemes. Younger mesenteries not bilaterally arranged. Retractors diffuse. Acontia absent (from Carlgren 1949).

Genus *Actinostola* Verrill 1883

Column may be short, cup-like, long, or cylindrical. Column usually thick, either almost smooth, or with flat tubercles produced by mesogleal thickenings. Sphincter weak, mesogleal. Upper column cannot entirely cover tentacles. Tentacles short, inner longer than outer, fewer than proximal mesenteries. Tentacles may have mesogleal thickenings on aboral sides of base, microbasic *b*-mastigophores found on tips. Two well-developed siphonoglyphs. Numerous perfect mesenteries, hexamerously arranged. Third or fourth cycle, with one irregularly arranged mesentery with asymmetrical longitudinal muscles. Retractors diffuse, parietobasilar and basilar muscles strong. Mesenteries of first two cycles sterile. Cnidom: spirocysts, basitrichs, microbasic *p*- and *b*-mastigophores (from Carlgren 1949).

Actinostola capensis Carlgren 1928

(Plate 20, Figs C – D)

Paractinostola capensis Carlgren, 1928a: 184-187; **1938**: 64-65; 1949: 79. Fautin, 1984: 19. Acuña & Griffiths, 2004: 196.

Actinostola capensis Riemann-Zürneck, 1978: 66, 76-78, 80-82. Zamponi, 1984: 111, 117.

Diagnosis and description

Column narrow at base and wider towards oral disc, which may be lobed in larger individuals. Thick column may be irregularly furrowed, creating appearance of pale, raised bumps or tubercles. Pedal disc occasionally invaginated. Mesogleal sphincter reticular, weak and stratified. Many short tentacles, up to 450 in large individuals. Tentacles cannot be fully retracted. Longitudinal muscles of the tentacles and radial muscles of oral disc mesogleal. Actinopharynx furrowed. Two broad siphonoglyphs and two pairs of directives. Number of mesenteries decreases towards base, with oldest four mesenteries perfect. Mesenteries of third cycle and younger fertile, end in filaments. Retractors diffuse and may be asymmetrical. Strong parietobasilar and basilar muscles. Common name: Phoeby's delight.

Size

Live and relaxed: height 70 – 85 mm, breadth of pedal disc 35 – 75 mm, breadth of oral disc 40 – 155 mm.

Colour

Column and pedal disc rose, pale pink or flesh coloured; with or without irregular pale bumps. Body wall beneath ectoderm white. Tentacles and oral disc bright orange or deep maroon.

Cnidom

Column, actinopharynx: basitrichs. Tentacles: basitrichs, microbasic mastigophores, spirocysts. Filaments: basitrichs, microbasic mastigophores.

Habitat and distribution

An abundant deep-sea species, currently classified as endemic to South Africa. As distribution records form a distinct line between the border of Namibia and South Africa, Namibian trawl data should be collected to determine if this species is found in Namibian waters. Recorded in trawls from Port Nolloth on the West Coast to Port Shepstone on the East Coast. Highest densities up the West Coast and on the Agulhas Bank from a depth range of 81 – 1005 m. Twenty-six specimens housed at SAM.

Genus *Anthosactis* Danielssen 1890

Column smooth, low, sometimes longitudinally ridged. Sphincter strong, mesogleal. Only a few short, robust tentacles, hexamerously or octamerously arranged, outer shorter than inner. Base of outer tentacles with stinging battery of microbasic *b*-mastigophores. Actinopharynx short with two well-developed siphonoglyphs. Six pairs of perfect mesenteries. Two pairs of directives. Retractors weak, parietobasilar muscles well-developed. Younger mesenteries growing from basal disc upwards. All stronger mesenteries fertile. Cnidom: spirocysts, basitrichs, microbasic *b*- and *p*-mastigophores (from Carlgren 1949).

***Anthosactis capensis* Carlgren 1938**

(Plate 20, Figs E – F)

Anthosactis capensis Carlgren, 1938: 62-63; 1949: 82. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Column smooth and short. Base strong, narrower than oral disc. Mesogleal sphincter strong. Short tentacles octamerously arranged, 32 in total. Outer tentacles shorter than inner. Actinopharynx short. Siphonoglyphs distinct. Number of mesenteries at base match number of tentacles, grow upwards from base. Two pairs of directives. Eight perfect mesenteries, with first two cycles fertile. Retractors of fertile cycles diffuse and weak. Parietobasilar muscles on

mesogleal projection, well developed. Basilar muscles present. Gonochoric, females with large ova. Common name: Rose anemone.

Size

Preserved and contracted: height 5 mm, base 10 mm. Live: height 15 mm, oral disc 40 mm, base 10 mm.

Colour

Cloudy grey column, with burnt orange to pink tentacles and oral disc. Mouth a light orange colour. No patterns or markings on any part of anemone.

Cnidom

Tentacles: atrichs, spirocysts, other unidentified nematocysts. Column: atrichs.

Habitat and distribution

A predominantly deep-sea species found amongst small stones and sand between 12 – 550 m depth. Distribution ranges from Hondeklip Bay on the West Coast to Sodwana Bay on the East Coast, but not common. Endemic to South Africa. Five specimens housed at SAM.

Family Isanthidae Carlgren 1938

Thenaria with well developed mesogleal sphincter. Mesenteries divisible into macro- and microcnemes. Acontia absent. Retractors of mesenteries very strong (from Carlgren 1949).

Genus *Isanthus* Carlgren 1938

Column cylindrical, smooth, without projections. Margin distinct. Sphincter weak, mesogleal. Tentacles hexamerously arranged. Two siphonoglyphs, two pairs of directives. Six pairs of perfect mesenteries, fertile. Remainder microcnemes. Equal number of mesenteries proximally and distally. Retractors strong. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophores (from Carlgren 1949).

***Isanthus capensis* Carlgren 1938**

(Plate 21, Figs A – B)

Isanthus capensis **Carlgren, 1938: 59-61**; 1945: 15; 1949: 76. Hand, 1955: 88. Cha & Song, 2001: 91, 93-95, 109, 111-112, pl. 1, figs A-B. Acuña & Griffiths, 2004: 196.

Diagnosis and description

Column cylindrical, smooth with longitudinal furrows marking mesenteries. Mesogleal sphincter short. All 48 tentacles equal in length, some individuals with two longer catch tentacles positioned on opposite sides of oral disc. Actinopharynx longitudinally furrowed with two distinct siphonoglyphs. Twenty-four pairs of mesenteries with six perfect and fertile. Two pairs of directives. Mesenteries of second and third cycles sterile, no retractors. Retractors of remaining cycles strong, reticular and branched. Longitudinal muscles of mesenteries folded. Parietobasilar muscles weak, basilar muscles present. Internal brooders and sequential hermaphrodites. Common name: Ring-tentacle anemone.

Size

Preserved and relaxed: height 18 mm, diameter of column 7 mm. Live: height 20 mm, column diameter 15 mm.

Colour

Patterns striking in live specimens. Column grey, cream or pale yellow below and light brown or orange above. Tentacles cream with grey bands and two brown dots at base. A thick orange line joins two orange inner tentacles, which point upwards. Oral disc covered with cream and orange stripes. Star-shaped pattern around mouth. Colourless and cylindrical in shape when preserved.

Cnidom

Actinopharynx, column, filaments: basitrichs, microbasic *p*-mastigophores. Tentacles: basitrichs, microbasic *p*-mastigophores, spirocysts.

Habitat and distribution

Attaches to small pebbles amongst gravel. Common from Hondeklip Bay on the West Coast to False Bay on the Cape Peninsula. Non-endemic, described from South Africa, but also abundant on Korean shores. Predominantly a rocky shore species, but can be found attached to stones up to 157 m depth. SAM houses 51 specimens.

Suborder Ptychodacteae Stephenson 1922

Anthozoa with definite base. Filaments with or without ciliated tracts. Gonads not enclosed in mesoglea. Basilar and parietobasilar muscles present or absent (from England & Robson 1984).

Family Preactiidae England in England & Robson 1984

Column covered with tentaculate vesicles, occasionally found on oral disc. Actinopharynx well-developed. Two siphonoglyphs connected to directive mesenteries. Mesenterial pairs regularly arranged, most perfect with a total of 12. All mesenteries usually fertile. Filaments with ciliated tracts. Basilar muscles present (from England & Robson 1984).

Genus *Preactis* England in England and Robson 1984

Preactiidae without ectodermal longitudinal muscles on column, sometimes slight remnants around vesicles. Sphincter absent. Actinopharynx with deep folds and numerous pockets. Siphonoglyphs well-developed. Equal number of mesenteries proximally and distally. Mesenteries fused for a third of column length proximally to distally. Cnidom: spirocysts, atrichs and basitrichs (from England & Robson 1984).

***Preactis millardae* England in England & Robson 1984**

(Plate 21, Figs C – E)

Preactis millardae **England in England and Robson, 1984: 316-328**. Dayton *et al.*, 1997: 135, 140-141. Riemann-Zürneck & Griffiths, 1999: 194. Cappola & Fautin, 2000: 995-996, 998-1003. Acuña & Griffiths, 2004: 196. Branch *et al.*, 2010: 28, pl. 7.4.

Diagnosis and description

Pedal disc weakly adhesive, usually convex when not attached to substrata. Smooth oral disc, without tentacles, mouth small and central. Oral disc narrower than pedal disc, but commonly of same shape. Tentaculate vesicles (histologically identical to tentacles) arranged in ordered, longitudinal rows on column. Lacking ectodermal longitudinal muscles in column. Sphincter absent. Actinopharynx short, wide and deeply furrowed. Intense folding of actinopharynx occurs when column contracted to enable feeding. Two symmetrically arranged siphonoglyphs longer than actinopharynx, each with a pair of directives attached. Twelve mesenterial pairs arranged in two cycles, fused in lower part of column. All mesenteries with ciliated tracts in upper part of filament, fertile. Gonads develop in mesenterial mesoglea (Cappola & Fautin, 2000) and extend the length of body cavity. Anemone gonochoric. Two retractors, basilar muscles and parietobasilar muscles absent. Common name: Hedgehog or walking anemone.

Size

Live: height 100 – 200 mm, diameter of pedal disc 50 – 90 mm, diameter of oral disc 17 – 20 mm. Preserved: height 30 – 50 mm. Live juveniles: height 10 mm.

Colour

Body wall translucent orange with white stripes extending from base of each tentacle. Tentaculate vesicles grey-white with orange tips. Some vesicles with white bands. Oral and pedal discs with same striped pattern of orange and white marking mesenterial insertions. Orange colouration may be replaced with pink or red. Juveniles cream or white.

Cnidom (Cappola & Fautin 2000)

Actinopharynx: basitrichs, atrichs. Tentaculate vesicles: basitrichs, atrichs, spirocysts. Oral disc: atrichs, spirocysts. Filaments: atrichs.

Habitat and distribution

Predators of gorgonians and alcyonarians (*Capnella thyrsoidea*), feeds by engulfing prey. A mobile anemone, which uses peristaltic waves of body wall and vesicles for locomotion. Contractions originate from the base and move towards oral disc, body shape changes with ease. Column cylindrical in shape when base and lateral tentacles attached to rock walls or hydrocorals (*Allopora nobilis*). Anemone typically sways back and forth in current. Endemic to South Africa. Found between 10 – 32 m depth on Atlantic side of the Cape Peninsula and in False Bay. A moderately common sighting for SCUBA divers in False Bay. Nine specimens housed at SAM.

ORDER CORALLIMORPHARIA Carlgren 1940a

Anthozoa with flat, usually adhesive pedal disc, without basilar muscles. Column smooth without vesicles, verrucae or acrorhagi. Sphincter usually absent or weak. Tentacles not retractile, simple or branched, sometimes with acrospheres, rarely arranged in cycles. Siphonoglyphs and directives weak or absent. Mesenteries often irregularly arranged. Perfect mesenteries numerous. Retractors and parietobasilar muscles weak. Filaments without ciliated tracts. Holotrichs numerous, spirocysts very rare or absent. Animals solitary or connected by coenenchyme. Cnidom: spirocysts, atrichs, holotrichs, micro-basic *b*- and *p*-mastigophores (from Carlgren 1949).

Family Corallimorphidae Hertwig 1882

Simple or gregarious. Tentacles simple, with acrospheres. More than one tentacle connected with each older endocoel. Endocoelic tentacles in each row variable in number. Spirocysts numerous (from Carlgren 1949).

Genus *Corynactis* Allman 1846

Small Corallimorphidae often forming groups of individuals. Asexual reproduction by longitudinal fission common. Sphincter weak. Only one tentacle communicating with each exocoel. Endocoelic tentacles arranged in radial rows with 2-5 tentacles in each row. Outer tentacles larger than inner. Acrospheres distinct. Cnidom: spirocysts, atrichs, holotrichs, microbasic *p*- and *b*-mastigophores (from Carlgren 1949).

Corynactis annulata (Verrill 1867)

(Plate 21, Figs F – I)

Melactis annulata Verrill, 1867: 50, pl. 1, fig. 8a.

Corynactis annulata Verrill, 1868: 16; 1869a: 74, 101. **Carlgren, 1938: 13-14, pl. 3, fig. 5**; 1939: 791; 1941: 1-4, 11; 1949: 13. Acuña & Griffiths, 2004: 196, 198. Branch *et al.*, 2010: 24, pl. 5.1.

Ropalactis annulata Andres, 1883: 262, 470.

Diagnosis and description

Column smooth. Approximately 90 simple tentacles, wrinkled. Tentacles arranged in radial rows, inner tentacles shorter than outer. Acrospheres form knobs on tips of tentacles. Sphincter and siphonoglyphs weak, one or two pairs of directives present. Actinopharynx ridged, up to two siphonoglyphs. Approximately 80 mesenterial pairs, less than 40 perfect, all with filaments without ciliated tracts. Asexual reproduction by means of longitudinal fission common, leading to colony formation. Retractors and parietobasilar muscles weak, basilar muscles absent. Common name: Strawberry anemone.

Size

Preserved: height 12 mm, diameter of oral disc 9 mm.

Colour

Two colours apparent: column translucent, either pale pink with peach-coloured ring at margin or burnt orange with yellow ring. Column colour fades proximally. Tentacles transparent with opaque white tips. Mouth and oral disc transparent, tinged with pale pink or orange-brown. Mesenterial insertions visible on oral disc.

Cnidom (Carlgren 1938)

Column and tentacle tips: holotrichs, microbasic mastigophores (small and large). Actinopharynx: holotrichs, microbasic mastigophores. Filaments: holotrichs (small and large), microbasic mastigophores.

Habitat and distribution

Typically found clustered together on rocky reef in groups of identical colour, but polyps not connected. Endemic to South Africa and found from Port Nolloth on the West Coast to East London on the South Coast. Common between 1 – 108 m. Seven specimens housed at SAM.

Family Discosomatidae Duchassaing de Fonbressin & Michelotti 1864

Small Corallimorpharia usually with two types of tentacles. Tentacles arranged in radial rows, may be simple or compound. Oral disc with one or more mouths. Asexual reproduction frequent (from Carlgren 1949).

Genus *Rhodactis* Milne Edwards & Haime 1851

Marginal tentacles simple, tentacles on oral disc usually branched. Tentacles mostly arranged in radial lines. Gregarious. Individuals may have two or more mouths. Cnidom: atrichs, holotrichs, microbasic *p*- and *b*-mastigophors (from Carlgren 1949).

***Rhodactis rhodostoma* (Hemprich & Ehrenberg in Ehrenberg 1834)**

(Plate 22, Figs A – B)

Metridium rhodostomum Ehrenberg, 1834: 263.

Rhodactis rhodostoma Carlgren, 1899a: 14; **1938: 15-17**; 1949: 16. Fishelson, 1970: 113-116, fig. 19. Acuña & Griffiths, 2004: 196.

Discosoma sp. Branch *et al.*, 2010: 24, pl. 5.2.

Diagnosis and description

Pedal disc wide. Column wrinkled longitudinally, tentacles and column housing zooxanthellae. Two tentacle types: margin with a row of short, simple tentacles, each with a nematocyst battery at tip; and oral disc with branched tentacles arranged in radial rows. Branched tentacles with thick base and varying numbers of projections, immature tentacles appear to be unbranched. Tentacles towards centre of oral disc with up to 30 branches. Oral disc wide, with margin uniformly flattened, small central mouth raised on hypostome. Sphincter elongate, diffuse. Actinopharynx with longitudinal furrows. Up to 62 pairs of mesenteries, approximately 18 pairs perfect. Parietobasilar muscles weak, no basilar muscles. Asexual reproduction common. Common name: Elephant-ear mushroom coral.

Size

Live: height 15 mm, diameter of oral disc 25 – 40 mm.

Colour

Column and oral disc brown. Marginal tentacles brown, branched tentacles brown with white tips. Oral disc with one to two radial stripes of white or maroon tentacles. Actinopharynx white.

Cnidom (Carlgren 1938)

Column, branched tentacles: holotrichs, microbasic mastigophores. Actinopharynx and filaments: holotrichs. Marginal tentacles: holotrichs, atrichs.

Habitat and distribution

Column able to cover tentacles when animal disturbed. Always found clustered together in groups. Cosmopolitan in tropical seas; samples from Japan, Melanesia, India, the Red Sea, East Africa and South Africa. Moderately rare on the East Coast from Durban and Sodwana Bay. Occurs in 0 – 20 m of water, most often seen between 12 – 20 m. No samples at SAM due to restrictions on collection in marine reserves.

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Chapter 4 – Biogeographic patterns in species richness and endemism within South African Actiniaria

Introduction

South African coastal and offshore waters are host to a diverse marine biota, comprising at least 12 915 species, 853 (6.6 %) of which are Cnidarians (Griffiths *et al.* 2010). The Actiniaria include just 63 species, 0.4 % of the total biota and 7.3 % of the Cnidarian species in South Africa. Although this percentage is not high, many other species depend on sea anemones for survival. Actiniaria provide homes for a diverse range of marine biota, mainly fish and crustaceans (Fautin & Allen 1992, Guo *et al.* 1996), which live either in mutualism with the anemones, or as parasites of them. Anemones also provide a means of defence for hermit crabs (Gusmão 2010), are consumed by numerous invertebrates and predatory fish (Ates 1989), and are important in the structuring of invertebrate rocky shore species assemblages (Kruger & Griffiths 1998).

The high species richness observed in South Africa's Exclusive Economic Zone (EEZ) is due in part to the large diversity of habitats within the region. The EEZ extends 200 nautical miles from the coast and is divided into six ecoregions (Sink *et al.* 2012). Each ecoregion is further broken down into ecozones, based on bathymetry, benthic slope, substratum, depth, geology, grain size in sandy environments, wave exposure, habitat connectivity and biogeography. The presence of these distinct zones is largely a result of differences in water temperature. The warm Agulhas Current along the East Coast provides an environment in which mean monthly offshore temperatures range between 20 and 28 °C (Lutjeharms 1998), but nutrient levels tend to be low here due to a scarcity of upwelling. By contrast, water temperatures in the cold Benguela Current on the West Coast range between 15.4 and 20.1 °C (Taunton-Clark & Shannon 1988). The inshore upwelling zone along the West Coast is more variable than the offshore upwelling zone, with temperatures ranging between 10 and 18 °C (Shannon *et al.* 1992). Exceedingly cold water can be experienced on the West Coast in summer during upwelling events, which occur when offshore winds blow surface waters out to sea, causing cold, nutrient-rich deep water to rise up

and replace the displaced water. A transition zone between these two oceanographic regimes occurs on the South Coast between Cape Agulhas and Cape Point, resulting in conditions intermediate between the two. The warm Agulhas Current is diverted offshore by the Agulhas Bank (Lutjeharms 1998), creating an area characterised by variable temperatures, ranging between those found on the West and East Coasts. The disparity between nutrients and water temperature around the coast has resulted in distinct biogeographic patterns in biomass and species distribution around South Africa (Bustamante & Branch 1996).

Marine invertebrate biogeographic patterns for coastal inshore taxa have been fairly comprehensively studied in South Africa (Barnard 1950, Day 1967a & b, Millard 1975, Griffiths 1976, Clark & Courtman-Stock 1976, Kensley 1978, Kilburn & Ripley 1982, Gosliner 1987, Thander 1989, Emanuel *et al.* 1992, Williams 1992, Bustamante & Branch 1996, Monniot *et al.* 2001, Awad *et al.* 2002, Acuña & Griffiths 2004, Primo & Vazquez 2004, Frascchetti *et al.* 2005, Laird & Griffiths 2008, Scott 2009); however, not much work has been done on offshore benthic taxa (Eschmeyer *et al.* 2010, Griffiths *et al.* 2010). Trends of species richness along the South African coastline differ according to the taxa under study. Increases in species richness from west to east has been noted for many taxa, including bivalves, gastropods, echinoderms and brachyurans, while amphipods, isopods, ascidians, octocorals and polychaetes all show highest species richness on the South Coast (Awad *et al.* 2002). Rates of endemism are highest on the South Coast; however, these high endemism rates may be artificially enhanced by the fact that the South Coast is most distant from the political borders of the country, and by lower sampling effort in neighbouring countries (Acuña & Griffiths 2004).

Sink *et al.* (2012) have described the numerous inshore ecozones (five inshore ecozones and seven shelf ecozones), in contrast to only six deep-sea ecozones (four bathyal ecozones and two abyssal ecozones, excluding the shelf slope, which is a transitional zone) (Figure 4.1). Data for South Africa are congruent with worldwide data, which indicate that the deep-sea environment supports a relatively low species richness, when compared to the inshore environment (Grassle & Maciolek 1992; Rex *et al.* 2005). The low species richness in the deep-sea environment is a result of the characteristic low levels of productivity there, which is in turn due to the lack of light and low average temperature of about 4 °C (Costello *et al.* 2011). Nevertheless, of the

species living at these depths, a greater proportion consists of endemic species when compared to the proportion of endemics in shallower areas of the ocean. Recent studies suggest that species richness in the abyss is probably considerably higher than previously thought, and with more rigorous sampling and the use of Remotely Operated Vehicles (ROVs), the numbers of species found from this zone is expected to increase dramatically (Rex *et al.* 2005, Vanreusel *et al.* 2010).

Apart from the work of Acuña & Griffiths (2004), which reviews the biogeography of Actinia in South Africa, no other work has been published on the biogeography of this order. The current study adds 12 new species to the list of South African Actiniaria, as well as three species new to science. This chapter reports on the biogeography of Actiniaria and Corallimorpharia in South Africa according to the ecozones set out by Sink *et al.* (2012), thereby allowing a more comprehensive analysis than those of previous studies. Biogeographic trends in species richness and endemism within each of the ecozones is examined, and for the first time diversity patterns are analysed with respect to depth.

Methods

Data collection

Data used for this chapter included historical data from the Iziko South African Museum (SAM) collection and from the catalogues of the University of Cape Town (UCT) Ecological Survey. These data were extracted and digitized from the handwritten records housed in the marine invertebrate collection at SAM. The many unidentified anemones in the SAM wet collection were also identified as far as possible and the records added to the data base, which eventually consisted of 1880 complete records (Figure 4.2). Additional historic data used from the literature included those of Lesson (1830), Milne Edwards (1857a, 1857b), Verrill (1865a, 1865b, 1866, 1869a, 1869b), Hertwig (1882b), Pax (1920), Carlgren (1928a, 1938, 1940b), Carlgren (1920), England & Robson (1984), Griffiths *et al.* (1996), Riemann-Zürneck & Griffiths (1999), Acuña *et al.* (2004), and Schama *et al.* (2012).

Datasets from previous rocky shore intertidal surveys around South Africa were generously provided by Dr. Kerry Sink and Dr. Angela Mead. Photographic identification data acquired from recreational SCUBA divers were also included, as were trawl by-catch data, which were provided by the Department of Agriculture, Forestry and Fisheries (DAFF). Data collected during the course of this study are also included, and comprise both rocky intertidal data and subtidal data acquired by SCUBA divers.

As abundance data were not documented for every record, presence/absence data were used to analyse biogeographic patterns. The binary nature of the data is a limitation to the study, and the spatial analysis is purely descriptive. It is also important to note that a species was recorded as 'absent' only if it was not recorded at a site that had been surveyed and shown to contain other species of anemone. In addition, species abundance and biodiversity were not calculated, due to a lack of information from historical data. Attached to the locality data were depth records, enabling a depth range to be determined for each species. The range of different data types resulted in data points that covered 19 of the 22 ecozones, and fell within all of the six ecoregions of the EEZ

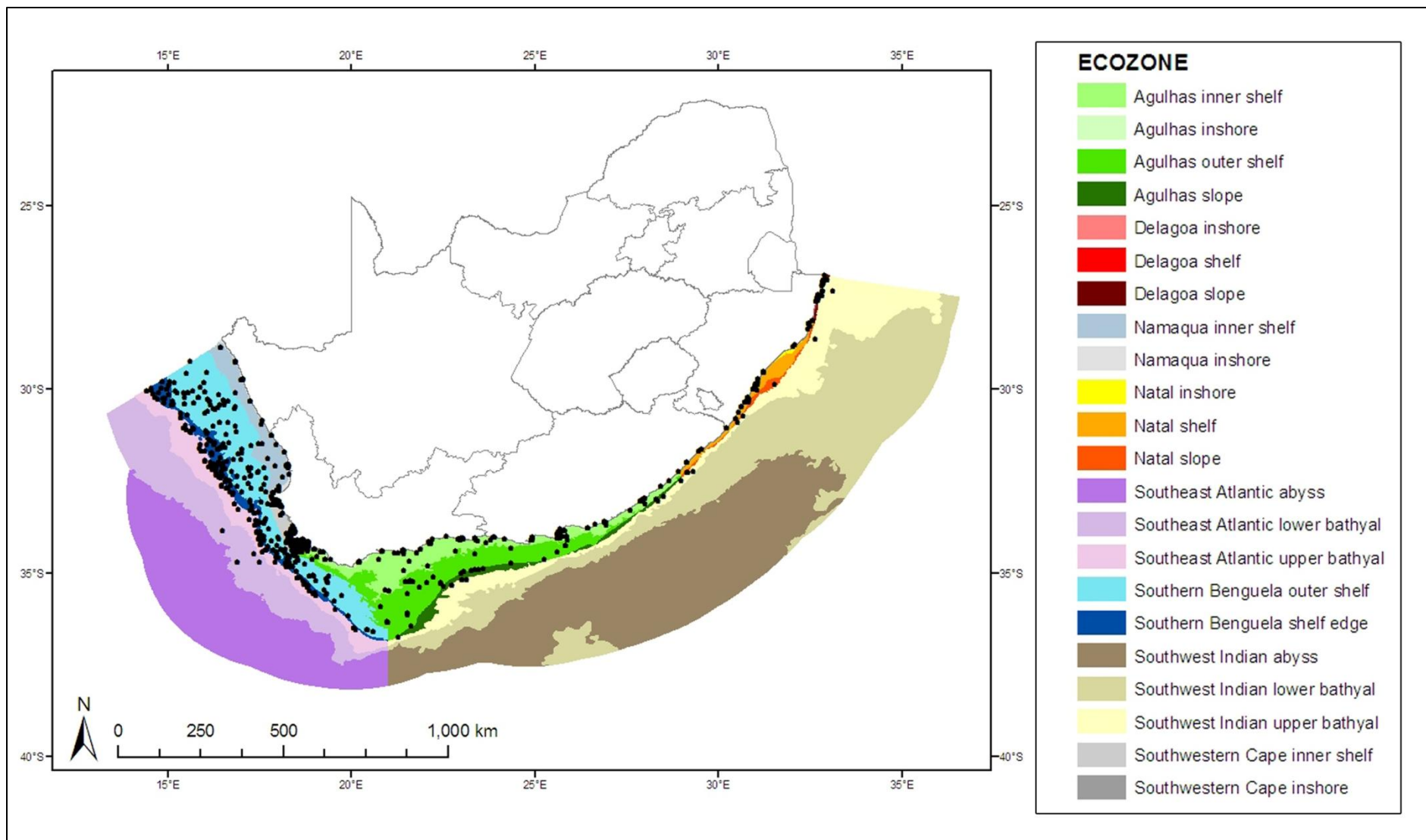


Figure 4.1: Plot of each anemone sample used in the analyses of this study. Shading indicates the 22 ecozones defined by Sink *et al.* (2012).

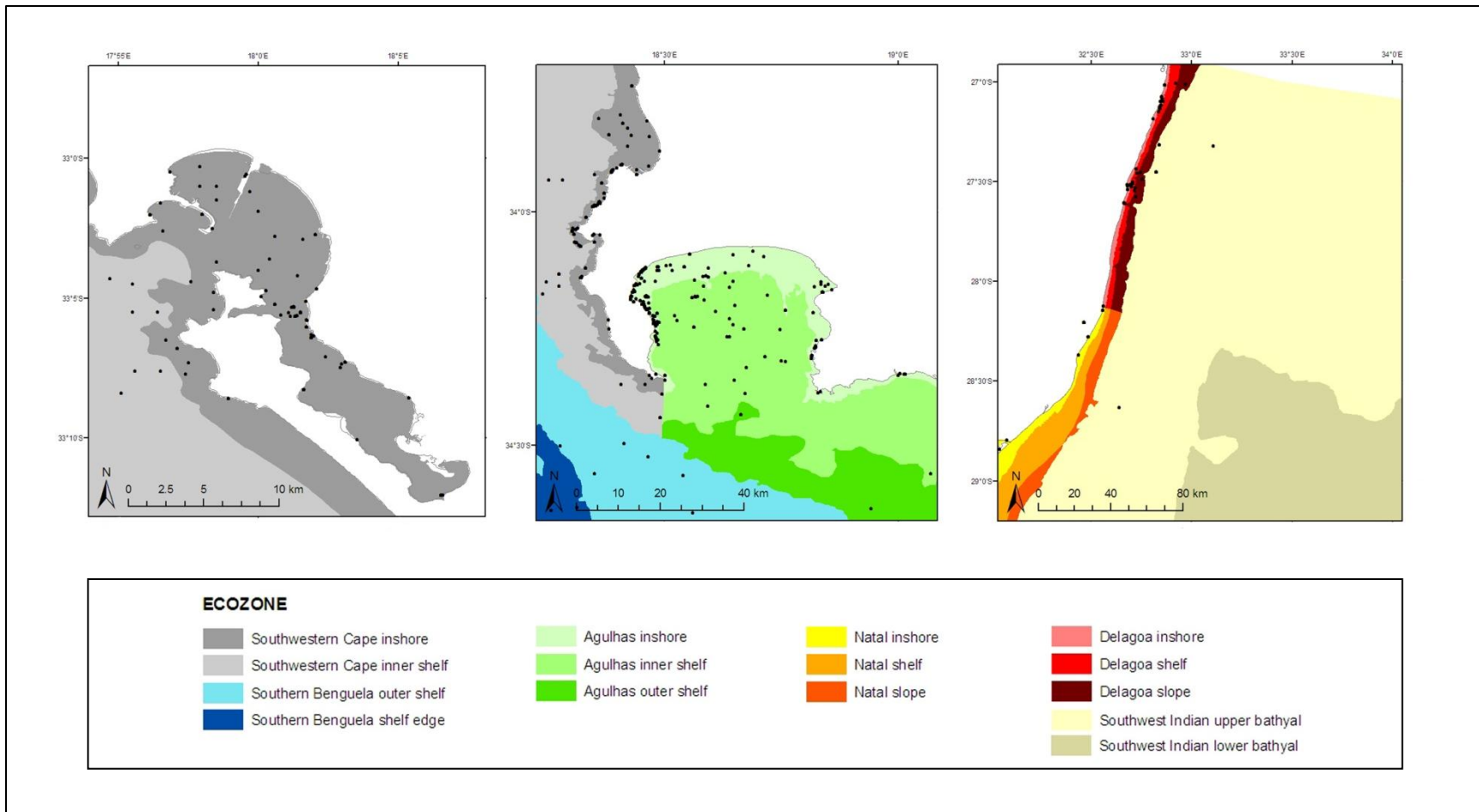


Figure 4.2: Higher resolution plots showing anemone samples recorded in the vicinities of a) Langebaan Lagoon, b) False Bay and c) the Delagoa region. Shading indicates the ecozones defined by Sink *et al.* (2012).

For ease of reference, the West Coast was defined as the coastal zone stretching from the Namibian border to Cape Point, the South Coast as the zone stretching eastwards from Cape Point to the Mbashe River in the Transkei, and the East Coast as the zone stretching from the Mbashe River northwards to the Mozambique border. During sampling trips, animals that were not commonly found in the SAM collection were gathered for examination using a specialised scraper tool. As collections were prohibited in marine reserves, only photographic records were obtained in these areas. Although sampling was conducted opportunistically, an effort was made to spread sample sites along the coastline to ensure broad representivity across ecoregions for comparative purposes. Data from recreational SCUBA divers were concentrated in areas that are popular diving locations, and trawl data were limited to historical records. Fresh samples were fixed in 4 % formalin and preserved in 70% ethanol. Where duplicate samples were available, these were preserved in 96% ethanol to enable genetic analyses for future studies. After wet material was identified, all specimens were added to the SAM marine invertebrate collection.

Based on the above data, an updated species list for South African anemones was created (see Chapter 3). The updated synonymy was resolved with the aid of several online biogeography and cybertaxonomy databases: the Global Biodiversity Information Facility (GBIF), Ocean Biogeographic Information System (OBIS), Integrated Taxonomic Information System (ITIS), the World Register of Marine Species (WoRMS), and most importantly Daphne Fautin's website 'Hexacorallians of the World' (HoW). In addition, all available literature was consulted to resolve synonymies. In some cases original descriptions could not be accessed, and published species revisions were then used. All new records for South Africa, as well as new species found during the field surveys, were added to the anemone checklist.

Each species was classified as being endemic, non-endemic, cosmopolitan, or introduced. Endemic was defined as species that are restricted to South Africa, non-endemics are species found in South Africa as well as in a few other countries, cosmopolitan species are globally widespread, and introduced species originate from other parts of the world and subsequently arrived in South Africa as a result of human activities, most by means of shipping.

Spatial analyses

Each species record was plotted in ArcGIS 9.3 and a shape file overlay of the 22 ecozones established by Sink *et al.* (2012) was added. Graphs were compiled using SigmaPlot version 10.0 (Systat Software 2006) and Microsoft Excel (2007). Branch *et al.* (2010) assumed that species ranges stretched to include the entire coastline between the most westerly and most easterly records; however, in this study each record is plotted individually in order to avoid incorrect exaggerations of species' ranges.

Each species record was then assigned to a spatial sample unit to enable the comparison of anemone biogeography in South Africa with that defined by Sink *et al.* (2012). The linear nature of the coastline enabled the use of linear sample units. The entire South African coastline was split into twenty-nine 100 km sections from west to east (Figure 4.3). These sections roughly correspond to those of Awad *et al.* (2002) and Acuña & Griffiths (2004), although an additional section results from the inclusion of harbours and the Langebaan Lagoon in the measurement of distance around the coast. Each 100 km stretch was treated as a separate sample, characterised by the list of all anemone species recorded along that particular stretch of coast and within the depth range of 0 – 4.9 m for the purposes of the multivariate analysis. The remainder of the EEZ was divided spatially into quarter-degree grid cells, with each cell representing a separate sample characterised by the species recorded within the cell. ESRI ArcMap 9.3 was used to assign anemone records to the two types of sample units (coastal sections and quarter-degree grid cells) using the spatial join function. Ecoregion and ecozone shape files were provided by Dr. Kerry Sink.

ArcMap was also used to assign depth categories, ecoregions and ecozones, as defined by Sink *et al.* (2012), to each record. Depth categories comprised the coastal zone (0 – 4.9 m), the inshore zone (5 – 29 m), the shelf zone (30 – 349 m), the shelf edge (350 – 499 m), the upper bathyal (500 – 1299 m), the lower bathyal (1300 – 3499 m) and the abyss (>3500 m). The shelf zone depth category was split into the inner and outer shelf ecozones according to the GIS layers imported into ArcMap.

The software package PRIMER version 6 was used to conduct a multivariate assessment to determine whether the biogeography of anemones conforms to the ecoregions set out by Sink *et al.* (2012). As the dataset contained only presence/absence data, the data were not transformed. Two separate analyses were performed, one for the coastline, using the coastal sections as samples; and the other for the remainder of the EEZ, using quarter-degree grid cells as samples. Each section, or cell, was treated as a sample, and a Bray-Curtis similarity assessment (Bray & Curtis 1957) was performed based on the presence or absence of species in a section or cell. A cluster analysis was performed based on the similarity matrix to assess and graphically display the similarity between samples based on the species assemblage found. A similarity profile (SIMPROF) was conducted to identify significantly similar groups of samples based on their species assemblages. Ecoregions and ecozones were added as factors and an ANOSIM was performed separately for coastal and offshore zones in order to compare the variation in species composition among sampling units.

Each significantly similar group was assigned a group code, which was used to display the results in ArcMap, and determine whether the groups were spatially clustered. This map was visually compared to that produced by Sink *et al.* (2012) to assess whether there was a correlation between the biogeography of anemones and the defined ecoregions and ecozones. The ecoregions and ecozones within which the sample, or the majority thereof, fell were added as a factor and plotted on the cluster analysis and a multi-dimensional scaling (MDS) plot to provide an alternative means to visually assess whether anemone biogeography conforms to defined ecoregions and ecozones. Two outliers in the offshore data were discarded before running the ANOSIM and producing the offshore MDS plot. A Spearman-rank correlation was performed on both coastal and offshore non-parametric data to determine whether the numbers of samples collected in each ecoregion were correlated with the number of species recorded.

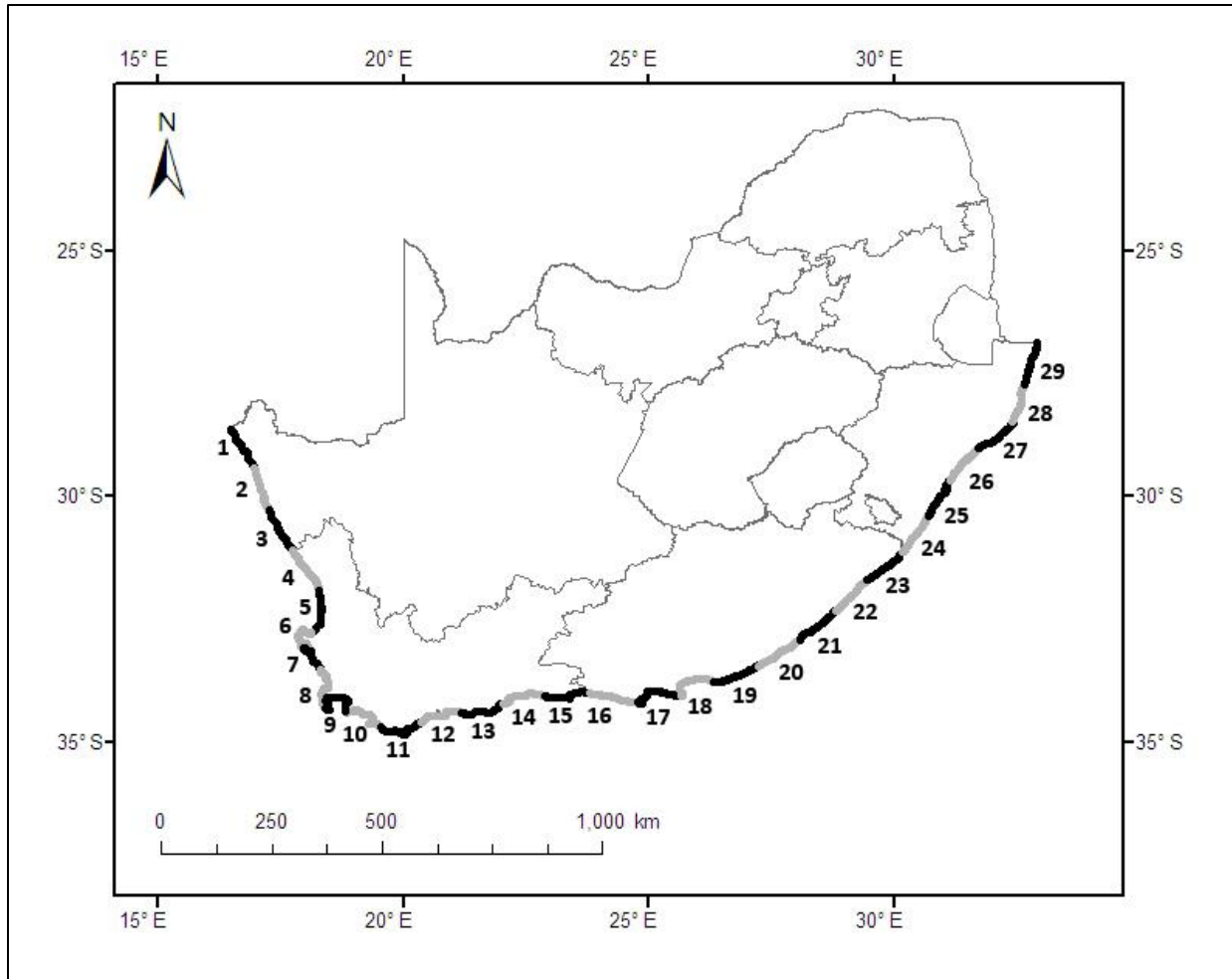


Figure 4.3: The South African coast was divided into 29 coastal sections of 100 km each. Section 1 was the most north-westerly section which started at the border of South Africa and Namibia, section 6 was at Saldanha Bay, section 9 was at False Bay, section 14 was at Mossel Bay, section 18 was at Port Elizabeth, section 20 was at East London, section 22 was at the Mbashe River, section 25 was at Durban, section 27 was at Richard's Bay and section 29 was at the border of South Africa and Mozambique.

Results

Species discovery

The first anemone record from South African waters was *Actinia capensis* in 1830, now known as *Bunodosoma capense* (Lesson, 1830). No new discoveries were made until 1857 when *Cystiactis reynaudi*, now called *Bunodactis reynaudi*, was described from the Cape of Good Hope (Milne Edwards, 1857a). Verrill (1865, 1866, 1869b) described three new species, now called *Haloclava capensis*, *Anthothoe stimpsonii* and *Corynactis annulata*, followed by *Anthopleura michaelsoni* which was described by Pax (1907). The rate of species discovery in South Africa then flattened out (Figure 4.4) until eight species were recorded by Carlgren (1928a), followed by another 24 species in his ‘Monograph of South African Actiniaria and Corallimorpharia’ (Carlgren, 1938), and two more new species two years later (Carlgren, 1940a). After more than 40 years without any additional species being added to the fauna, England and Robson (1984) discovered *Preactis millardae* in 1984, followed by a new record of *Metridium senile* from Cape Town (Griffiths *et al.* 1996). Another rise in new anemone records occurred in 2004 with *Sagartia ornata*, *Entacmaea quadricolor*, *Gyactis sesere*, *Heteractis magnifica* and *Stichodactyla mertensii* reported in a review of the biogeography of South African sea anemones (Acuña & Griffiths 2004, Acuña *et al.* 2004). Subsequently, Schama *et al.* (2012) found the previously reported ‘*Actinia equina*’ to be a new species, which was named *Actinia ebhayiensis*. The current work makes another significant contribution, by adding 12 new records to the anemone fauna of South Africa, as well as three new species, specifically *Edwardsia isimangaliso* (Daly *et al.*, 2012), *Anthostella* n. sp. and *Halianthella* n. sp., as seen in the sudden rise at the end of the graph (Figure 4.4).

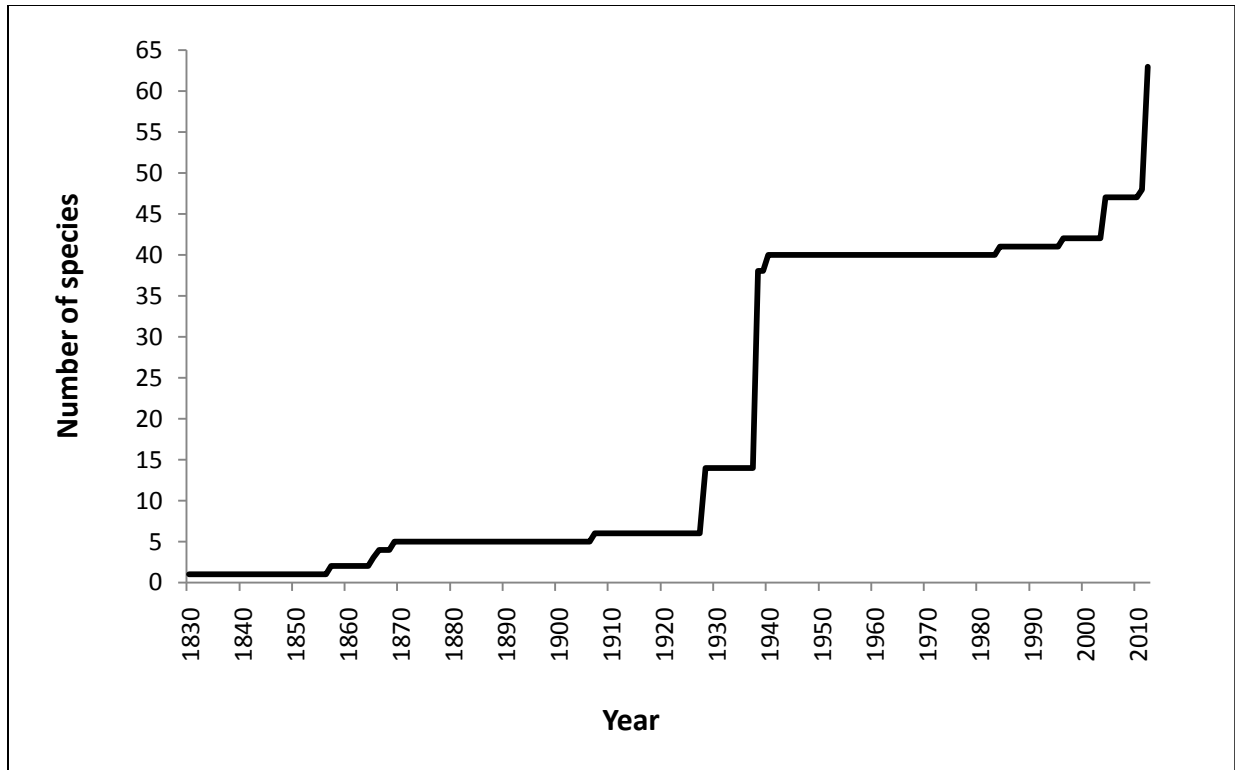


Figure 4.4: Temporal growth in the number of anemone species reported from South Africa, with a total of 63 species currently known.

Prior to this study, 49 anemone species were recognised from South African waters (Acuña & Griffiths 2004). This study increases the number of South African sea anemones to 63 species within 47 genera from 23 families. Sixty percent of the South African families contain only one genus, but all have additional species found elsewhere in the world. The family Actiniidae is by far the largest in the Actiniaria, and contain 17 species from 12 genera within the South African fauna.

Distribution of records

In terms of distributional analysis, a total of 1879 species records were included in the study. Figure 4.5 shows the distribution of the species records around the coastline, distinguished according to three modes of collection: shore collection, trawl collection and collection by SCUBA divers. The dominant modes of collection in the coastal, inshore, and offshore zones are

shore collection, SCUBA collection, and trawl surveys respectively. The records are reasonably distributed across the three major coastal regions and within the six ecoregions. Exceptions include small peaks of shore collected records in Cape Town (Southern Benguela coastal zone), False Bay (Agulhas coastal zone) and Durban (Natal coastal zone), as well as the very large number of SCUBA diving records collected in the Agulhas ecoregion. Ecozones were not all thoroughly sampled, and noticeable gaps exist where no samples have been taken in the lower bathyal and the abyss.

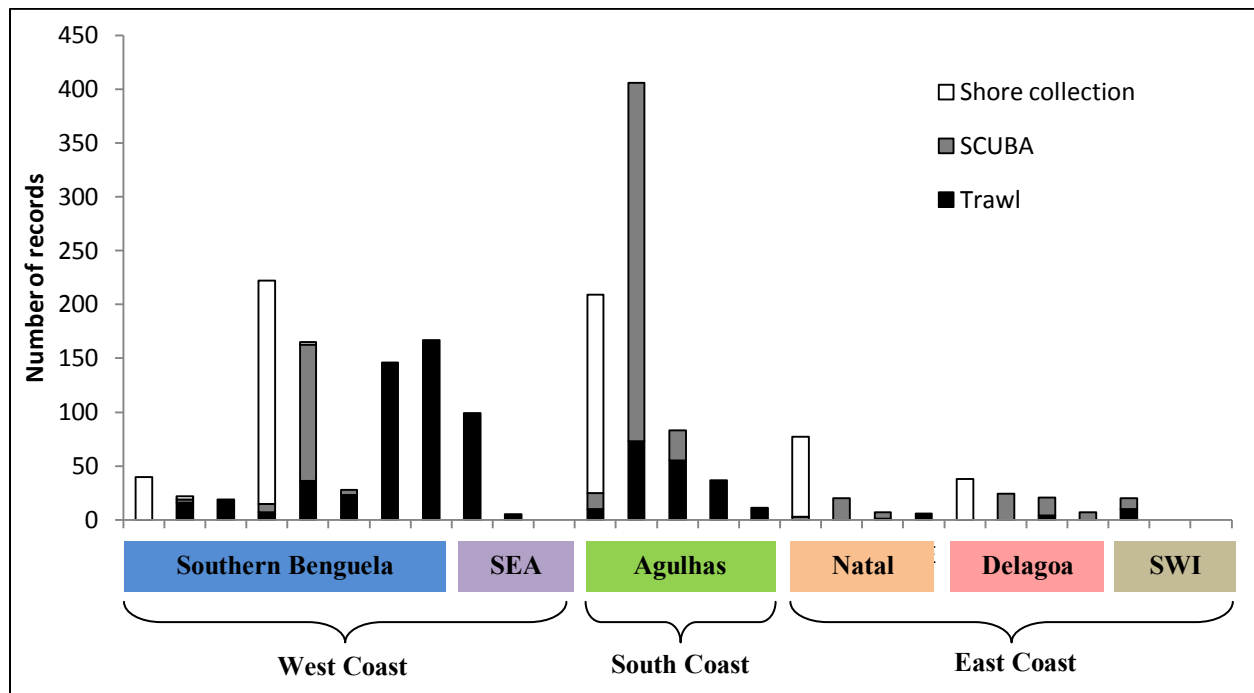


Figure 4.5: Total number of records obtained around South Africa depicted according to coast, ecoregion and ecozone. Ecoregions include the Namaqua (Nam), the Southwestern Cape (SWC), the Southern Benguela (consisting of the Namaqua and the Southwestern Cape and the Southern Benguela ecozones respectively), the Southeast Atlantic (SEA), the Agulhas, the Natal, the Delagoa and the Southwest Indian (SWI) ecoregions. These are further broken down into ecozones: coastal (C), inshore (I), inner shelf (IS), outer shelf (OS), shelf edge (SE), upper bathyal (UB), lower bathyal (LB) and abyss (A).

Figure 4.6 shows the numbers of locality records reported for each of the species in the fauna. Many species are known from relatively few records, indeed six species are known from only a single record, another six from two records each, and a further six from three records each. In total, 21 species are known from less than five records each, indicating that little is known of their true distributional range. Only four species are known from more than 20 records each. Of the species that are known from fewer than five records, 45.0 % were from the inshore zone, 27.5 % from the coastal zone, and 27.5 % from the offshore zones.

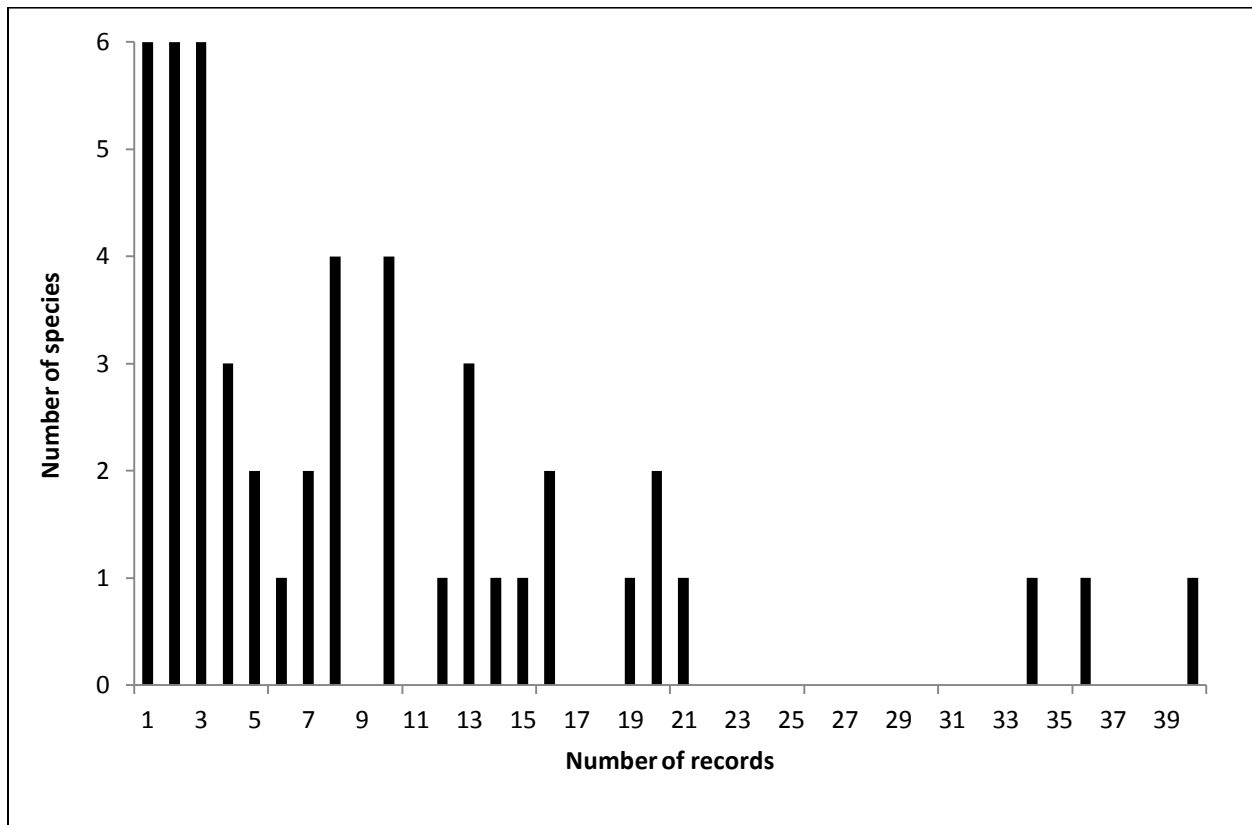


Figure 4.6: Number of species known plotted against the number of records for each.

The depth distributions of all anemone records from South Africa are plotted in Figure 4.7. The highest percentage of records are from the coastal zone (37 %), with 34 % from the inshore zone, 23 % from the shelf (upper and lower shelf combined), 5 % from the shelf edge (also called the shelf slope), and only 1 % from the upper bathyal. No species have been recorded in the lower bathyal and abyss (Figure 4.7a). Fewer records and fewer species are thus found at increasing

depth. The number of species found at depth is indicated in Figure 4.7b, with the majority of species found in the inshore zone (38 %), 30 % from the coastal zone, 24 % from the shelf, 5 % from the upper bathyal and 3 % from the shelf edge.

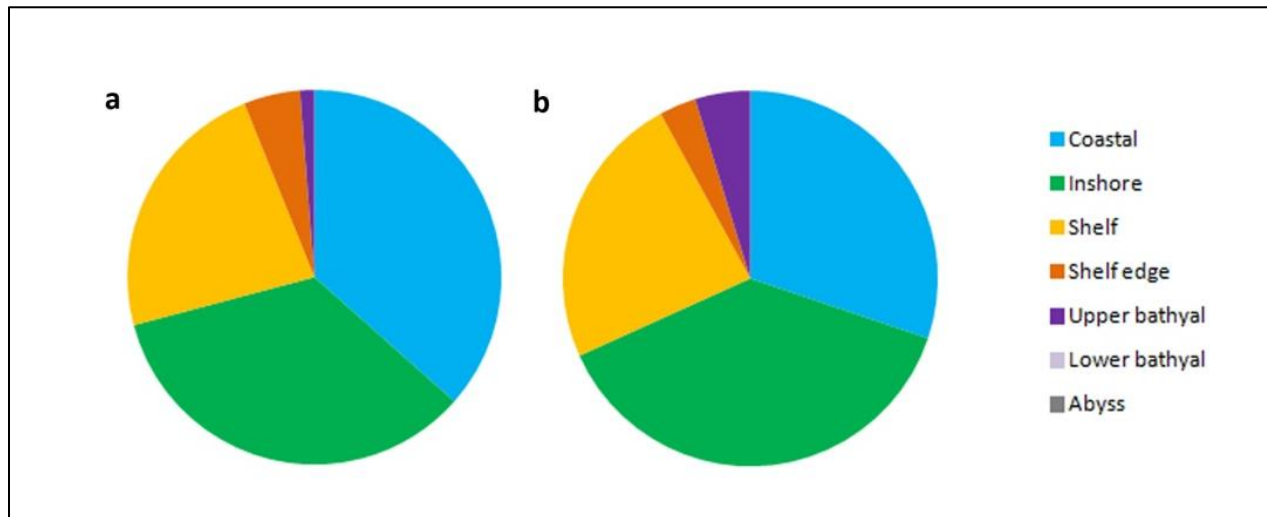


Figure 4.7: Percentage of a) records and b) species found in each depth category.

Biogeography

Of the total anemone species, three are restricted to the West Coast, one to the South Coast and 17 to the East Coast. Eighteen species are found on all three coasts, 17 have only been recorded on the West and South Coasts and seven are distributed on the South and East Coasts (see Chapter 3). Forty-six percent of the South African sea anemone species are endemic, 29 % non-endemic, 22 % cosmopolitan and 3 % introduced.

Coastal biogeography

The Southern Benguela ecoregion was significantly different from the Natal ecoregion ($R = 0.542$, $P = 0.001$) and the Delagoa ecoregion ($R = 0.524$, $P = 0.022$), and the Agulhas ecoregion was significantly different from the Natal ecoregion ($R = 0.595$, $P = 0.001$). The MDS plot showed grouping of coastal sections with ecoregions at the 40 % significance level (Figure 4.8).

Shore samples clustered into three significant groups, as indicated in Figure 4.9. Group A (average similarity 57.2 %), coded in black, consisted of samples found in both the Southern Benguela and the Agulhas ecoregion. *Pseudactinia flagellifera* accounted for 19.5 % of the similarity between the coastal zones found in group A, with *Anthothoe stimpsonii*, *Bunodactis reynaudi* and *Bunodosoma capense* contributing 18.8 %, 17.1 % and 11.9 % respectively. Group B (average similarity 61.0 %), coded in blue, fell in the Natal and Delagoa ecoregions, with 27.7 % similarity contributed by *Actinia ebhayiensis*, *Anemonia natalensis* and *Bunodactis reynaudi* respectively. Group C (average similarity 48.8 %), coded in red, was situated largely within the Agulhas ecoregion with *Bunodosoma capense* and *Anthopleura michaelsoni* explaining 77.2 % and 22.7 % of the similarity respectively.

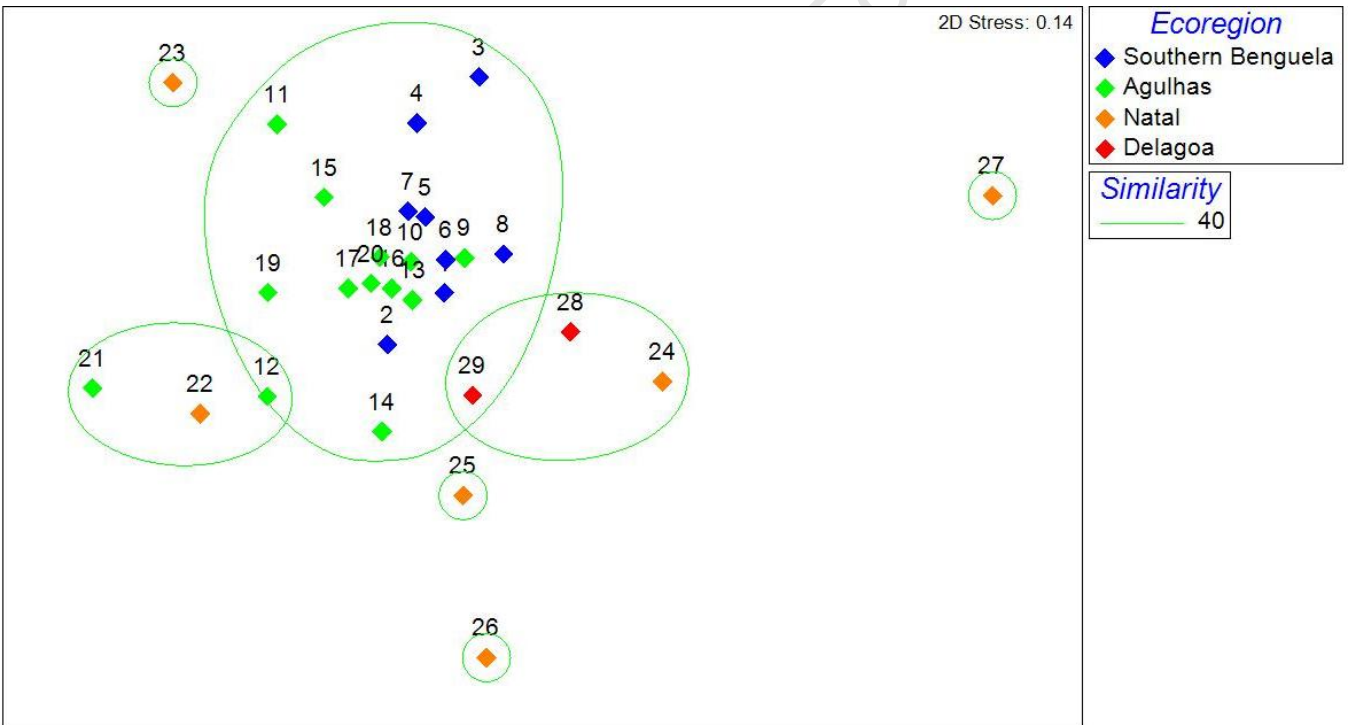


Figure 4.8: Multi-dimensional Scaling (MDS) plot of coastal data with ecoregions added as a factor. The analysis was performed using a Bray-Curtis similarity measure on untransformed data.

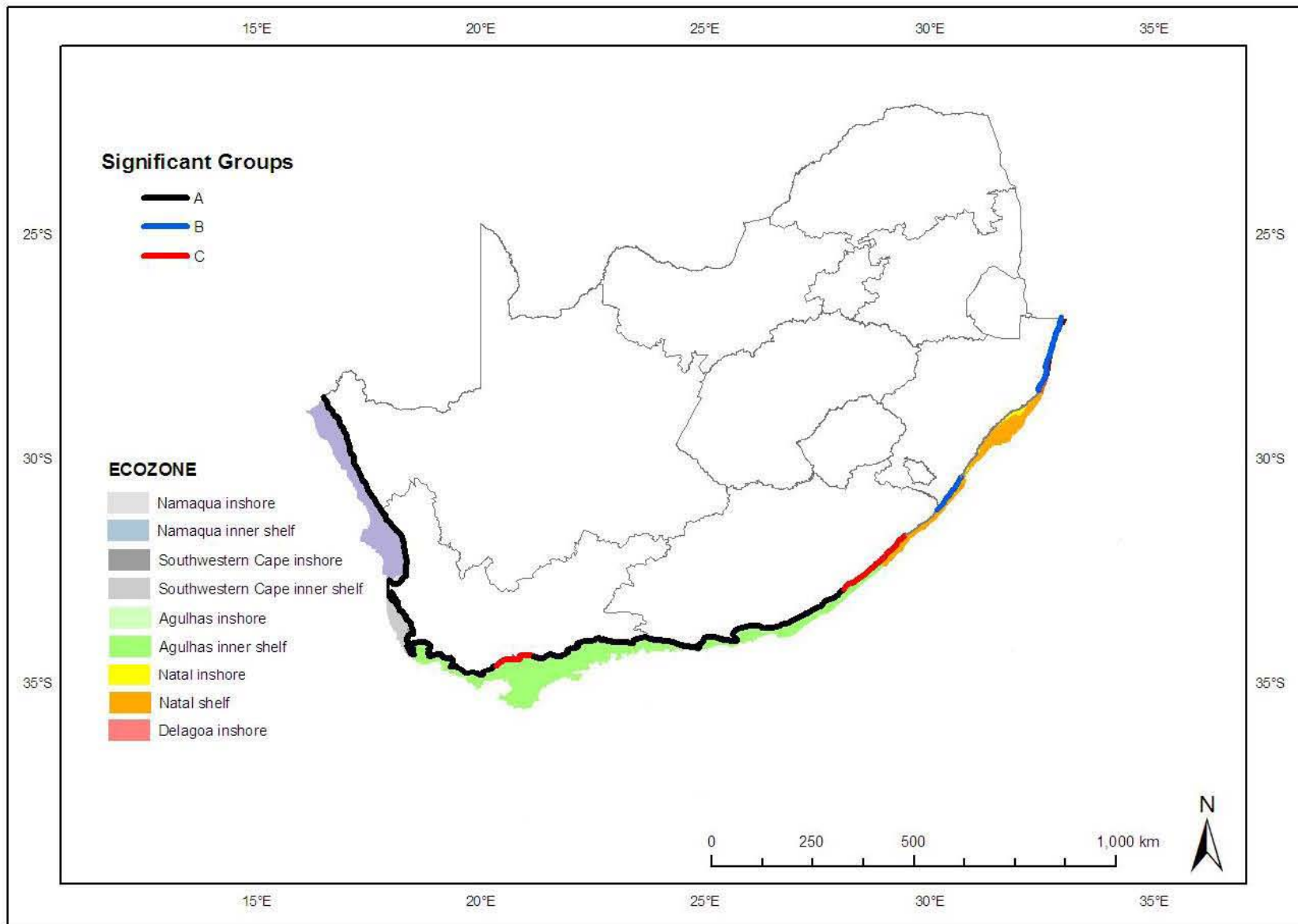


Figure 4.9: Shore zones 1 – 29 grouped according to species assemblages with inshore and inner shelf ecozones overlaid.

The number of species reported from each of the 29 coastal sections is plotted in Figure 4.10. There was no clear geographic trend in species richness, with an average of eight species in each of the West Coast sections, seven in the South Coast sections, and six in the East Coast sections. The highest number of species collected from any single 100 km section along the coastal zone (species richness) was found in section 25 (Durban), with 16 species, nine of which were endemic (Figure 4.10). The west side of the Cape Peninsula (section 8) had the second highest species richness, with 15 species, six of which were endemic. No trend of increased species richness was observed from west to east and, if anything, species richness declined.

The number of coastal records was highest for section 6 (Langebaan), from which a total of 13 species was recorded, followed by section 9 (False Bay), which had 12 species, and then section 8 (west side of Cape Peninsula), which had 15 species. Also notable was section 25 (Durban), which had the fourth highest amount of records and 16 species. There was a significant positive correlation between the number of coastal records compared to the number of coastal species ($R = 0.9$, $p < 0.05$). When looking at the regional differences in the number of coastal endemic species, the Natal ecoregion was highest with 13 endemics, followed by the Agulhas ecoregion with nine endemics, then the Southern Benguela ecoregion with eight endemics and lastly the Delagoa with only three endemic species. The Natal ecoregion has the greatest number of cosmopolitan species. The Southern Benguela is the only coastal ecoregion with any introduced species. They were found in section 6 and 7 (Saldanha Bay and Langebaan Lagoon respectively).

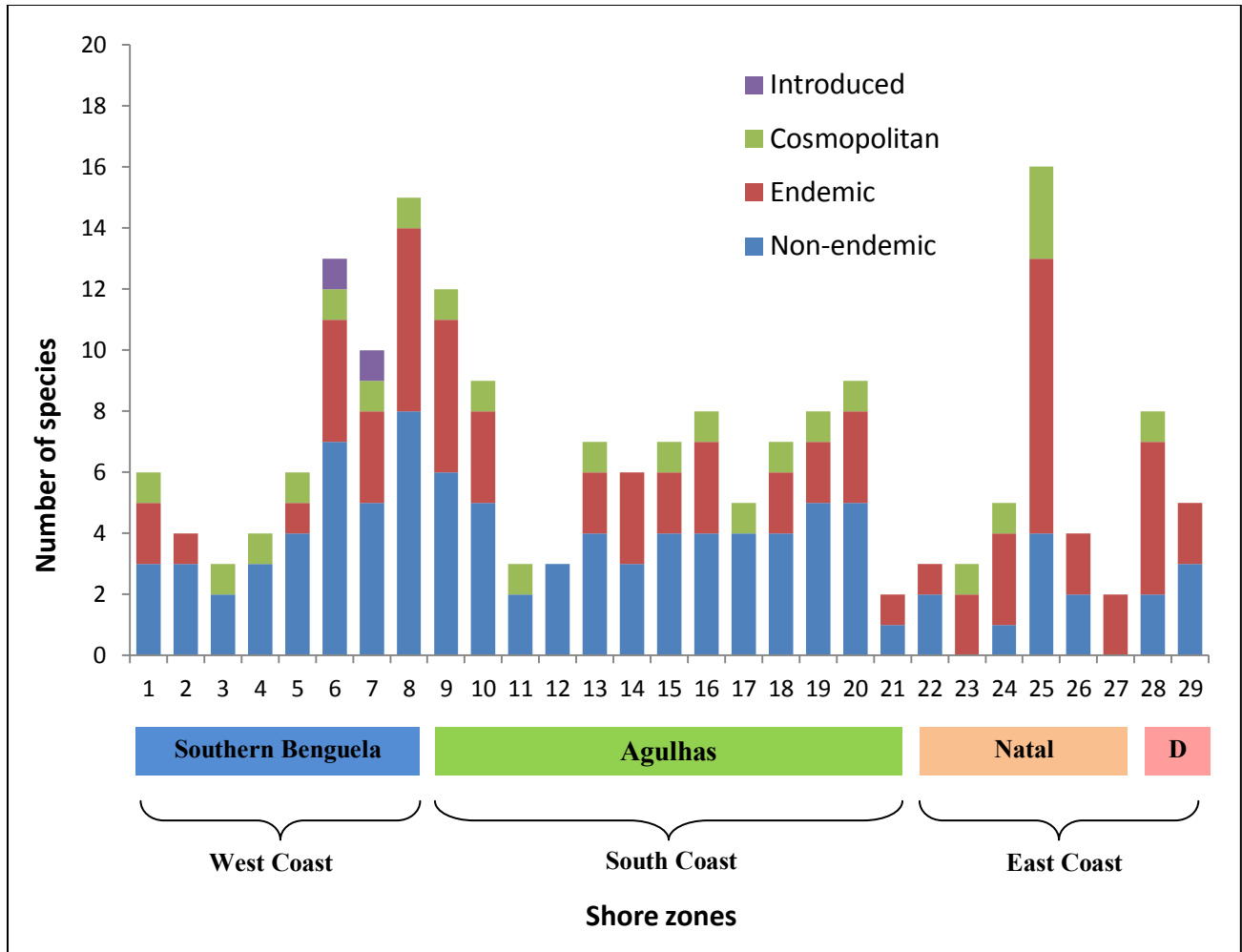


Figure 4.10: Number of species found in each coastal zone and grouped according to the four inshore ecoregions: Southern Benguela (Namaqua and Southwestern Cape), Agulhas, Natal and Delagoa (D). Introduced species are indicated in purple, cosmopolitan species in green, endemic species in red and non-endemic species in blue.

Offshore biogeography

Results of the ANOSIM showed that the Southeast Atlantic ecoregion was significantly different from the Agulhas ecoregion ($R = 0.089$, $P = 0.036$), the Southwest Indian ecoregion ($R = 0.574$, $P = 0.001$) and the Natal ecoregion ($R = 0.723$, $P = 0.001$). The Southern Benguela ecoregion was significantly different from the Agulhas ecoregion ($R = 0.247$, $P = 0.001$), the Southwest Indian ecoregion ($R = 0.510$, $P = 0.001$), the Natal ecoregion ($R = 0.639$, $P = 0.001$) and the Delagoa ecoregion ($R = 0.766$, $P = 0.003$). The MDS plot did not display groupings of quarter-degree grid cells with ecoregions at the 40 % similarity level (Figure 4.11).

Offshore samples clustered into ten significant groups as indicated in Figure 4.12. Group A (average similarity 39.2 %), coded in blue, consisted of samples found in both the Southern Benguela and the Agulhas ecoregions. *Actinostola capensis* accounted for 53.5 % of the similarity between the quarter-degree grid cells found in group A, with *Bolocera kerguelensis* contributing 22.9 %. Group B (average similarity 51.7 %), coded in grey, was distributed within the Southeast Atlantic, Agulhas and Natal ecoregions, with 90.1 % similarity contributed by *Acontiphorum mortenseni*. Group C (average similarity 52.2 %), coded dark green, fell entirely within the Natal ecoregion, with *Calliactis algoaensis* explaining 100 % of the similarity. Group D (average similarity 68.8 %), coded in yellow, was situated within the Agulhas ecozone and 90.3 % similarity was contributed by *Anthothoe stimpsonii*. Group E (average similarity 52.3 %), coded in pale pink, was found scattered across all ecozones, except for the Southwest Indian ecozone, with *Anthopleura michaelsoni* and *Anthothoe stimpsonii* each contributing 16.4 % to the similarity within the group. Group F (average similarity 52.6), coded in dark pink, was found in the Southern Benguela, Agulhas and Delagoa ecoregions, with *Anthostella* n. sp., *Anthothoe stimpsonii*, *Korsaranthus natalensis* and *Pseudactinia* sp. each contributing 17.9 % towards the similarity of the group. Group G (average similarity 57.1), coded in brown, was located within the Southern Benguela ecoregion, with *Actinia ebhayiensis* and *Bunodactis reynaudi* each contributing 50 % similarity. Group H (average similarity 33.6 %), coded pale green, was located in the Southern Benguela ecoregion, with *Bunodosoma capense* contributing 100 % of the within group similarity. Finally, group I (average similarity 50 %), coded in orange, was situated in both the Southern Benguela and Agulhas ecoregions, with *Haloclava capensis* contributing 77.7 % of the within-group similarity.

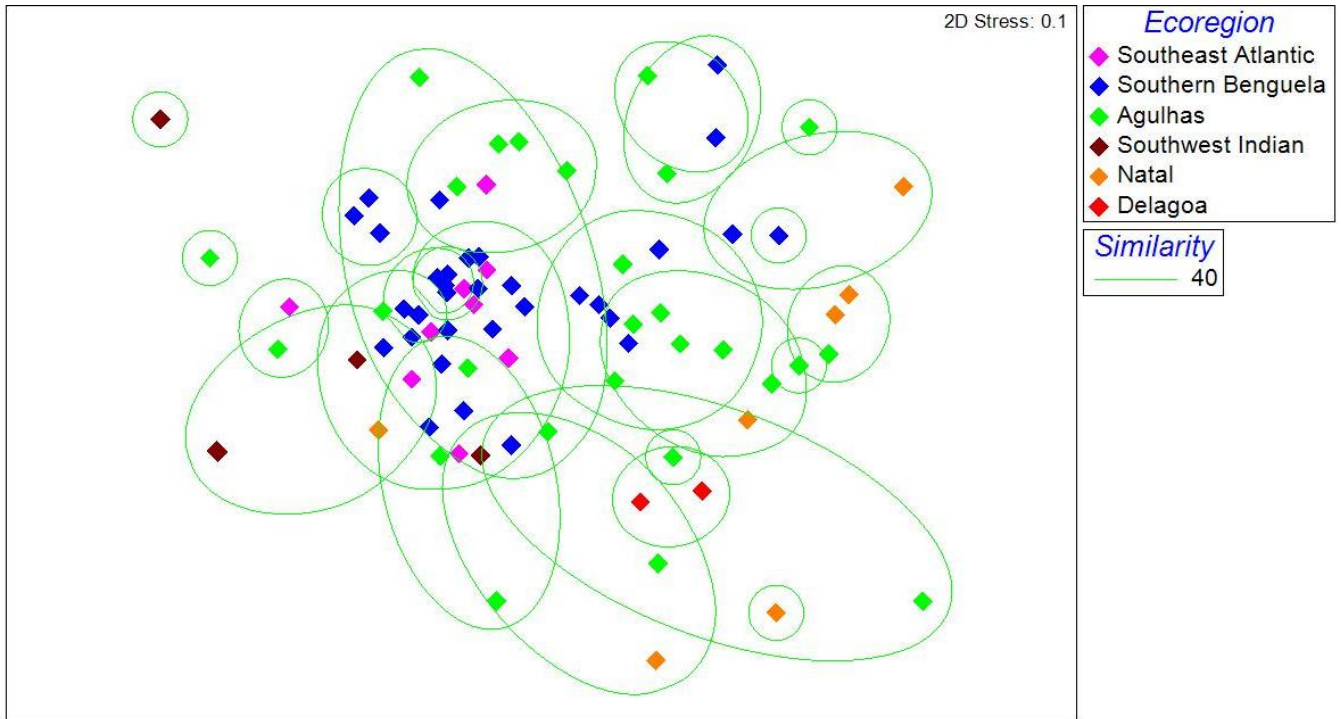


Figure 4.11: Multi-dimensional Scaling (MDS) plot of offshore data with ecoregions added as a factor. The analysis was performed using a Bray-Curtis similarity measure on untransformed data.

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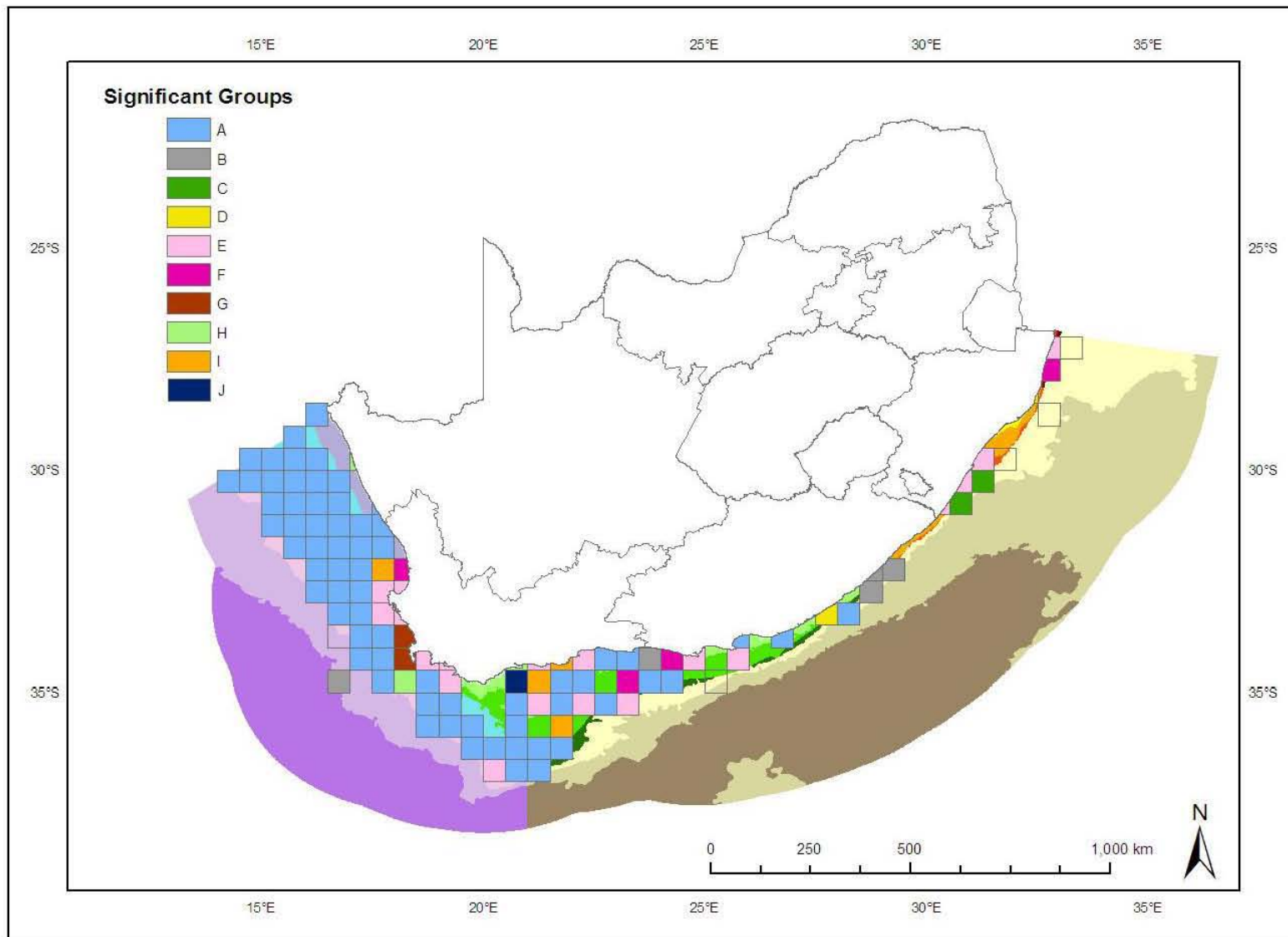


Figure 4.12: Offshore quarter-degree grid (QDG) cells coded according to similarity of species assemblages. Only statistically significant similarities are highlighted.

Figure 4.13 shows the species richness of the fauna in each of the recognised ecozones and ecoregions, excluding the coastal zone. The Agulhas inshore zone had the highest number of species (27), the Agulhas inner shelf zone had the second highest (26) and the Southwestern Cape inshore zone had the third highest species richness (18). At a larger scale, there was an average of 13 species in the Southern Benguela ecoregion, four in the Southeast Atlantic ecoregion, 19 in the Agulhas ecoregion, seven in the Natal ecoregion, nine in the Delagoa ecoregion and five in the Southwest Indian ecoregion. Species richness did not increase uniformly from west to east, and if anything species richness declined towards the east.

The number of offshore records was highest in the Southern Benguela ecoregion, from which a total of 32 species was recorded, followed by the Agulhas ecoregion from which 41 species were recorded, and then the Southeast Atlantic from which nine species were recorded. There was no significant correlation between the number of offshore records and the number of species ($R = 0.6$, $p = 0.2$).

In terms of small-scale differences in the number of offshore endemic species, the Agulhas inshore zone had 15, while the Agulhas inner shelf zone 16 endemics, and the Southwestern Cape inshore zone had nine (Figure 4.13). At a larger scale, the Agulhas ecoregion had the highest number of endemics with 24, followed by the Southern Benguela ecoregion with 16 endemics, then the Natal, Southwest Indian, Southeast Atlantic and Delagoa ecoregions with eight, seven, five and three endemics respectively.

The Delagoa ecoregion had the greatest number of cosmopolitan species with 11, while the Southern Benguela and the Agulhas ecoregions were the only two offshore ecoregions with introduced species. The introduced species were found in the Namaqua inshore zone (Cape Columbine), the Southwestern Cape inshore and inner shelf zone (Saldanha Bay and Table Bay), and in the Agulhas outer shelf zone (Mossel Bay).

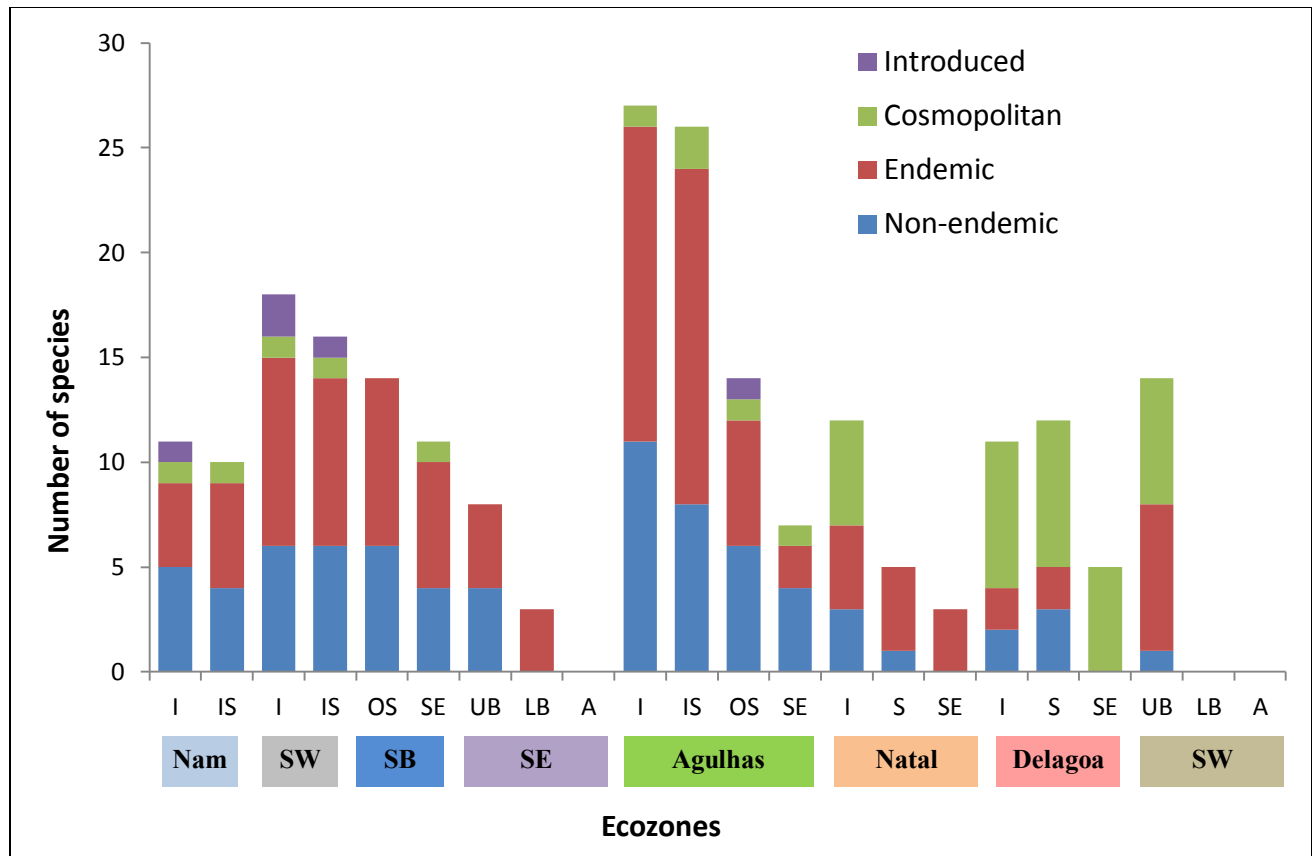


Figure 4.13: Species richness grouped according to the ecozones: Namaqua, Southwestern Cape (SWC), Agulhas, Natal and Delagoa (D). Abbreviations of zones are: inshore (I), inner shelf (IS), outer shelf (OS), shelf edge (SE), upper bathyal (UB), lower bathyal (LB), abyss (A). The status of each species is indicated by shading: introduced (purple), cosmopolitan (green), endemic (brown) or non-endemic (blue).

Depth

Figure 4.14 shows the depth ranges of the 63 anemone species. Generally, species within a family were not restricted to similar depth categories. Deep-sea families Actinoscyphiidae, Metridiidae, Halcuriidae, Acontiophoridae, Condylanthidae and Liponematidae are each represented by one species in South Africa. Other exclusively deep-sea families include Hormathiidae and Actinostolidae, whereas Actiniidae comprise both shallow and deep-sea species.

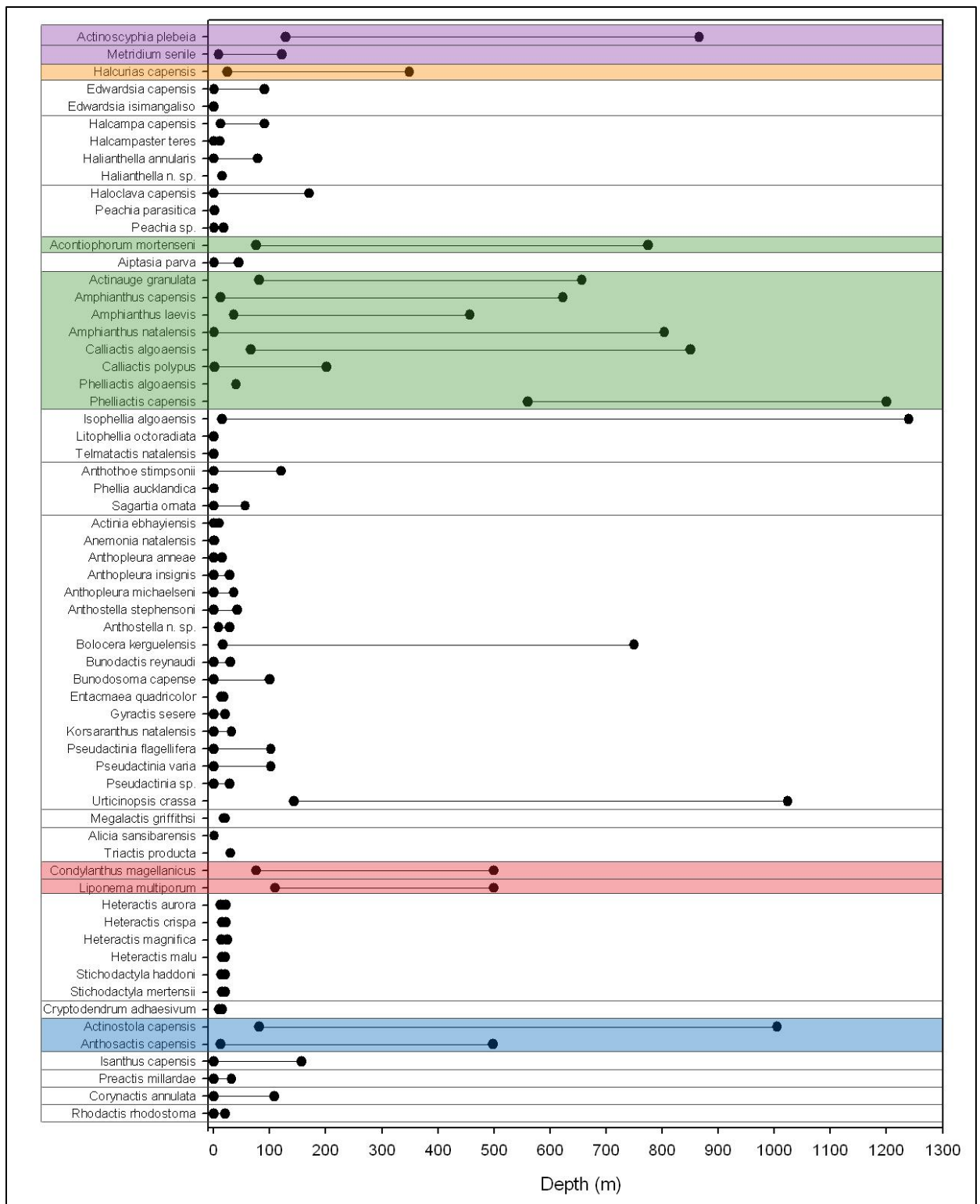


Figure 4.14: Depth ranges for the South African Actiniaria and Corallimorpharia. Species on the y-axis are arranged according to family. Each family is separated by a grey line, and families that contain exclusively deep-sea species are highlighted. Colours indicate families that belong to the same superfamily (or suborder in the case of *Halcurias capensis*). Families are from top to bottom: Actinoscyphiidae, Halcuriidae, Edwardsiidae, Halcampidae, Haloclavidae, Acontiphoridae, Aiptasiidae, Hormathiidae, Isophelliidae, Sagartiidae, Actiniidae, Actinodendronidae, Aliciidae, Condylanthidae, Liponematidae, Stichodactylidae, Thalassianthidae, Actinostolidae, Isanthidae, Preactiidae, Corallimorphidae and Discosomatidae.

The distribution of species richness according to depth is shown in Figure 4.15. The majority of species were from the inshore zone, with a total of 24 species found from depths between 5 – 29 m. The coastal zone had the second highest number of species with 19 species and the shelf zone the third with 15 species. Only five species were found below the shelf zone. Figure 4.7 shows that the highest percentages of records were found in the coastal (37 %), inshore (34 %) and shelf zones respectively (23 %). Most striking is the complete absence of species, and number of records, from the lower bathyal and the abyss.

Introduced species were restricted to the coastal and shelf zones, whereas cosmopolitan species were found from the coastal zone to the shelf edge, but were highest in the inshore zone (10 species). Endemic species were more or less evenly distributed between the coastal, inshore and shelf zones, with ten and eight species each respectively. The proportion of species that were endemic in each depth zone was lowest in the inshore zone and highest in the upper bathyal zone, while no species were found in the abyss. Non-endemic species remained relatively constant in the shallower zones, with the coastal and inshore zones containing six species each and the shelf zone five.

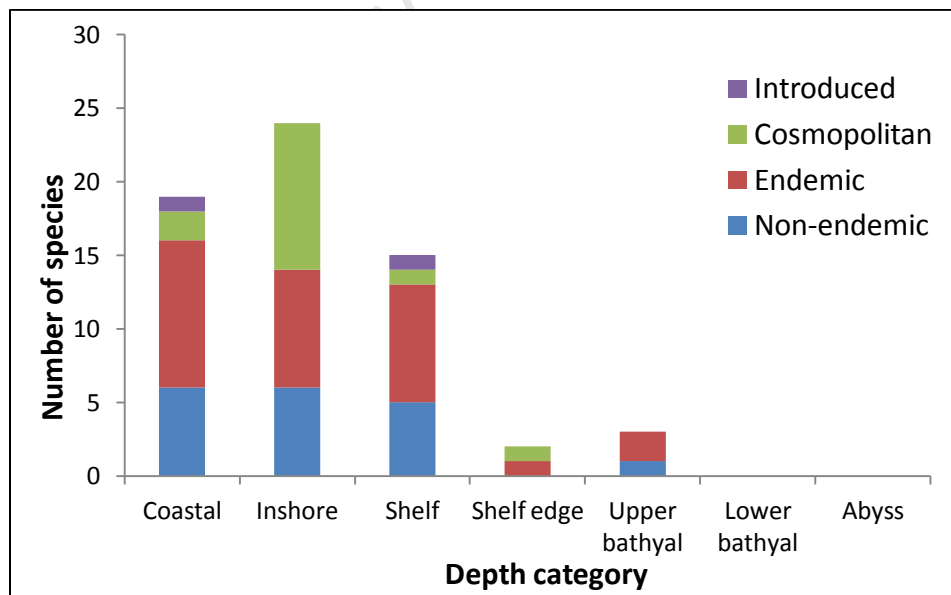


Figure 4.15: The number of species recorded in each depth category, with the endemic status coded above. Depth categories allocated according to Sink *et al.* (2012). No anemones were recorded in the lower bathyal and abyss.

Discussion

Species discovery

The order Actiniaria is a moderately diverse taxon, which is well represented in South African museum records. As seen in Figure 4.4, the majority of South African species were first recorded in a monograph by Carlgren (1938) in which he described 19 new species, created two new families and five new genera, and added five new records. Other significant contributions include that of Carlgren (1928a) in which six new species were described, and two recorded from South Africa for the first time; as well as Carlgren (1940b) in which an additional two species were described. The first review of the biogeography of sea anemones listed 49 species from South Africa (Acuña & Griffiths 2004). The present study adds three new species, two of which are described herein, as well as 12 new records for the region. Most of the records new to South Africa added by this study were previously known from the Indo-Pacific and Mozambique, but are reported here for the first time from within the political borders of South Africa. It is possible that these species were missed by Carlgren (1928a, 1938, 1940b) due to difficulty in sampling the coral reefs off the East Coast, which were inaccessible at that time. However, with SCUBA diving now being an easy and effective survey method, and the increasing popularity of these sites as centres for sport diving and underwater photography, these areas are becoming more intensely studied. There is also a lack of local specialised taxonomists working on these orders (Sink *et al.* 2012), resulting in unidentified species lying dormant on museum shelves for many years.

Distribution of records

The number of records included in this study are more or less equally distributed across the six ecoregions. One exception is the large amount of data collected by SCUBA divers from the inshore zone of the Agulhas ecoregion (Figure 4.5). This is due to the popularity of diving in False Bay and in Algoa Bay, Port Elizabeth. It is unlikely that the SCUBA diver records skew the results of this study, as the majority of species encountered by SCUBA divers in these areas were already recorded in inshore trawls. Despite the increased trawl by-catch sampling taking place annually, predominantly off the West and South Coasts, there is still a deficiency of deep

water invertebrate samples, especially anemone samples, in South African waters (Figures 4.5 & 4.15), and no anemone records exist from both the lower bathyal and the abyss, although it is almost certain that anemone species do occur there.

Most concerning, are the results illustrated in Figure 4.6, which show that the majority of South African Actiniaria are known from fewer than five records, with 28 % known from fewer than three records. Of the species that are known from five or fewer records, 45 % are from the inshore zone between 5 – 30 m. These species are rare, and the majority of them are tropical species found on the East Coast, where productivity and species biomass is known to be low (Bustamante & Branch 1996). The remainder of the ‘rare’ samples are evenly distributed between the coastal and offshore zones, with 27.5 % each. It is probable that coastal species are apparently rare due to their very small size making them easily overlooked, while the rarity experienced in the offshore zones is most likely attributable to the relatively few sampling expeditions that occur offshore. Thus, it should not be assumed that offshore species are truly rare until more thorough sampling has been conducted. The Department of Agriculture, Forestry and Fisheries (DAFF) is making an effort to increase the number of samples obtained from the deep-sea and Dr. Lara Atkinson is working on a project to produce an identification guide of these species. The result of those surveys should improve our knowledge of these deeper water species.

Records are much more readily available for the coastal and inshore zones (Figure 4.7a), with the majority of species in these zones known from more than ten records. There is; however, a concentration of species records around Cape Town, False Bay and Durban (Figure 4.5). These areas are easily accessible, have large human populations and are centres of research by universities, which conduct active marine surveys. Although sampling effort at remote sites was increased during the course of this study, attention still needs to be directed towards more poorly sampled regions, particularly the coastlines adjacent to South African borders with Namibia and Mozambique.

Biogeography

Coastal anemone assemblages roughly corresponded to the ecoregions demarcated by Sink *et al.* (2012), while only a few offshore anemone assemblages correspond to the ecoregions. Coastal species that were key in grouping the three different coastal anemone assemblages were *Pseudactinia flagellifera* in the Southern Benguela and Agulhas ecoregions, *Anemonia natalensis* in the Natal and Delagoa ecoregions, and *Bunodosoma capense* in group C, which fell largely in the Agulhas ecoregion (Figure 4.9). Although separation of group C into two sections was not expected, this may be due to the fact that there are only three records from section 12. Although the Southern Benguela and Agulhas ecoregions were expected to group separately from each other, this was not shown in group A. A possible explanation is that many anemone species are able to live in a variety of habitats from cold to warm water, and from the intertidal to 100 m or deeper (Figure 4.14), resulting in no biogeographic trends across ecoregions. *Bunodosoma capense* and *Pseudactinia flagellifera* are two such species. They are prolific along both the West and South Coasts (Plate 13G & 15D), and have a wide depth range, accounting for the lack of clear grouping according to ecoregions for anemones.

Nine significant groups of anemone assemblages were identified in the offshore samples (Figure 4.12). Of particular interest were groups A, C and G, which corresponded to the Southern Benguela and Agulhas ecoregion, the Natal ecoregion and the Southwestern Cape inner shelf ecozone respectively. Species that were the major contributors of groupings in the offshore region included *Actinostola capensis* in group A, *Calliactis algoaensis* in group C, and *Bunodactis reynaudi* in Group G. These groupings conform to expectations as it was evident from the museum and trawl records that each species was characteristic of these ecoregions and ecozones. With the exception of these three groupings, the overall spatial distribution of significantly similar sample units did not correspond to the ecoregions defined by Sink *et al.* (2012). Although, very few records were present in some of the quarter-degree grid cells, these findings follow the worldwide trend of deep-sea species, which generally have large biogeographic ranges.

In contrast to what has been found for a number of other marine invertebrate groups, including bivalves, gastropods, brachyurans and echinoderms (Bustamante & Branch 1996, Awad *et al.* 2002, Griffiths *et al.* 2010), species richness did not increase around the coast from west to east for either coastal or offshore species (Figures 4.10 & 4.13). Instead, Actiniaria showed erratic species richness, with overall average species richness highest on the South Coast. Species richness was highest in the Natal ecoregion for coastal species (Figure 4.10), and the Agulhas ecoregion for offshore species (Figure 4.13), followed by the Southern Benguela ecoregion for both coastal species and offshore species. Species richness for the coastal zone was lowest in the Delagoa ecoregion, while the smallest value in the offshore zone was found in the Southeast Atlantic. The species richness observed in the Delagoa ecoregion is low in comparison to that of a number of marine invertebrate taxa, such as echinoderms and brachyurans (Griffiths *et al.* 2010), but follows the overall trend of marine invertebrates as observed by Awad *et al.* (2002), which shows that species richness is low in this region. This decline is probably a result of lower sampling intensity in this region. The elevated species richness in the Southern Benguela and Agulhas offshore ecoregions may conversely be due to the relatively frequent trawl surveys that take place off these coasts (Figure 4.5). Trawls off the East Coast are infrequent, thus the low species richness in the Natal and Delagoa offshore ecozones may be due to poor sampling effort. Another possibility is that the decreased area in these offshore regions due to the extremely narrow shelf, when compared to the wide shelf of the Agulhas Bank, may be limiting the number of anemone species found in these areas. The high species richness in the Natal coastal ecoregion seen in Figure 4.10 follows trends found in other marine invertebrates, such as bivalves and gastropods (Awad *et al.* 2002); however, a positive correlation between the number of records and the number of species found in each ecoregion was found for coastal regions, suggesting that patterns may be an artefact of sampling effort in coastal analyses.

Patterns of endemism were similar to those of species richness, with endemism highest in the Natal ecoregion for coastal species and the Agulhas ecoregion for offshore species (Figures 4.10 & 4.13). High endemism in the Agulhas ecoregion was expected, as this region is located the furthest from the political borders of South Africa. This is in line with the hypothesis of Awad *et al.* (2002), which states that species located in ecoregions isolated from political borders are more likely to be endemic. The lowest coastal endemism was found in the Southern Benguela

and Delagoa ecoregions and the lowest offshore endemism was found in the Delagoa ecoregion. This pattern of endemism is comparable to that shown for amphipods, isopods and polychaetes in South Africa (Awad *et al.* 2002). Actiniaria have an endemism rate of 46 %, higher than the 31.4 % average for the overall marine fauna (Gibbons *et al.*, 1999), but lower than the 50 % reported by Acuña & Griffiths (2004). The drop in this figure is attributable to the recent addition of several widespread Indo-Pacific species, such as *Heteractis aurora*, *H. crispa* and *H. malu*, to the South African anemone fauna, which reduced the proportion of endemic species.

The greatest number of introduced species in both the offshore and coastal zones was located in the Southern Benguela ecoregion. This most likely is related to the presence of major shipping ports at both Saldanha Bay and Cape Town, where many alien species have been introduced both on the hulls and in the ballast water of ships (Robinson *et al.* 2005, Mead *et al.* 2011a & b). Although suitable ports for the proliferation of introduced species also lie on the East and South Coasts, water temperature there is most likely too high for the invasion of *Sagartia ornata* and *Metridium senile*, which are the only anemone species that have been introduced to South Africa to date.

Depth

The spatial separation between deep-sea species and inshore species is clear on the West Coast and the Agulhas Bank, where the continental shelf is broad (Figure 4.2b) and deeper water is located further offshore. This distinction is less obvious on the East Coast, where the Natal and Delagoa shelves become extremely narrow (Figure 4.2c), enabling deep-sea species to be collected close to shore. Multi-species families within the order Actiniaria do not contain exclusively deep-sea, or exclusively shallow water species, with the exception of the Hormathiidae (Figure 4.14). Thirty-three percent of species in the inshore zone and 67 % of species in the upper bathyal zone were endemic (Figure 4.15), suggesting that relative rates of endemism increase with depth.

In summary, the species richness of the South African Actiniaria follows similar trends to those of amphipods, isopods and polychaetes, with highest species richness in the Southwestern Cape ecoregion. Only 3 % of the South African Actiniaria are introduced, indicating that anemones do not have a known propensity to invade. Non-endemic species make up 29 % of the fauna, while cosmopolitan species make up 22 %. The overall sea anemone endemism of 46 % is slightly higher than the average for South African marine invertebrates, which stands at 31% (Gibbons *et al.* 1999). Although, this value is comfortably within the limits of endemism for the invertebrate groups reported on by Awad *et al.* (2002), it is likely that the endemism reported here may be slightly inaccurate, due to the poor state of taxonomic knowledge of anemones in the countries bordering South Africa. Nevertheless, sea anemones contribute a great amount to the uniqueness of South African marine invertebrate fauna, and this group should be taken into account when conservation measures are put in place, especially in the coastal and inshore zones.

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Chapter 5 – Synthesis

Anemone taxonomy in South Africa has not advanced markedly since the publication of Carlgren's (1938) monograph of Actinaria and Corallimorpharia. Chapter 1 reviews the literature and state of knowledge of sea anemones in South Africa, and defines technical terms used later in the thesis. Since the original works of Carlgren (1938), which listed a total of 40 species, 23 new records have been added to the South African anemone fauna, 12 of which were added by this study. In Chapter 2, range extensions for 40 of the species were reported, and three new species were added to the order Actiniaria, two of which were described as part of this work.

The main product of this thesis is a simplified field identification key, coupled with an updated and comprehensive guide of South African anemones, as presented in Chapter 3. This chapter reviews the systematics of the group in its entirety for the first time in 74 years, enabling accurate identification of even the most cryptic species. Data used in this study included historical distributional data collated from the Iziko South African Museum (SAM) records, as well as from the uncatalogued wet collection, and from previously published literature. Photographic records submitted by SCUBA divers, and specimens collected during the course of this study provided more recent data. It incorporates scaled colour photographs of each species, many of which depict live anemones in their natural environment. In numerous cases these are the first published photographs of this species. The key makes use of easily recognisable morphological characteristics, such as colour and column texture, enabling non-specialist users to identify anemone species for the first time with relative ease.

It is important to note that it was possible to identify anemones with obviously unique characteristics by means of photographic evidence alone. Although photo-identification is an excellent field tool, it is necessary to warn non-specialists about the dangers of misidentifying anemones based on photographs. Certain features such as acrorhagi, pseudoacrorhagi and vesicles need to be noted before an accurate identification is made. It is often also helpful to observe the behaviour of the animal in life and consider the environment in which it lives. Thus, naturalists in the field must be cautious and must take care not to rush to conclusions before all aspects of the anemone and its biology have been considered.

Many of the species which were reported as records new to South Africa represent Indo-Pacific species from warm-water habitats and are known from other parts of the world. It is probable that these species remained undetected in South African waters for many decades; and only with the relatively recent explosion of recreational SCUBA diving, underwater photography and online databases, have these species been recorded and shared amongst divers and marine biologists. Another species, *Anthostella* n. sp., one of three new species added to the anemone fauna as a result of this work, was discovered in the 1980s and was not described until now due to inadequate taxonomic expertise in South Africa. The fact that it has taken over 30 years for these samples to be formally described, substantiates the views articulated by Gibbons *et al.* (1999) and Griffiths *et al.* (2010), whom call for the training of additional taxonomists and for incentives for those scientists already trained in taxonomy to remain in the field in order to properly assess marine biodiversity in South Africa.

The distribution of South African sea anemones throughout the six ecoregions and 22 ecozones laid out by Sink *et al.* (2012) was analysed and reported in terms of species richness and endemism in Chapter 4. Species richness did not increase around the coast from west to east for either coastal or offshore species. Instead, the distribution of Actiniaria around the coast followed similar trends to those of amphipods, isopods and polychaetes; with erratic species richness experienced from west to east and overall average species richness highest in the Southwestern Cape ecoregion. This pattern may either be related to poor sampling effort in some regions, or it may be attributable to the fact that the shelf zone is narrower in the Natal and Delagoa offshore regions than on the Agulhas Bank, which may be limiting the number of anemone species found on the East Coast.

Of the 63 species of Actiniaria and Corallimorpharia now recognised in South Africa, 46% were found to be endemic, 29% non-endemic, 22% cosmopolitan, and 3% introduced. In addition, 33 % of species in the inshore zone and 67 % of species in the upper bathyal zone were endemic, suggesting that relative rates of endemism increase with depth. Although the high endemism rates may to some extent be artificially elevated due to insufficient sampling of adjacent countries surrounding South Africa, the country remains a hot spot for endemism.

In terms of depth, the inshore zone between 5 – 30 m supported the highest species richness, with a total of 24 species. This is also probably attributable to the increasing number of SCUBA divers collecting photographic data in this depth range. Coastal anemone assemblages roughly corresponded to the ecoregions within the Exclusive Economic Zone (EEZ), while only a few offshore anemone assemblages correspond to the ecoregions. However, as very few records were present in some of the quarter-degree grid cells, thus more samples are needed to reach convincing conclusions.

An increase in both coastal and inshore sampling intensity around South Africa as a result of this study, coupled with the addition of previously uncaptured data from museums and trawl databases, has added a large amount of knowledge about the biodiversity of Actiniaria and Corallimorpharia, which were formerly neglected orders in South Africa. However, despite the addition of new and previously unidentified records, the majority of South African Actiniaria are currently known from fewer than five records, with 28 % known from fewer than three records. Although sampling effort was increased at remote sites during the course of this study, species records are still concentrated around Cape Town, False Bay and Durban. This resulted in inaccurate distribution ranges for some of the species, which leads one to question the accuracy of endemism measures within South Africa. Thus, sparsely scattered dots on the distribution maps in Chapter 3 do not necessarily indicate rarity, but may also depict endemics to specific regions, or species that remain to be recorded in the future.

As it was not possible to thoroughly sample all locations around the coast, there is a real possibility that future sampling will reveal more species, especially small burrowing species. Attention now needs to be directed towards the South African coastline adjacent to Namibia and Mozambique. To improve the status of taxonomy in South Africa, it is suggested that government and funding organisations incentivise practising taxonomists to remain in the field and maximise their outputs, and encourage the development of new taxonomists to add to the pool of expertise. Before this strategy can be successfully implemented, a multitude of challenges must first be met (see Costello *et al.* 2006 & 2010). Some of these include the financial challenges faced by developing countries, the deficiency of specialised researchers and

the difficulty of perusing unfunded projects, many of which concern species of economic and ecological importance. Costello *et al.* (2010) found a positive correlation between the accessibility of species identification guides and awareness of biodiversity. This is a direct positive impact of the research of taxonomists on society and conservation, and with the help of the right support systems, which are already in place, our knowledge can only grow.

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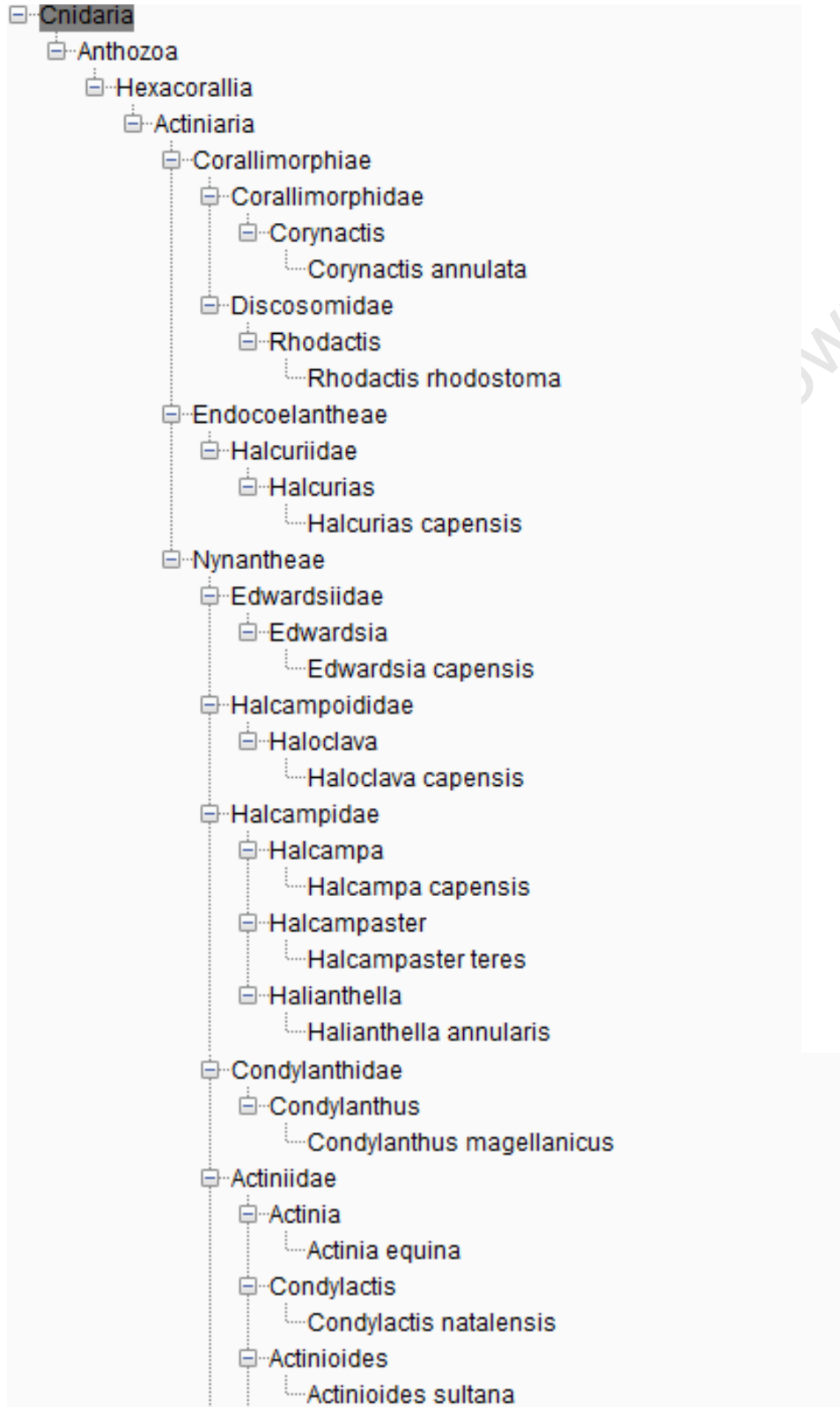
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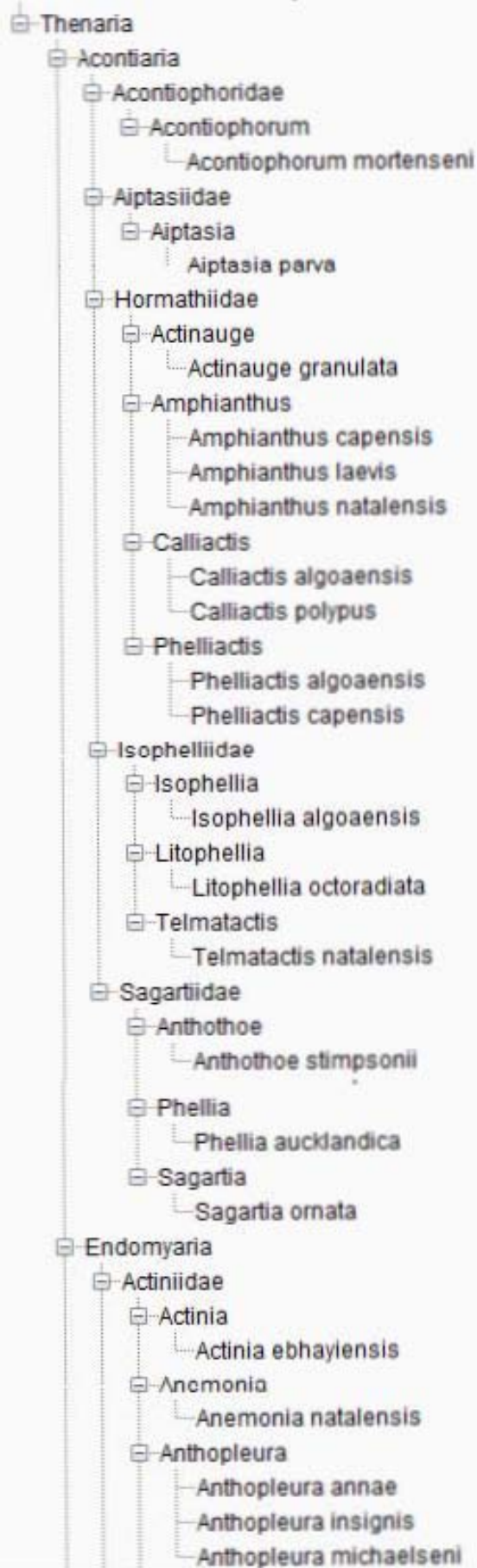
Appendix A – Classification according to Carlgren 1938



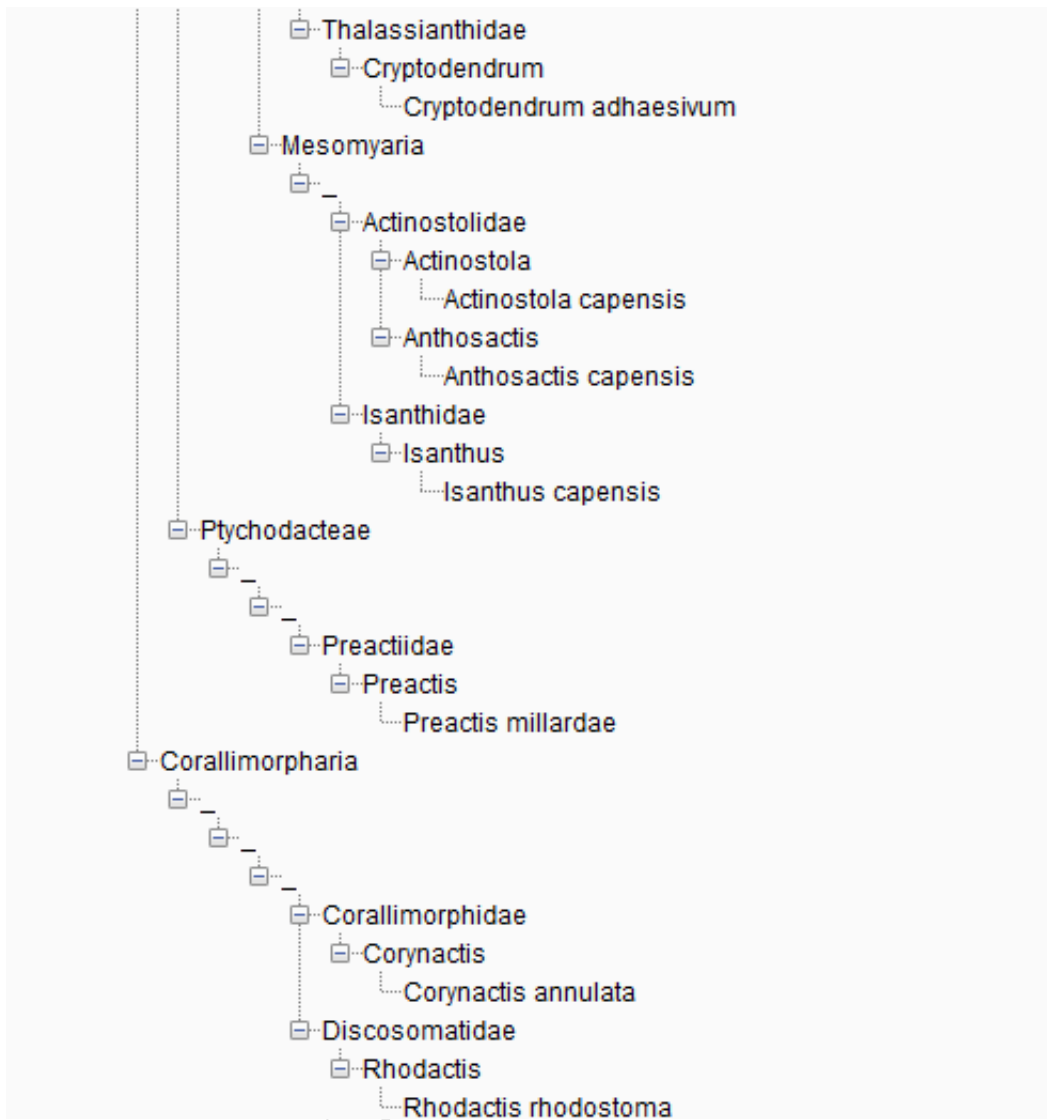
- [-] Anemonia
 - [-] Anemonia natalensis
- [-] Anthostella
 - [-] Anthostella stephensoni
- [-] Bolocera
 - [-] Bolocera capensis
- [-] Liponema
 - [-] Liponema brevicirrata
- [-] Bunodactis
 - [-] Bunodactis reynaudi
- [-] Anthopleura
 - [-] Anthopleura michaelsoni
- [-] Urticinopsis
 - [-] Urticinopsis crassa
- [-] Bunodosoma
 - [-] Bunodosoma capensis
- [-] Pseudactinia
 - [-] Pseudactinia flagellifera
 - [-] Pseudactinia varia
- [-] Isanthidae
 - [-] Isanthus
 - [-] Isanthus capensis
- [-] Actinostolidae
 - [-] Anthosactis
 - [-] Anthosactis capensis
 - [-] Paractinostola
 - [-] Paractinostola capensis
- [-] Acontiophoridae
 - [-] Acontiophorum
 - [-] Acontiophorum mortenseni
- [-] Isophelliidae
 - [-] Isophellia
 - [-] Isophellia algoaënsis
 - [-] Telmatactis
 - [-] Telmatactis natalensis
 - [-] Litophellia
 - [-] Litophellia octoradiata
- [-] Aiptasiidae
 - [-] Aiptasia
 - [-] Aiptasia parva

- [-] Hormathiidae
 - [-] Calliactis
 - Calliactis algoaënsis
 - Calliactis polypus
 - [-] Amphianthus
 - Amphianthus laevis
 - Amphianthus natalensis
 - Amphianthus capensis
 - [-] Actinauge
 - Actinauge granulata
 - [-] Phelliactis
 - Phelliactis algoaënsis
 - Phelliactis capensis
- [-] Sagartiidae
 - [-] Phellia
 - Phellia aucklandica
 - [-] Anthothoë
 - Anthothoë stimpsoni

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- ☐ Anthostella
 - └ Anthostella stephensoni
 - └ Anthostella n. sp.
- ☐ Bolocera
 - └ Bolocera kerguelensis
- ☐ Bunodactis
 - └ Bunodactis reynaudi
- ☐ Bunodosoma
 - └ Bunodosoma capense
- ☐ Entacmaea
 - └ Entacmaea quadricolor
- ☐ Gyraetis
 - └ Gyraetis sesere
- ☐ Korsaranthus
 - └ Korsaranthus natalensis
- ☐ Pseudactinia
 - └ Pseudactinia flagellifera
 - └ Pseudactinia varia
 - └ Pseudactinia sp.
- ☐ Urticinopsis
 - └ Urticinopsis crassa
- ☐ Actinodendronidae
 - ☐ Megalactis
 - └ Megalactis griffithsi
- ☐ Aliciidae
 - ☐ Alicia
 - └ Alicia sansibarensis
 - ☐ Triactis
 - └ Triactis producta
- ☐ Condylanthidae
 - ☐ Condylanthus
 - └ Condylanthus magellanicus
- ☐ Liponematidae
 - ☐ Liponema
 - └ Liponema multiporum
- ☐ Stichodactylidae
 - ☐ Heteractis
 - └ Heteractis aurora
 - └ Heteractis crista
 - └ Heteractis magnifica
 - └ Heteractis malu
 - ☐ Stichodactyla
 - └ Stichodactyla haddoni
 - └ Stichodactyla mertensii



Appendix C – Summary table

Table 5.1: A summary of all South African Actiniaria and Corallimorpharia species detailing depth ranges, coastal zone sections, ecoregions and total number of records (n). Ecoregions include the Southern Benguela (SB), Southeast Atlantic (SEA), Agulhas (A), Natal (N), Delagoa (D) and Southwest Indian (SWI) ecoregions.

Species	Status	Depth range (m)	Coastal zone	Ecoregion	N
<i>Acontiphorum mortenseni</i>	Endemic	76 - 775	N/A	SB, A, SWI, N	10
<i>Actinauge granulata</i>	Endemic	81 - 657	N/A	A, SEA, SB, SWI	81
<i>Actinia ebhayiensis</i>	Endemic	0 - 10	1, 2, 5 – 10, 13, 14, 16, 18, 20, 24, 25, 28, 29	A, D, N, SB	45
<i>Actinoscyphia plebeia</i>	Non-endemic	128 - 866	N/A	A, SEA, SB	34
<i>Actinostola capensis</i>	Endemic	81 - 1005	N/A	A, N, SEA, SB, SWI	177
<i>Aiptasia parva</i>	Non-endemic	1 - 45	26	N, D, A	4
<i>Alicia sansibarensis</i>	Non-endemic	105	N/A	D	1
<i>Amphianthus capensis</i>	Non-endemic	12 - 623	N/A	SB, SEA, A, D	8
<i>Amphianthus laevis</i>	Endemic	36 - 457	N/A	SB, A	11
<i>Amphianthus natalensis</i>	Endemic	1 - 804	N/A	A, N, D	13
<i>Anemonia natalensis</i>	Endemic	0 - 2	24 – 26, 28, 29	N, D	19
<i>Anthopleura aneae</i>	Endemic	0 - 15	6, 8, 24, 25, 28	SB, A, N	13
<i>Anthopleura insignis</i>	Endemic	0 - 29	10, 19, 20, 23, 25	SB, A, N	14
<i>Anthopleura michaelsoni</i>	Non-endemic	0 - 36	1, 6, 8 – 10, 12 – 14, 16 – 20, 22, 25, 26, 28, 29	SB, A, N, D	90
<i>Anthosactis capensis</i>	Endemic	12 - 498	N/A	D, SEA, SB, SWI	6
<i>Anthostella n. sp.</i>	Endemic	9 - 29	N/A	A, N, SB	15
<i>Anthostella stephensoni</i>	Endemic	0 - 42	8, 9, 19, 21, 28	A, N, SB	55
<i>Anthothoe simpsonii</i>	Non-endemic	0 - 120	1, 2, 5 – 20, 25	A, N, SB	204
<i>Bolocera kerguelensis</i>	Non-endemic	16 - 750	N/A	A, SEA, SB	101
<i>Bunodactis reynaudi</i>	Non-endemic	0 - 30	1 – 10, 13, 15- 18, 20, 24, 28, 29	A, D, N, SB	108
<i>Bunodosoma capense</i>	Non-endemic	0 - 100	2, 4 – 10, 12, 13, 15 – 17, 19 – 22, 25, 29	A, D, N, SB	151
<i>Calliactis algoaensis</i>	Endemic	66 - 850	N/A	A, D, N, SWI	6
<i>Calliactis polypus</i>	Cosmopolitan	2 - 201	N/A	A, D, N, SB	6
<i>Condylanthus magellanicus</i>	Non-endemic	76 - 500	N/A	A, SWI, SB	4
<i>Corynactis annulata</i>	Endemic	0 - 108	1, 6 – 9, 13, 14, 16	A, SB	97
<i>Cryptodendrum adhaesivum</i>	Cosmopolitan	10 - 15	N/A	D	2
<i>Edwardsia capensis</i>	Endemic	0 - 1	14, 25	A, N	2
<i>Edwardsia isimangaliso</i>	Endemic	0 - 1	27, 28	N, D	21
<i>Entacmaea quadricolor</i>	Cosmopolitan	14 - 18	N/A	N, D, SWI	8

Species	Status	Depth range (m)	Coastal zone	Ecoregion	N
<i>Gyraetis sesere</i>	Cosmopolitan	0 - 20	24, 25	N, D	7
<i>Halcampa capensis</i>	Endemic	12 - 91	N/A	A, SB	2
<i>Halcampaster teres</i>	Endemic	0 - 11	8, 15, 20	A, SB	4
<i>Halcurias capensis</i>	Endemic	8 - 13	N/A	SB, A	13
<i>Halianthella annularis</i>	Endemic	0 - 79	8, 9, 27	SB, A, N	13
<i>Halianthella</i> n. sp.	Endemic	15	N/A	A	1
<i>Haloclava capensis</i>	Endemic	0 - 170	6, 7, 15, 16, 18, 22, 23	A, N, SB	41
<i>Heteractis aurora</i>	Cosmopolitan	12 - 22	N/A	D, SWI, N	8
<i>Heteractis crispa</i>	Cosmopolitan	15 - 22	N/A	SWI, D, N	8
<i>Heteractis magnifica</i>	Cosmopolitan	14 - 25	N/A	D, SWI	16
<i>Heteractis malu</i>	Cosmopolitan	15 - 20	N/A	D	2
<i>Isanthus capensis</i>	Non-endemic	0 - 157	3 - 10	A, SB	62
<i>Isophellia algoaensis</i>	Endemic	15 - 1240	N/A	A, SEA, SB	40
<i>Korsaranthus natalensis</i>	Endemic	0 - 32	25	A, N	21
<i>Liponema multiporum</i>	Cosmopolitan	110 - 500	N/A	SB, A, SWI	10
<i>Litophellia octoradiata</i>	Endemic	0	25	N	1
<i>Megalactis griffithsi</i>	Non-endemic	18 - 20	N/A	D	2
<i>Metridium senile</i>	Introduced	9 - 122	N/A	SB, A	8
<i>Peachia parasitica</i>	Non-endemic	2	8	SB	1
<i>Peachia</i> sp.	Non-endemic	1 - 18	6	SB, A	3
<i>Phellia aucklandica</i>	Non-endemic	0 - 1	8	SB	2
<i>Phelliactis algoaensis</i>	Endemic	40	N/A	SEA, A	2
<i>Phelliactis capensis</i>	Endemic	560 - 1200	N/A	A, SWI	3
<i>Preactis millardae</i>	Endemic	0 - 32	9 - 10	A, SB	21
<i>Pseudactinia flagellifera</i>	Cosmopolitan	0 - 102	1, 3 - 11, 13, 15 - 20, 23, 28	A, D, N, SB	142
<i>Pseudactinia</i> sp.	Non-endemic	0 - 29	19	A, N	36
<i>Pseudactinia varia</i>	Non-endemic	0 - 102	6 - 9, 11, 14, 15, 18 - 20, 25	A, N, SB	63
<i>Rhodactis rhodostoma</i>	Cosmopolitan	0 - 20	25	D, SWI, N	4
<i>Sagartia ornata</i>	Introduced	0 - 56	6, 7	SB	16
<i>Stichodactyla haddoni</i>	Cosmopolitan	14 - 20	N/A	D	3
<i>Stichodactyla mertensii</i>	Cosmopolitan	15 - 20	N/A	D	2
<i>Telmatactis natalensis</i>	Endemic	0 - 1	25 - 26	N	3
<i>Triactis producta</i>	Cosmopolitan	30	25	N	1
<i>Urticinopsis crassa</i>	Non-endemic	143 - 1024	N/A	SB, SEA	10

Appendix E – Material examined

Table 5.2: A summary of all material examined using morphological methods. Neither cnidae analysis nor histology was performed on these specimens unless otherwise stated. In the absence of a specimen, it was in some cases possible to identify anemones from photographic records. Specimens are listed with their South African Museum (SAM) category number (Cat. #).

Species	Cat. #	Date	Coast	Locality details	Latitude	Longitude	Depth (m)
<i>Acontiophorum mortenseni</i>	H5285	15/08/1947	West Coast	Hondeklip Bay	-31.235000	16.608333	272
<i>Acontiophorum mortenseni</i>	H5713	12/10/1965	West Coast	Cape of Good Hope	-34.500000	18.276667	400
<i>Acontiophorum mortenseni</i>	H5334	25/04/1996	South Coast	Storms River	-34.100000	23.816667	91
<i>Acontiophorum mortenseni</i>	H5307	25/05/1978	South Coast	Haga Haga	-32.916667	28.516667	630
<i>Acontiophorum mortenseni</i>	H5293	24/06/1979	East Coast	Mazeppa Bay	-32.476667	28.980000	775
<i>Acontiophorum mortenseni</i>	H5335	25/06/1979	East Coast	Mbashe River	-32.256667	29.161667	650
<i>Acontiophorum mortenseni</i>	H5310	25/06/1979	East Coast	Mbashe River	-32.253333	29.163333	580
<i>Acontiophorum mortenseni</i>	H5367	25/06/1979	East Coast	Coffee Bay	-32.250000	29.151667	520
<i>Acontiophorum mortenseni</i>	H5308	25/06/1979	East Coast	Mbashe River	-32.248333	29.173333	620
<i>Actinauge granulata</i>	H5223	02/08/1990	West Coast	Hondeklip Bay	-30.241667	14.895000	488
<i>Actinauge granulata</i>	H5183	03/02/2007	West Coast	Brazil	-29.900000	15.041667	375
<i>Actinauge granulata</i>	H5221	02/08/1990	West Coast	Hondeklip Bay	-30.433333	15.113333	460
<i>Actinauge granulata</i>	H5356	16/01/1995	West Coast	Strandfontein N	-31.783336	16.233336	440
<i>Actinauge granulata</i>	H5280	08/12/1959	West Coast	Cape of Good Hope	-34.700000	16.900003	250
<i>Actinauge granulata</i>	H5323	08/12/1959	West Coast	Cape of Good Hope	-34.700000	16.900003	250
<i>Actinauge granulata</i>	H5224	15/06/1947	West Coast	Yzerfontein	-33.333333	17.500000	402
<i>Actinauge granulata</i>	H5230	20/10/1946	West Coast	Cape Town	-33.966664	17.583333	402
<i>Actinauge granulata</i>	H4598	01/02/1928	West Coast	Lions Head	-33.636803	17.641514	365
<i>Actinauge granulata</i>	H5197	11/01/2007	West Coast	Cape of Good Hope	-34.638333	18.256667	483
<i>Actinauge granulata</i>	H1606	?	West Coast	Cape Point	-34.368872	18.405833	?
<i>Actinauge granulata</i>	H5188	09/01/2008	West Coast	Cape of Good Hope	-34.440000	18.490000	157
<i>Actinauge granulata</i>	H5182	14/01/2007	South Coast	Cape Hangklip	-34.760000	18.750000	176
<i>Actinauge granulata</i>	H5218	22/01/1993	South Coast	Gansbaai	-35.083333	18.986667	180

<i>Actinauge granulata</i>	H5229	08/02/1992	South Coast	Gansbaai	-35.166667	19.333333	165
<i>Actinauge granulata</i>	H5249	03/05/1993	South Coast	Natures Valley	-34.175000	23.688333	93
<i>Actinauge granulata</i>	3997	?	South Coast	Hardy Bank	-35.180000	23.030000	500
<i>Actinia ebhayiensis</i>	H5523	14/11/1935	West Coast	Port Nolloth	-29.252611	16.867036	1
<i>Actinia ebhayiensis</i>	H1520	20/04/1961	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	1
<i>Actinia ebhayiensis</i>	H1523	29/04/1961	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	1
<i>Actinia ebhayiensis</i>	H5522	27/07/1938	West Coast	Lamberts Bay	-32.093050	18.301358	1
<i>Actinia ebhayiensis</i>	H5303	28/06/1934	West Coast	Oudekraal	-33.987319	18.348822	1
<i>Actinia ebhayiensis</i>	H4956	16/03/2002	False Bay	Wooleys Pool	-34.132653	18.445383	2
<i>Actinia ebhayiensis</i>	H5556	06/07/1936	False Bay	St James	-34.120542	18.458153	1
<i>Actinia ebhayiensis</i>	H5539	19/03/2006	False Bay	Kalk Bay	-34.125831	18.451114	0.5
<i>Actinia ebhayiensis</i>	H5559	17/11/1953	False Bay	Oatland Point	-34.208203	18.462628	5
<i>Actinia ebhayiensis</i>	H5341	20/03/1939	South Coast	Kleinmond	-34.345494	19.003256	0.5
<i>Actinia ebhayiensis</i>	H5235	19/03/1939	South Coast	Kleinmond	-34.347256	19.013150	1
<i>Actinia ebhayiensis</i>	H5630	04/01/1932	South Coast	Still Bay	-34.390314	21.429328	1
<i>Actinia ebhayiensis</i>	H5402	25/03/1939	South Coast	Richmond	-33.955831	25.624503	1
<i>Actinia ebhayiensis</i>	H5525	21/07/1936	South Coast	Port Elizabeth	-33.983258	25.671442	1
<i>Actinia ebhayiensis</i>	H5342	05/07/1937	South Coast	Shelly Beach	-33.047050	27.884075	1
<i>Actinia ebhayiensis</i>	H5637	26/07/1937	South Coast	Shelly Beach	-33.020869	27.920206	1
<i>Actinia ebhayiensis</i>	H5340	27/12/1938	East Coast	Umtwalumi	-30.483333	30.633333	1
<i>Actinia ebhayiensis</i>	H5455	20/07/2009	East Coast	Mission Rocks	-28.278492	32.485986	0.5
<i>Actinoscyphia plebeia</i>	H5181	31/01/2011	West Coast	Groen River	-31.162267	15.622967	653
<i>Actinoscyphia plebeia</i>	H5179	31/01/2011	West Coast	Groen River	-31.162267	15.622967	427
<i>Actinoscyphia plebeia</i>	H5178	24/01/2011	West Coast	Cape Columbine	-32.611983	16.491783	811
<i>Actinostola capensis</i>	H5215	02/08/1990	West Coast	Hondeklip Bay	-30.398333	15.163333	393
<i>Actinostola capensis</i>	H5222	15/10/1955	West Coast	Cape Columbine	-32.433333	16.616667	384
<i>Actinostola capensis</i>	H5220	28/07/1990	West Coast	Hondeklip Bay	-30.515000	16.835000	190
<i>Actinostola capensis</i>	H5666	12/09/1946	West Coast	Yzerfontein	-33.333333	17.500000	357
<i>Actinostola capensis</i>	H5225	15/06/1947	West Coast	Yzerfontein	-33.333333	17.500000	400
<i>Actinostola capensis</i>	H5217	06/05/1947	West Coast	Cape Columbine	-32.583333	17.633333	267
<i>Actinostola capensis</i>	H1356	17/09/1903	West Coast	Cape Point	-34.384178	17.672839	1005

<i>Actinostola capensis</i>	H1352	13/03/1900	West Coast	Lions Head	-33.563058	17.674811	285
<i>Actinostola capensis</i>	H1342	13/03/1900	West Coast	Lions Head	-33.563058	17.674811	285
<i>Actinostola capensis</i>	H1351	11/09/1903	West Coast	Cape of Good Hope	-34.339656	17.722347	1005
<i>Actinostola capensis</i>	H1355	27/08/1903	West Coast	Cape Point	-34.692594	17.949003	548
<i>Actinostola capensis</i>	H5199	11/01/2007	West Coast	Cape of Good Hope	-34.638333	18.256667	483
<i>Actinostola capensis</i>	H1350	08/09/1902	West Coast	Lions Head	-33.931794	18.251808	146
<i>Actinostola capensis</i>	H1573	?	West Coast	Sea Point	-33.911483	18.386428	?
<i>Actinostola capensis</i>	H5171	19/01/2011	South Coast	Cape Point	-35.138767	18.534167	631
<i>Actinostola capensis</i>	H5186	10/01/2008	South Coast	Danger Point	-35.580000	19.330000	608
<i>Actinostola capensis</i>	H5170	16/01/2011	South Coast	Brownes Bank	-36.494583	20.082867	623
<i>Actinostola capensis</i>	H5169	16/01/2011	South Coast	Brownes Bank	-36.494583	20.082867	623
<i>Actinostola capensis</i>	H5201	01/05/2011	South Coast	Grue Bank	-35.173000	23.159000	550
<i>Actinostola capensis</i>	H1358	16/04/1901	South Coast	East London	-33.028781	28.357061	548
<i>Actinostola capensis</i>	H5336	25/06/1979	East Coast	Mbashe River	-32.256667	29.161667	650
<i>Actinostola capensis</i>	H1348	09/04/1901	East Coast	Mbashe River	-32.228256	29.328253	640
<i>Actinostola capensis</i>	H5412	11/05/1977	East Coast	Port Shepstone	-30.720000	30.680000	780
<i>Aiptasia parva</i>	H5456	22/07/2009	East Coast	Thompsons Pool	-29.504883	31.238633	2
<i>Aiptasia parva</i>	H5278	09/04/2002	Sodwana Bay	Jesser Point	-27.523450	32.700083	45
<i>Aiptasia parva</i>	4054	01/12/1935	South Coast	East London	-32.994958	27.954103	?
<i>Alicia sansibarensis</i>	H5158	25/04/2004	Sodwana Bay	Sodwana Bay	-27.458333	32.726333	105
<i>Amphianthus capensis</i>	H5311	09/09/1947	West Coast	Port Nolloth	-30.253339	14.955008	461
<i>Amphianthus capensis</i>	H5574	04/10/1947	West Coast	Cape Columbine	-32.686667	17.295000	247
<i>Amphianthus capensis</i>	H5177	16/01/2011	South Coast	Brownes Bank	-36.494583	20.082867	623
<i>Amphianthus capensis</i>	H5722	03/06/1960	South Coast	Mossel Bay	-34.800000	22.100000	100
<i>Amphianthus capensis</i>	H5673	02/09/2008	South Coast	Goukamma	-34.400003	22.850000	95
<i>Amphianthus capensis</i>	H5207	12/04/2007	South Coast	Robberg	-34.466661	23.383331	106
<i>Amphianthus capensis</i>	H5372	08/04/2002	Sodwana Bay	Sodwana Bay	-27.606133	32.663600	12
<i>Amphianthus laevis</i>	H5394	14/01/1996	West Coast	Hondeklip Bay	-30.100000	16.850000	141
<i>Amphianthus laevis</i>	H5205	29/08/1967	West Coast	Cape of Good Hope	-34.721667	18.208333	365
<i>Amphianthus laevis</i>	H5697	22/02/1965	False Bay	Cape Point	-34.360000	18.648333	87
<i>Amphianthus laevis</i>	H5326	25/02/1964	South Coast	Bettys Bay	-34.178333	18.720000	36

<i>Amphianthus laevis</i>	H5717	18/02/1965	False Bay	Rooi Els	-34.320000	18.758333	64
<i>Amphianthus laevis</i>	H5287	11/05/2011	South Coast	Agulhas Bank	-35.566000	21.545000	127
<i>Amphianthus laevis</i>	H5450	09/02/1962	South Coast	Port Elizabeth	-34.250000	25.841667	108
<i>Amphianthus laevis</i>	H5449	09/02/1962	South Coast	Port Elizabeth	-34.250000	25.841667	108
<i>Amphianthus laevis</i>	4055	1929	West Coast	Cape Town	-33.920000	18.350003	?
<i>Amphianthus natalensis</i>	H5439	20/06/1972	South Coast	Hardy Bank	-35.100000	22.250000	120
<i>Amphianthus natalensis</i>	H5448	09/02/1962	South Coast	Port Elizabeth	-34.250000	25.841667	108
<i>Amphianthus natalensis</i>	H5711	16/07/1961	South Coast	East London	-33.121667	28.016667	88
<i>Amphianthus natalensis</i>	H5592	18/03/2008	East Coast	Landers Reef	-30.332883	30.792050	28
<i>Amphianthus natalensis</i>	H5594	18/03/2008	East Coast	Landers Reef	-30.332883	30.792050	28
<i>Amphianthus natalensis</i>	H4596	1901	East Coast	Durban	-29.863833	31.540275	804
<i>Amphianthus natalensis</i>	H5107	15/04/2002	Sodwana Bay	Sodwana Bay	-27.610683	32.667500	60
<i>Amphianthus natalensis</i>	H5106	13/04/2002	Sodwana Bay	Sodwana Bay	-27.610683	32.667500	56
<i>Amphianthus natalensis</i>	H5313	02/06/1990	Sodwana Bay	Sodwana Bay	-27.546667	32.713333	77
<i>Amphianthus natalensis</i>	H5315	02/06/1990	Sodwana Bay	Sodwana Bay	-27.530000	32.716667	70
<i>Amphianthus natalensis</i>	H5338	06/06/1990	East Coast	Kosi Bay	-27.006667	32.920000	66
<i>Anemonia natalensis</i>	H5343	15/07/1935	East Coast	Isipingo	-29.850289	31.039692	1
<i>Anemonia natalensis</i>	H5626	15/07/1935	East Coast	Isipingo	-29.850289	31.039692	1
<i>Anemonia natalensis</i>	H5458	23/07/2009	East Coast	Tiger Rocks	-30.005267	30.941867	2
<i>Anemonia natalensis</i>	H5698	18/03/2008	East Coast	Reunion Rocks	-29.996953	30.950475	1
<i>Anemonia natalensis</i>	H5699	18/03/2008	East Coast	Reunion Rocks	-29.996953	30.950475	1
<i>Anemonia natalensis</i>	H5625	29/06/1935	East Coast	Isipingo	-29.862875	31.044722	0
<i>Anemonia natalensis</i>	H5623	21/12/1938	East Coast	Umhlali	-29.537050	31.223058	1
<i>Anemonia natalensis</i>	H5457	22/07/2009	East Coast	Thompsons Pool	-29.504883	31.238633	2
<i>Anemonia natalensis</i>	H5263	03/05/1939	East Coast	Umpagazi	-28.143942	32.556069	1
<i>Anthopleura aneae</i>	H5695	26/03/2008	West Coast	Kommetjie	-34.140250	18.321583	0.5
<i>Anthopleura aneae</i>	H5435	30/12/1938	East Coast	Port Edward	-31.060789	30.224819	0.5
<i>Anthopleura aneae</i>	H5330	27/12/1938	East Coast	Umtwalumi	-30.484733	30.633517	0
<i>Anthopleura aneae</i>	H5239	03/05/1939	East Coast	Umpagazi	-28.143942	32.556069	1
<i>Anthopleura insignis</i>	H5279	15/12/1957	West Coast	Table Bay	-33.810000	18.410000	15
<i>Anthopleura insignis</i>	H5461	10/07/2009	South Coast	Woody Cape	-33.770111	26.447611	1

<i>Anthopleura michaelseni</i>	H5527	14/11/1935	West Coast	Port Nolloth	-29.249783	16.867053	1
<i>Anthopleura michaelseni</i>	H5649	25/03/2008	Langebaan Lagoon	Langebaan Lagoon	-33.096314	18.028789	0
<i>Anthopleura michaelseni</i>	H5593	25/03/2008	Langebaan Lagoon	Langebaan Lagoon	-33.096422	18.028958	0
<i>Anthopleura michaelseni</i>	H5642	26/03/2008	West Coast	Kommetjie	-34.140250	18.321583	0
<i>Anthopleura michaelseni</i>	H5276	20/03/1939	South Coast	Kleinmond	-34.347136	19.015781	1
<i>Anthopleura michaelseni</i>	H5244	03/07/1951	South Coast	Breede River Estuary	-34.396989	20.843858	1
<i>Anthopleura michaelseni</i>	H5631	08/01/1932	South Coast	Still Bay	-34.392542	21.425789	1
<i>Anthopleura michaelseni</i>	H5628	09/01/1932	South Coast	Still Bay	-34.392542	21.425789	1
<i>Anthopleura michaelseni</i>	H5622	09/01/1932	South Coast	Still Bay	-34.392542	21.425789	1
<i>Anthopleura michaelseni</i>	H5660	19/07/2009	South Coast	Jeffreys Bay	-34.034158	24.933578	0
<i>Anthopleura michaelseni</i>	H5613	11/03/2008	South Coast	Shark Rock Pier	-33.979917	25.657167	0
<i>Anthopleura michaelseni</i>	H5614	13/03/2008	South Coast	Table Top	-33.982000	25.693167	12
<i>Anthopleura michaelseni</i>	H5700	13/03/2008	Algoa Bay	Flat Rocks	-33.999783	25.685383	1
<i>Anthopleura michaelseni</i>	H5554	08/07/1937	South Coast	Shelly Beach	-33.052058	27.874900	1
<i>Anthopleura michaelseni</i>	H5636	17/07/1937	South Coast	Bat Cave Rocks	-33.042228	27.903303	1
<i>Anthopleura michaelseni</i>	H5635	12/07/1937	South Coast	Bat Cave Rocks	-33.020889	27.920214	1
<i>Anthopleura michaelseni</i>	H5370	12/07/1937	South Coast	Bat Cave Rocks	-33.019056	27.921258	1
<i>Anthopleura michaelseni</i>	H5501	20/07/2009	East Coast	Coffee Bay	-31.987033	29.154061	0.5
<i>Anthopleura michaelseni</i>	H5503	20/07/2009	East Coast	Coffee Bay	-31.987033	29.154061	0.5
<i>Anthopleura michaelseni</i>	H5504	20/07/2009	East Coast	Coffee Bay	-31.987033	29.154061	0.5
<i>Anthopleura michaelseni</i>	H5661	20/07/2009	East Coast	Coffee Bay	-31.987033	29.154061	0
<i>Anthopleura michaelseni</i>	H5591	19/03/2008	East Coast	Rocky Bay	-30.337117	30.735283	0
<i>Anthopleura michaelseni</i>	H5597	19/03/2008	East Coast	Rocky Bay	-30.337117	30.735283	0
<i>Anthopleura michaelseni</i>	H5705	19/03/2008	East Coast	Rocky Bay	-30.337117	30.735283	0
<i>Anthopleura michaelseni</i>	H5553	01/07/1935	East Coast	Isipingo	-29.847728	31.038378	1
<i>Anthosactis capensis</i>	H5214	01/02/2007	West Coast	Hondeklip Bay	-30.260000	16.100000	219
<i>Anthosactis capensis</i>	H5198	17/01/2008	West Coast	Cape Columbine	-32.410000	16.460000	406
<i>Anthosactis capensis</i>	H5105	08/04/2002	Sodwana Bay	Diepgat	-27.606133	32.663600	12
<i>Anthosactis capensis</i>	H5468	06/10/2009	Sodwana Bay	Ribbon Reef	-27.450761	32.822800	22
<i>Anthosactis capensis</i>	H5719	31/01/2012	West Coast	Yzerfontein	-33.586147	17.457986	498
<i>Anthostella stephensoni</i>	H4694	27/02/1993	West Coast	Oudekraal	-33.986922	18.350117	1

<i>Anthostella stephensoni</i>	H5724	25/02/1964	False Bay	Seal Island	-34.188333	18.585000	42
<i>Anthostella stephensoni</i>	H5589	11/03/2008	Algoa Bay	Riy Banks	-33.984950	25.862900	20
<i>Anthostella stephensoni</i>	H5590	11/03/2008	Algoa Bay	Riy Banks	-33.984950	25.862900	20
<i>Anthostella stephensoni</i>	H5647	18/03/2008	East Coast	Landers Reef	-30.332883	30.792050	28
<i>Anthostella stephensoni</i>	H5373	03/05/1939	East Coast	Umpagazi	-28.143942	32.556069	1
<i>Anthothoe stimpsonii</i>	H5524	29/10/1935	West Coast	Port Nolloth	-29.254481	16.867397	1
<i>Anthothoe stimpsonii</i>	H5261	01/05/1959	Saldanha Bay	Saldanha Bay	-33.106664	17.895003	79
<i>Anthothoe stimpsonii</i>	H5261	01/05/1959	Saldanha Bay	Saldanha Bay	-33.106664	17.895003	79
<i>Anthothoe stimpsonii</i>	H1583	?	Saldanha Bay	Saldanha Bay	-33.008228	17.947481	1
<i>Anthothoe stimpsonii</i>	H5255	24/05/1947	Saldanha Bay	Saldanha Bay	-33.033650	17.935450	5
<i>Anthothoe stimpsonii</i>	H5358	29/04/1963	Saldanha Bay	Saldanha Bay	-33.016669	17.965003	9
<i>Anthothoe stimpsonii</i>	H5115	24/04/2001	Saldanha Bay	Saldanha Bay	-33.033333	17.966667	1
<i>Anthothoe stimpsonii</i>	H5294	09/04/1953	Saldanha Bay	Saldanha Bay	-33.041914	17.972594	11
<i>Anthothoe stimpsonii</i>	H5297	14/07/1946	Saldanha Bay	Saldanha Bay	-33.016667	17.975000	9
<i>Anthothoe stimpsonii</i>	H5296	29/04/1959	Saldanha Bay	Ore Jetty	-33.025000	17.975006	13
<i>Anthothoe stimpsonii</i>	H5300	09/04/1953	Saldanha Bay	Salamander Bay	-33.066667	18.000000	5
<i>Anthothoe stimpsonii</i>	H5295	09/04/1953	Saldanha Bay	Donkergat Point	-33.078767	18.004431	6
<i>Anthothoe stimpsonii</i>	H5298	09/04/1953	Saldanha Bay	Donkergat Point	-33.078767	18.004431	6
<i>Anthothoe stimpsonii</i>	H5681	16/07/1946	Langebaan Lagoon	Langebaan Lagoon	-33.093333	18.013333	5
<i>Anthothoe stimpsonii</i>	H5686	05/05/1951	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	1
<i>Anthothoe stimpsonii</i>	H5573	05/05/1951	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	1
<i>Anthothoe stimpsonii</i>	H1522	30/04/1961	Langebaan Lagoon	Schapen Island	-33.092086	18.018017	1
<i>Anthothoe stimpsonii</i>	H5577	15/07/1946	Langebaan Lagoon	Langebaan Lagoon	-33.106667	18.031667	1
<i>Anthothoe stimpsonii</i>	H5299	25/09/1957	Saldanha Bay	Lynch Point	-33.045553	18.034053	1
<i>Anthothoe stimpsonii</i>	H5350	24/05/1961	Saldanha Bay	Lynch Point	-33.045553	18.034053	0.5
<i>Anthothoe stimpsonii</i>	H5682	12/12/1950	Langebaan Lagoon	Oostewaal	-33.122364	18.049533	1
<i>Anthothoe stimpsonii</i>	H5708	05/02/1953	West Coast	Lamberts Bay	-32.083331	18.233314	66
<i>Anthothoe stimpsonii</i>	H1574	?	West Coast	Lions Head	-33.931825	18.281394	?
<i>Anthothoe stimpsonii</i>	H5618	22/01/1957	West Coast	Lamberts Bay	-32.068333	18.295000	23
<i>Anthothoe stimpsonii</i>	H5211	18/01/1957	West Coast	Lamberts Bay	-32.080000	18.296667	17
<i>Anthothoe stimpsonii</i>	H5519	25/07/1938	West Coast	Lamberts Bay	-32.090233	18.307453	1

<i>Anthothoe stimpsonii</i>	H5586	23/03/2008	West Coast	Hout Bay	-34.050442	18.345550	0.5
<i>Anthothoe stimpsonii</i>	H5302	26/06/1934	West Coast	Oudekraal	-33.986958	18.349369	1
<i>Anthothoe stimpsonii</i>	H5653	24/03/2008	West Coast	Oudekraal	-33.982167	18.359400	0
<i>Anthothoe stimpsonii</i>	H1347	25/09/1958	West Coast	Table Bay	-33.859825	18.419994	?
<i>Anthothoe stimpsonii</i>	H5530	01/04/2006	False Bay	Wooleys Pool	-34.132653	18.445383	0.5
<i>Anthothoe stimpsonii</i>	H4952	15/03/2002	False Bay	Wooleys Pool	-34.132750	18.445633	1
<i>Anthothoe stimpsonii</i>	H5480	17/02/1953	False Bay	Glencairn	-34.157853	18.435242	7
<i>Anthothoe stimpsonii</i>	H5371	09/03/1950	False Bay	Fish Hoek	-34.141667	18.450000	18
<i>Anthothoe stimpsonii</i>	H5490	12/03/1953	False Bay	Oatland Point	-34.208408	18.461622	5
<i>Anthothoe stimpsonii</i>	H5406	15/02/1965	False Bay	Smitswinkel Bay	-34.283333	18.486667	27
<i>Anthothoe stimpsonii</i>	H5510	12/10/1967	False Bay	Muizenberg	-34.116667	18.486667	7
<i>Anthothoe stimpsonii</i>	H5254	26/01/1963	West Coast	Milnerton	-33.869836	18.489161	0.5
<i>Anthothoe stimpsonii</i>	H5560	10/07/1962	False Bay	Muizenberg	-34.113333	18.511667	13
<i>Anthothoe stimpsonii</i>	H5333	31/01/1959	False Bay	False Bay	-34.183333	18.558333	38
<i>Anthothoe stimpsonii</i>	H5508	25/04/1967	False Bay	Seal Island	-34.181667	18.566667	?
<i>Anthothoe stimpsonii</i>	H5379	20/02/1964	False Bay	Seal Island	-34.120000	18.593333	22
<i>Anthothoe stimpsonii</i>	H5671	17/02/1965	False Bay	Millers Point	-34.241667	18.646661	53
<i>Anthothoe stimpsonii</i>	H5384	26/02/1964	False Bay	Swartklip	-34.115000	18.680000	29
<i>Anthothoe stimpsonii</i>	H5564	16/02/1965	South Coast	Kogel Bay	-34.215000	18.818333	19
<i>Anthothoe stimpsonii</i>	H5348	20/03/1939	South Coast	Kleinmond	-34.345494	19.003256	1
<i>Anthothoe stimpsonii</i>	H5627	15/01/1968	South Coast	Arniston	-34.671772	20.233608	1
<i>Anthothoe stimpsonii</i>	H5349	07/02/1952	South Coast	Breede River Estuary	-34.410617	20.850067	1
<i>Anthothoe stimpsonii</i>	H5620	07/01/1932	South Coast	Still Bay	-34.386358	21.426786	1
<i>Anthothoe stimpsonii</i>	H1331	01/08/1898	South Coast	Mossel Bay	-34.187503	22.160183	?
<i>Anthothoe stimpsonii</i>	H5704	08/03/2008	South Coast	Mossel Bay	-34.189667	22.151883	0
<i>Anthothoe stimpsonii</i>	H5664	18/07/2009	South Coast	Goukamma	-34.069122	22.929608	0
<i>Anthothoe stimpsonii</i>	H5346	02/06/1939	South Coast	Jeffreys Bay	-34.036803	24.931903	1
<i>Anthothoe stimpsonii</i>	H5662	19/07/2009	South Coast	Jeffreys Bay	-34.034158	24.933578	0
<i>Anthothoe stimpsonii</i>	H5345	06/07/1936	South Coast	Port Elizabeth	-33.990111	25.675575	1
<i>Anthothoe stimpsonii</i>	H5651	10/03/2008	South Coast	Philips Reef	-33.981508	25.668197	12
<i>Anthothoe stimpsonii</i>	H5645	13/03/2008	South Coast	Bell Buoy	-33.980292	25.692958	22

<i>Anthothoe stimpsonii</i>	H5587	12/03/2008	South Coast	Algoa Bay	-33.998333	25.708700	16
<i>Anthothoe stimpsonii</i>	H5654	12/03/2008	South Coast	White Sands	-34.006133	25.719433	25
<i>Anthothoe stimpsonii</i>	H5650	11/03/2008	Algoa Bay	Riy Banks	-33.984483	25.864017	17
<i>Anthothoe stimpsonii</i>	H5506	08/08/2009	South Coast	Port Alfred	-33.611383	26.890194	1
<i>Anthothoe stimpsonii</i>	H1354	27/08/1901	South Coast	Keiskamma	-33.283461	27.593897	60
<i>Anthothoe stimpsonii</i>	H5629	05/07/1937	South Coast	Shelly Beach	-33.049561	27.879986	1
<i>Anthothoe stimpsonii</i>	H5521	11/07/1937	South Coast	Bat Cave Rocks	-33.007964	27.927714	1
<i>Anthothoe stimpsonii</i>	H1332	29/01/1899	South Coast	East London	-32.958219	28.001019	1
<i>Anthothoe stimpsonii</i>	H5292	16/07/1935	East Coast	Isipingo	-29.999950	30.947503	1
<i>Anthothoe stimpsonii</i>	H5460	23/07/2009	East Coast	Durban	-29.863206	31.022719	1
<i>Anthothoe stimpsonii</i>	H5209	08/05/2010	East Coast	Cape Vidal	-28.369617	32.437839	30
<i>Bolocera kerguelensis</i>	H5194	03/02/2007	West Coast	Brazil	-29.900000	15.041667	375
<i>Bolocera kerguelensis</i>	H5413	01/08/1990	West Coast	Hondeklip Bay	-30.100000	15.266667	250
<i>Bolocera kerguelensis</i>	H5418	14/01/1997	West Coast	Hondeklip Bay	-30.216667	15.466667	242
<i>Bolocera kerguelensis</i>	H5419	16/01/1996	West Coast	Port Nolloth	-29.250000	15.633336	175
<i>Bolocera kerguelensis</i>	H5227	03/08/1990	West Coast	Hondeklip Bay	-30.596667	16.103333	253
<i>Bolocera kerguelensis</i>	H5499	26/06/1987	West Coast	Cape Columbine	-32.100000	16.133333	750
<i>Bolocera kerguelensis</i>	H5216	03/08/1990	West Coast	Hondeklip Bay	-30.415000	16.170000	226
<i>Bolocera kerguelensis</i>	H4951	28/07/1990	West Coast	Hondeklip Bay	-30.466667	16.866667	176
<i>Bolocera kerguelensis</i>	H1517	16/04/1900	West Coast	Lions Head	-33.989619	17.643369	365
<i>Bolocera kerguelensis</i>	H5702	22/09/1960	West Coast	Kreef Bay	-33.133333	17.850000	97
<i>Bolocera kerguelensis</i>	H5191	15/01/2007	West Coast	Cape of Good Hope	-34.466667	17.985000	333
<i>Bolocera kerguelensis</i>	H5696	15/12/1959	West Coast	Slangkop	-34.175000	18.238333	121
<i>Bolocera kerguelensis</i>	H5189	11/01/2007	West Coast	Cape of Good Hope	-34.638333	18.256667	483
<i>Bolocera kerguelensis</i>	H5319	12/10/1967	False Bay	Muizenberg	-34.125000	18.483333	16
<i>Bolocera kerguelensis</i>	H5167	19/01/2011	False Bay	Cape Point	-35.138725	18.534158	455
<i>Bolocera kerguelensis</i>	H5165	21/01/2011	West Coast	Cape Point	-34.643800	18.559583	172
<i>Bolocera kerguelensis</i>	H5513	13/07/1967	False Bay	Cape Hangklip	-34.433333	18.663333	102
<i>Bolocera kerguelensis</i>	H5415	31/01/1959	False Bay	Cape Hangklip	-34.388244	18.671731	92
<i>Bolocera kerguelensis</i>	H5174	18/01/2011	South Coast	Danger Point	-35.541431	19.026831	403
<i>Bolocera kerguelensis</i>	H5275	09/01/1967	South Coast	Agulhas Bank	-35.600000	19.750000	150

<i>Bolocera kerguelensis</i>	H5547	06/04/2007	South Coast	Brownes Bank	-36.600000	20.616669	174
<i>Bolocera kerguelensis</i>	H5277	29/05/1988	South Coast	Agulhas Bank	-36.083333	21.550000	161
<i>Bolocera kerguelensis</i>	H5438	20/06/1972	South Coast	Hardy Bank	-35.366667	22.516667	200
<i>Bolocera kerguelensis</i>	H5212	11/09/2008	South Coast	Grue Bank	-34.900003	23.383333	184
<i>Bolocera kerguelensis</i>	H5206	08/09/2008	South Coast	Tsitsikamma	-34.733331	24.366664	179
<i>Bolocera kerguelensis</i>	H5247	10/05/1993	South Coast	Port Elizabeth	-34.436667	25.630000	220
<i>Bolocera kerguelensis</i>	H1340	15/04/1901	South Coast	East London	-33.001692	28.299744	502
<i>Bunodactis reynaudi</i>	H5414	29/10/1935	West Coast	Port Nolloth	-29.242072	16.859578	1
<i>Bunodactis reynaudi</i>	H5555	26/10/1935	West Coast	Port Nolloth	-29.244114	16.863175	1
<i>Bunodactis reynaudi</i>	H5656	07/08/2008	West Coast	Kleinsee	-29.716667	17.058717	0.5
<i>Bunodactis reynaudi</i>	H5657	07/08/2008	West Coast	Kleinsee	-29.716667	17.058717	0.5
<i>Bunodactis reynaudi</i>	H5659	07/08/2008	West Coast	Kleinsee	-29.716667	17.058717	1
<i>Bunodactis reynaudi</i>	H5505	07/08/2008	West Coast	Kleinsee	-29.731686	17.058719	0.5
<i>Bunodactis reynaudi</i>	H5526	08/02/1940	West Coast	Hondeklip Bay	-30.317797	17.271858	1
<i>Bunodactis reynaudi</i>	H5426	07/03/1940	West Coast	Groen River	-30.845847	17.577358	1
<i>Bunodactis reynaudi</i>	H5243	24/09/1957	West Coast	Paternoster	-32.812633	17.865006	5
<i>Bunodactis reynaudi</i>	H5118	21/04/2001	Saldanha Bay	Hoedjes Point	-33.033333	17.966667	3
<i>Bunodactis reynaudi</i>	H1585	28/04/1963	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	1
<i>Bunodactis reynaudi</i>	H5675	02/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.100550	18.028606	1
<i>Bunodactis reynaudi</i>	H5360	02/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.100550	18.028606	1
<i>Bunodactis reynaudi</i>	H5453	12/07/2008	Langebaan Lagoon	Shipwreck	-33.105647	18.032769	1
<i>Bunodactis reynaudi</i>	H5409	25/09/1957	Saldanha Bay	Lynch Point	-33.045553	18.034053	1
<i>Bunodactis reynaudi</i>	H5258	02/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	0.5
<i>Bunodactis reynaudi</i>	H5667	17/01/1957	West Coast	Lamberts Bay	-32.125000	18.293333	20
<i>Bunodactis reynaudi</i>	H5690	19/01/1957	West Coast	Lamberts Bay	-32.089997	18.293336	30
<i>Bunodactis reynaudi</i>	H5617	18/01/1957	West Coast	Lamberts Bay	-32.083333	18.295000	29
<i>Bunodactis reynaudi</i>	H5665	19/01/1957	West Coast	Lamberts Bay	-32.091672	18.295000	27
<i>Bunodactis reynaudi</i>	H5691	23/01/1957	West Coast	Lamberts Bay	-32.034025	18.295625	27
<i>Bunodactis reynaudi</i>	H5425	27/07/1938	West Coast	Lamberts Bay	-32.095519	18.299733	1
<i>Bunodactis reynaudi</i>	H5423	27/07/1938	West Coast	Lamberts Bay	-32.098889	18.302333	1
<i>Bunodactis reynaudi</i>	H5596	23/03/2008	West Coast	Hout Bay	-34.050450	18.345550	0.5

<i>Bunodactis reynaudi</i>	H5408	12/07/1934	West Coast	Oudekraal	-33.987508	18.347761	1
<i>Bunodactis reynaudi</i>	H1341	11/02/1914	West Coast	Hout Bay	-34.047578	18.348858	1
<i>Bunodactis reynaudi</i>	H5411	25/04/1898	West Coast	Sea Point	-33.913831	18.386125	1
<i>Bunodactis reynaudi</i>	H1333	25/08/1898	West Coast	Sea Point	-33.913500	18.386881	1
<i>Bunodactis reynaudi</i>	H1343	01/03/1959	West Coast	Sea Point	-33.911364	18.387725	1
<i>Bunodactis reynaudi</i>	H5264	11/02/1947	West Coast	Robben Island	-33.791667	18.405000	19.5
<i>Bunodactis reynaudi</i>	H5534	19/03/2006	False Bay	Kalk Bay	-34.127808	18.448875	0.5
<i>Bunodactis reynaudi</i>	H1526	30/05/1961	False Bay	Dalebrook	-34.123511	18.453378	1
<i>Bunodactis reynaudi</i>	H5424	01/04/1937	False Bay	St James	-34.119708	18.459156	1
<i>Bunodactis reynaudi</i>	H5557	08/08/1932	False Bay	St James	-34.118881	18.459433	1
<i>Bunodactis reynaudi</i>	H5421	22/07/1932	False Bay	St James	-34.118881	18.459433	1
<i>Bunodactis reynaudi</i>	H5478	09/03/1953	False Bay	Oatland Point	-34.208203	18.462628	5
<i>Bunodactis reynaudi</i>	H5558	08/01/1940	South Coast	Cape Hangklip	-34.384153	18.833269	1
<i>Bunodactis reynaudi</i>	H5284	09/01/1932	South Coast	Still Bay	-34.385814	21.425772	1
<i>Bunodactis reynaudi</i>	H5607	18/07/2009	South Coast	Goukamma	-34.069122	22.929608	0
<i>Bunodactis reynaudi</i>	H5472	19/07/2009	South Coast	Jeffreys Bay	-34.034158	24.933578	1
<i>Bunodactis reynaudi</i>	H5420	09/07/1936	South Coast	Port Elizabeth	-33.982119	25.668519	1
<i>Bunodosoma capense</i>	H5318	28/07/1990	West Coast	Kleinsee	-29.750000	17.016667	78
<i>Bunodosoma capense</i>	H5368	19/04/1940	West Coast	Zout River	-31.243333	17.846111	1
<i>Bunodosoma capense</i>	H5286	24/09/1957	West Coast	Paternoster	-32.806550	17.884203	4
<i>Bunodosoma capense</i>	H1334	14/03/1902	Saldanha Bay	Hoedjes Point	-33.026778	17.941717	0.5
<i>Bunodosoma capense</i>	H5256	24/05/1947	Saldanha Bay	Saldanha Bay	-33.033736	17.935550	5
<i>Bunodosoma capense</i>	H5116	27/04/2001	Saldanha Bay	Hoedjes Point	-33.033333	17.966667	1
<i>Bunodosoma capense</i>	H5364	30/04/1963	Saldanha Bay	Saldanha Bay	-33.061667	17.975000	20
<i>Bunodosoma capense</i>	H5407	25/04/1964	Saldanha Bay	Ore Jetty	-33.020019	17.994989	13
<i>Bunodosoma capense</i>	H5289	23/03/1953	West Coast	Cape Columbine	-32.733333	18.000000	11
<i>Bunodosoma capense</i>	H1518	20/04/1961	Langebaan Lagoon	Schapen Island	-33.091642	18.025225	1
<i>Bunodosoma capense</i>	H5694	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.105031	18.031608	1
<i>Bunodosoma capense</i>	H5290	06/02/1953	West Coast	St Helena Bay	-32.650000	18.033333	27
<i>Bunodosoma capense</i>	H5290	06/02/1953	West Coast	St Helena Bay	-32.650000	18.033333	27
<i>Bunodosoma capense</i>	H5374	25/09/1957	Saldanha Bay	Lynch Point	-33.045553	18.034053	1

<i>Bunodosoma capense</i>	H5552	02/07/1961	West Coast	Lamberts Bay	-32.091667	18.288333	27
<i>Bunodosoma capense</i>	H5619	22/01/1957	West Coast	Lamberts Bay	-32.068333	18.295000	23
<i>Bunodosoma capense</i>	H5410	27/07/1938	West Coast	Lamberts Bay	-32.118475	18.301300	1
<i>Bunodosoma capense</i>	H5604	24/03/2008	West Coast	Star Walls	-34.041200	18.301383	29
<i>Bunodosoma capense</i>	H5265	26/04/1898	West Coast	Three Anchor Bay	-33.906206	18.396994	0.5
<i>Bunodosoma capense</i>	H1346	14/02/1958	False Bay	Simons Bay	-34.179594	18.428544	18
<i>Bunodosoma capense</i>	H1344	14/02/1958	False Bay	Simons Bay	-34.186125	18.438161	18
<i>Bunodosoma capense</i>	H5366	12/10/1967	False Bay	Fish Hoek	-34.138333	18.443333	11
<i>Bunodosoma capense</i>	H5481	17/02/1953	False Bay	Glencairn	-34.157853	18.435242	7
<i>Bunodosoma capense</i>	H5437	09/03/1950	False Bay	Fish Hoek	-34.141667	18.450000	18
<i>Bunodosoma capense</i>	H5362	19/04/1955	False Bay	Fish Hoek	-34.141667	18.450000	17
<i>Bunodosoma capense</i>	H5369	22/07/1932	False Bay	St James	-34.119958	18.458719	1
<i>Bunodosoma capense</i>	H5643	26/03/2008	False Bay	A-Frame	-34.207950	18.460817	6
<i>Bunodosoma capense</i>	H5495	23/05/1953	False Bay	Oatland Point	-34.208203	18.462628	2
<i>Bunodosoma capense</i>	H5486	23/05/1953	False Bay	Oatland Point	-34.208203	18.462628	2
<i>Bunodosoma capense</i>	H1524	30/05/1961	False Bay	Dalebrook	-34.124658	18.452294	1
<i>Bunodosoma capense</i>	H5389	21/02/1964	False Bay	Glencairn	-34.148331	18.480008	26
<i>Bunodosoma capense</i>	H5436	22/02/1947	False Bay	Muizenberg	-34.125000	18.487500	19.5
<i>Bunodosoma capense</i>	H5670	22/05/1961	False Bay	Millers Point	-34.221667	18.521667	39
<i>Bunodosoma capense</i>	H5512	24/04/1967	False Bay	Cape Hangklip	-34.433333	18.663333	?
<i>Bunodosoma capense</i>	H5233	26/02/1964	False Bay	Swartklip	-34.095000	18.711667	15
<i>Bunodosoma capense</i>	H5483	19/08/1952	False Bay	Rooi Els	-34.275000	18.825000	16
<i>Bunodosoma capense</i>	H5561	16/02/1965	South Coast	Kogel Bay	-34.215000	18.818333	19
<i>Bunodosoma capense</i>	H5669	16/02/1965	False Bay	Gordons Bay	-34.158333	18.843333	7
<i>Bunodosoma capense</i>	H5250	07/07/1951	South Coast	Breede River Estuary	-34.410617	20.850067	1
<i>Bunodosoma capense</i>	H5621	09/01/1932	South Coast	Still Bay	-34.392542	21.425789	1
<i>Bunodosoma capense</i>	H5396	02/04/1939	South Coast	Robberg	-34.101328	23.398172	1
<i>Bunodosoma capense</i>	H5405	02/04/1939	South Coast	Storms River	-34.020472	23.903575	0.5
<i>Bunodosoma capense</i>	H5234	?	South Coast	Jeffreys Bay	-34.026208	24.930792	1
<i>Bunodosoma capense</i>	H5236	02/06/1939	South Coast	Jeffreys Bay	-34.036803	24.931903	1
<i>Bunodosoma capense</i>	H5689	10/09/1950	South Coast	Bushmans River	-33.679753	26.655897	1

<i>Bunodosoma capense</i>	H5634	21/01/1939	South Coast	Kowie	-33.603786	26.901042	1
<i>Bunodosoma capense</i>	H5241	06/07/1937	South Coast	Shelly Beach	-33.051211	27.876869	1
<i>Bunodosoma capense</i>	H5377	21/05/1939	South Coast	Qolora	-32.636214	28.430631	1
<i>Bunodosoma capense</i>	H5502	20/07/2009	East Coast	Coffee Bay	-31.987033	29.154061	0.5
<i>Calliactis algoaensis</i>	H5269	28/04/1996	South Coast	Port Elizabeth	-34.098333	25.896667	101
<i>Calliactis algoaensis</i>	H5309	10/05/1977	East Coast	Margate	-30.890000	30.528333	850
<i>Calliactis algoaensis</i>	H5320	09/07/1985	East Coast	Isipingo	-30.018333	31.053333	150
<i>Calliactis algoaensis</i>	H5608	19/01/2005	Sodwana Bay	Jesser Point	-27.523450	32.700083	66
<i>Calliactis algoaensis</i>	1175	01/01/1935	South Coast	East London	-32.996817	27.955208	?
<i>Calliactis polypus</i>	H5353	22/01/1995	West Coast	Strandfontein N	-31.516667	17.966667	95
<i>Calliactis polypus</i>	H5538	20/03/1948	South Coast	Brownes Bank	-36.733333	21.300000	201
<i>Calliactis polypus</i>	H4597	1939	East Coast	Durban	-29.862686	31.048192	?
<i>Calliactis polypus</i>	H5219	02/04/2002	Sodwana Bay	Jesser Point	-27.516733	32.693483	18
<i>Condylanthus magellanicus</i>	7216	?	South Coast	Agulhas Bank	-35.270000	22.450000	155
<i>Condylanthus magellanicus</i>	7379	?	South Coast	Agulhas Bank	-35.180000	23.030000	500
<i>Corynactis annulata</i>	H5712	03/05/1931	West Coast	Krom River	-34.231289	18.378814	1
<i>Corynactis annulata</i>	H5451	09/02/1962	South Coast	Port Elizabeth	-34.250000	25.841667	108
<i>Corynactis annulata</i>	H5707	04/05/1951	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	1
<i>Corynactis annulata</i>	H5306	26/04/1948	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	2
<i>Corynactis annulata</i>	H5546	25/02/1959	False Bay	Rooi Els	-34.251667	18.746667	45
<i>Corynactis annulata</i>	H4957	31/03/2002	Langebaan Lagoon	Schapen Island	-33.088514	18.021292	2
<i>Corynactis annulata</i>	H5119	21/04/2001	Saldanha Bay	Hoedjes Point	-33.033333	17.966667	5
<i>Edwardsia capensis</i>	82	01/01/1936	South Coast	False Bay	-34.250000	18.670000	91
<i>Edwardsia isimangaliso</i>	H5134	01/05/2010	East Coast	Charters Creek	-28.205867	32.464481	1
<i>Edwardsia isimangaliso</i>	H5135	01/02/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5136	01/05/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5137	01/07/2010	East Coast	Charters Creek	-28.205867	32.464481	1
<i>Edwardsia isimangaliso</i>	H5138	01/11/2010	East Coast	Charters Creek	-28.205867	32.464481	1
<i>Edwardsia isimangaliso</i>	H5139	15/03/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5140	24/07/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5141	24/07/2010	East Coast	Charters Creek	-28.205867	32.464481	0

<i>Edwardsia isimangaliso</i>	H5142	24/07/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5143	24/07/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5144	24/07/2010	East Coast	Charters Creek	-28.205867	32.464481	0
<i>Edwardsia isimangaliso</i>	H5151	01/05/2010	East Coast	Charters Creek	-28.205867	32.464481	1
<i>Edwardsia isimangaliso</i>	H5152	01/05/2010	East Coast	Charters Creek	-28.205867	32.464481	1
<i>Gyractis sesere</i>	H5529	29/12/1938	East Coast	Port Edward	-31.060789	30.224819	1
<i>Gyractis sesere</i>	H5329	13/07/1935	East Coast	Isipingo	-29.938244	31.008450	0.5
<i>Gyractis sesere</i>	H5344	13/07/1935	East Coast	Isipingo	-29.938244	31.008450	0.5
<i>Halcampa capensis</i>	4033	01/01/1936	False Bay	False Bay	-34.250000	18.670000	91
<i>Halcampaster teres</i>	H5638	20/07/1937	South Coast	Shelly Beach	-33.015075	27.922017	1
<i>Halcurias capensis</i>	H5208	14/01/2007	West Coast	Kommetjie	-34.133333	18.273333	118
<i>Halcurias capensis</i>	H5273	19/11/1947	South Coast	Agulhas Bank	-35.196653	18.703325	315
<i>Halcurias capensis</i>	H5725	22/02/1965	False Bay	Rooi Els	-34.310000	18.715000	71
<i>Halcurias capensis</i>	H5672	06/04/2007	South Coast	Brownes Bank	-36.543333	20.441667	191
<i>Halcurias capensis</i>	H5274	14/04/2011	South Coast	Brownes Bank	-36.331000	20.998000	147
<i>Halcurias capensis</i>	H5729	06/02/2012	West Coast	Cape Point	-34.961300	18.520283	349
<i>Halcurias capensis</i>	H5730	09/02/2012	South Coast	Cape Agulhas	-36.149283	19.936567	199
<i>Halcurias capensis</i>	4023	01/12/1929	South Coast	Agulhas Bank	-35.446667	20.936667	100
<i>Halcurias capensis</i>	7180	01/12/1929	South Coast	Agulhas Bank	-35.266667	22.445000	155
<i>Halianthella annularis</i>	H5545	29/04/1964	Saldanha Bay	Saldanha Bay	-33.140000	17.918333	79
<i>Halianthella annularis</i>	H5400	04/05/1960	Saldanha Bay	Postberg	-33.080000	17.973333	9
<i>Halianthella annularis</i>	H5701	30/06/1933	West Coast	Kommetjie	-34.137767	18.323042	1
<i>Halianthella annularis</i>	H5541	30/06/1933	West Coast	Kommetjie	-34.137767	18.323042	1
<i>Halianthella annularis</i>	H5266	17/03/1934	West Coast	Oudekraal	-33.986611	18.349094	1
<i>Halianthella annularis</i>	H5584	15/01/2006	West Coast	Moullie Point	-33.899331	18.406125	0.5
<i>Halianthella annularis</i>	H5485	27/01/1953	False Bay	Windmill Beach	-34.201333	18.457119	5
<i>Halianthella annularis</i>	H4954	15/03/2002	False Bay	St James	-34.120544	18.458147	?
<i>Halianthella annularis</i>	H5491	23/05/1953	False Bay	Oatland Point	-34.208203	18.462628	2
<i>Halianthella annularis</i>	H5473	22/02/1952	False Bay	Seal Island	-34.136667	18.588333	24
<i>Halianthella annularis</i>	H5248	16/07/1949	East Coast	Richards Bay	-28.795186	32.080264	1
<i>Haloclava capensis</i>	H5548	02/07/1961	West Coast	Lamberts Bay	-32.133333	17.650000	170

<i>Haloclava capensis</i>	H5386	28/04/1964	Saldanha Bay	North Head	-33.090000	17.886667	71
<i>Haloclava capensis</i>	H5390	28/04/1964	Saldanha Bay	North Head	-33.090000	17.886667	71
<i>Haloclava capensis</i>	H5550	21/09/1960	West Coast	Lamberts Bay	-32.083333	17.933336	128
<i>Haloclava capensis</i>	H5393	28/04/1963	Saldanha Bay	Kreef Bay	-33.126667	17.941667	53
<i>Haloclava capensis</i>	H5382	25/04/1963	Saldanha Bay	Kreef Bay	-33.128333	17.956667	31
<i>Haloclava capensis</i>	H5380	25/04/1962	West Coast	Kreef Bay	-33.121667	17.958333	26
<i>Haloclava capensis</i>	H5610	29/04/1958	Langebaan Lagoon	Schapen Island	-33.088872	18.019875	2
<i>Haloclava capensis</i>	H5685	07/05/1953	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	12.5
<i>Haloclava capensis</i>	H5684	05/05/1951	Langebaan Lagoon	Schapen Island	-33.093872	18.023044	1
<i>Haloclava capensis</i>	H5639	05/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.137739	18.026956	1
<i>Haloclava capensis</i>	H5683	05/05/1955	Langebaan Lagoon	Kraal Bay	-33.137739	18.026956	1
<i>Haloclava capensis</i>	H5687	07/05/1953	Langebaan Lagoon	Langebaan Lagoon	-33.085319	18.028278	1
<i>Haloclava capensis</i>	H5678	02/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.106667	18.031667	1
<i>Haloclava capensis</i>	H5640	02/05/1954	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Haloclava capensis</i>	H5679	03/05/1954	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Haloclava capensis</i>	H5612	18/04/1965	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	2
<i>Haloclava capensis</i>	H5240	01/04/1968	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	1
<i>Haloclava capensis</i>	H5609	01/04/2006	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	0.5
<i>Haloclava capensis</i>	H5655	01/04/2006	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	1
<i>Haloclava capensis</i>	H5517	12/10/1967	False Bay	Seal Island	-34.183333	18.558333	82
<i>Haloclava capensis</i>	H5497	10/09/1953	False Bay	Seal Island	-34.213333	18.608333	46
<i>Haloclava capensis</i>	H5154	25/10/1961	False Bay	Seal Island	-34.266667	18.633333	27
<i>Haloclava capensis</i>	H5516	13/07/1967	False Bay	Pringle Bay	-34.333333	18.675000	82
<i>Haloclava capensis</i>	H5562	22/02/1965	False Bay	Rooi Els	-34.310000	18.715000	71
<i>Haloclava capensis</i>	H5332	16/03/1988	South Coast	Gansbaai	-35.083333	19.408333	158
<i>Haloclava capensis</i>	H5441	22/06/1972	South Coast	Still Bay	-34.381667	21.433333	5
<i>Haloclava capensis</i>	H5477	02/06/1960	South Coast	Alphard Bank	-34.916667	21.433333	91
<i>Haloclava capensis</i>	H5440	21/06/1972	South Coast	Hardy Bank	-34.386667	21.436667	15
<i>Haloclava capensis</i>	H5677	03/06/1960	South Coast	Gouritz Mouth	-34.441667	21.800000	67
<i>Haloclava capensis</i>	H5271	28/12/1962	South Coast	Knysna	-34.066872	23.059281	1
<i>Haloclava capensis</i>	H5404	02/04/1939	South Coast	Storms River	-34.020472	23.903575	0.5

<i>Haloclava capensis</i>	H5403	25/03/1939	South Coast	Richmond	-33.955831	25.624503	1
<i>Haloclava capensis</i>	H5464	11/04/1954	South Coast	Mossel Bay	-34.006667	25.741667	39
<i>Haloclava capensis</i>	H5399	09/01/1939	East Coast	The Haven	-32.241839	28.918217	1
<i>Haloclava capensis</i>	H5611	19/01/1950	East Coast	Umngazi	-31.676353	29.457631	0.5
<i>Heteractis aurora</i>	H5401	08/04/2002	Sodwana Bay	Diepgat	-27.606133	32.663600	12
<i>Heteractis aurora</i>	H5467	06/10/2009	Sodwana Bay	Ribbon Reef	-27.450761	32.822800	22
<i>Heteractis crispa</i>	H5469	05/10/2009	East Coast	Antons Reef	-27.317508	32.838078	15
<i>Heteractis magnifica</i>	H5715	23/07/2008	Sodwana Bay	Sodwana Bay	-27.014147	32.968572	14
<i>Heteractis magnifica</i>	H5714	22/07/2008	Sodwana Bay	Sodwana Bay	-27.322336	33.108744	21
<i>Isanthus capensis</i>	H5528	08/02/1940	West Coast	Hondeklip Bay	-30.312667	17.271500	1
<i>Isanthus capensis</i>	H5543	07/03/1940	West Coast	Groen River	-30.848047	17.576794	1
<i>Isanthus capensis</i>	H5544	03/07/1961	Saldanha Bay	Saldanha Bay	-33.106667	17.748333	157
<i>Isanthus capensis</i>	H5709	27/04/1964	Saldanha Bay	North Head	-33.083333	17.886667	71
<i>Isanthus capensis</i>	H5581	28/04/1959	Saldanha Bay	Saldanha Bay	-33.071667	17.911667	51
<i>Isanthus capensis</i>	H5710	28/04/1963	West Coast	Kreef Bay	-33.126667	17.926667	64
<i>Isanthus capensis</i>	H5576	19/05/1959	Saldanha Bay	Saldanha Bay	-33.091669	17.939992	42
<i>Isanthus capensis</i>	H5580	02/05/1960	Saldanha Bay	Saldanha Bay	-33.108336	17.944986	19
<i>Isanthus capensis</i>	H5387	01/05/1960	Saldanha Bay	Saldanha Bay	-33.073331	17.959997	31
<i>Isanthus capensis</i>	H5463	09/04/1953	Saldanha Bay	Saldanha Bay	-33.041914	17.972594	11
<i>Isanthus capensis</i>	H5570	04/05/1951	Langebaan Lagoon	Schapen Island	-33.088906	18.021117	1
<i>Isanthus capensis</i>	H5688	07/05/1953	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	12.5
<i>Isanthus capensis</i>	H5427	26/04/1948	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	2
<i>Isanthus capensis</i>	H5568	02/05/1951	Langebaan Lagoon	Schapen Island	-33.094003	18.021789	4
<i>Isanthus capensis</i>	H5566	24/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.106667	18.031667	1
<i>Isanthus capensis</i>	H5579	27/04/1948	Langebaan Lagoon	Langebaan Lagoon	-33.106667	18.031669	2
<i>Isanthus capensis</i>	H5723	06/02/1953	West Coast	St Helena Bay	-32.683333	18.050000	27
<i>Isanthus capensis</i>	H5262	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5262	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5262	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5262	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5262	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1

<i>Isanthus capensis</i>	H5262	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5565	12/12/1950	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5578	02/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.121461	18.051825	1
<i>Isanthus capensis</i>	H5680	05/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.142739	18.089578	0.5
<i>Isanthus capensis</i>	H5571	24/04/1949	Langebaan Lagoon	Skrywers Hoek	-33.200606	18.108828	1
<i>Isanthus capensis</i>	H5572	28/04/1949	Langebaan Lagoon	Langebaan Lagoon	-33.200606	18.108828	1
<i>Isanthus capensis</i>	H5569	25/04/1949	Langebaan Lagoon	Skrywers Hoek	-33.200606	18.108828	1
<i>Isanthus capensis</i>	H5567	26/04/1949	Langebaan Lagoon	Skrywers Hoek	-33.200606	18.108828	1
<i>Isanthus capensis</i>	H5518	25/07/1938	West Coast	Lamberts Bay	-32.088153	18.300233	1
<i>Isanthus capensis</i>	H5533	04/03/2006	West Coast	Kommetjie	-34.140714	18.320119	0.5
<i>Isanthus capensis</i>	H5301	18/01/1934	West Coast	Oudekraal	-33.987594	18.348128	1
<i>Isanthus capensis</i>	H5582	15/01/2006	West Coast	Moullie Point	-33.899331	18.406125	0.5
<i>Isanthus capensis</i>	H5583	15/01/2006	West Coast	Moullie Point	-33.899331	18.406125	0.5
<i>Isanthus capensis</i>	H5535	01/05/2007	West Coast	Moullie Point	-33.899089	18.407164	0.5
<i>Isanthus capensis</i>	H4953	16/03/2002	West Coast	Green Point	-33.898950	18.407894	2
<i>Isanthus capensis</i>	H5492	17/02/1953	False Bay	Glencairn	-34.157853	18.435242	7
<i>Isanthus capensis</i>	H5479	12/03/1953	False Bay	Oatland Point	-34.208408	18.461622	5
<i>Isanthus capensis</i>	H5489	10/06/1953	False Bay	Oatland Point	-34.208203	18.462628	6
<i>Isanthus capensis</i>	H5476	05/03/1952	False Bay	Spaniard rock	-34.216667	18.466667	11
<i>Isanthus capensis</i>	H5324	12/10/1967	False Bay	Muizenberg	-34.125000	18.483333	16
<i>Isanthus capensis</i>	H5325	12/10/1967	False Bay	Muizenberg	-34.125000	18.483333	11
<i>Isanthus capensis</i>	H5357	05/03/1952	False Bay	Spaniard rock	-34.216664	18.483336	21
<i>Isanthus capensis</i>	H5507	13/07/1967	False Bay	Muizenberg	-34.116667	18.486667	7
<i>Isanthus capensis</i>	H5509	24/04/1967	False Bay	Seal Island	-34.181667	18.566667	?
<i>Isanthus capensis</i>	H5511	24/04/1967	False Bay	Seal Island	-34.181667	18.566667	?
<i>Isanthus capensis</i>	H5498	22/02/1952	False Bay	Seal Island	-34.136667	18.588333	24
<i>Isanthus capensis</i>	H5514	12/07/1967	False Bay	Millers Point	-34.266667	18.638333	58
<i>Isanthus capensis</i>	H5515	12/07/1967	False Bay	Millers Point	-34.266667	18.638333	58
<i>Isanthus capensis</i>	H5482	25/06/1952	False Bay	Gordons Bay	-34.150064	18.834997	18
<i>Isanthus capensis</i>	4038	?	West Coast	Blouberg	-33.730000	18.430000	0
<i>Isophellia algoaensis</i>	H5551	08/10/1960	West Coast	Cape Point	-34.416667	17.600000	1240

<i>Isophellia algoaensis</i>	H5365	27/04/1959	Saldanha Bay	Salamander Bay	-33.060000	18.006667	15
<i>Isophellia algoaensis</i>	H5213	14/01/2007	West Coast	Slangkop	-34.158333	18.273333	118
<i>Isophellia algoaensis</i>	H5166	19/01/2011	South Coast	Cape Point	-35.138725	18.534158	455
<i>Isophellia algoaensis</i>	H5563	22/02/1965	False Bay	Rooi Els	-34.318333	18.750000	68
<i>Isophellia algoaensis</i>	H5475	29/07/1952	False Bay	Rooi Els	-34.291667	18.820000	22
<i>Isophellia algoaensis</i>	H5173	17/01/2011	South Coast	Pearly Beach	-35.762500	19.540000	244
<i>Isophellia algoaensis</i>	H5674	19/09/2008	South Coast	Brownes Bank	-36.322333	20.986667	154
<i>Isophellia algoaensis</i>	H5355	29/05/1988	South Coast	Agulhas Bank	-36.083333	21.550000	161
<i>Isophellia algoaensis</i>	H5549	28/11/1952	South Coast	Alphard Bank	-34.666667	21.583333	74
<i>Isophellia algoaensis</i>	H5246	08/05/1993	South Coast	Port Alfred	-33.706667	26.951667	65
<i>Isophellia algoaensis</i>	7179	1928	South Coast	Algoa Bay	-33.839989	25.806492	22
<i>Korsaranthus natalensis</i>	H4950	20/05/1974	False Bay	Millers Point	-34.230167	18.475078	26
<i>Korsaranthus natalensis</i>	H4840	08/01/1997	South Coast	Still Bay	-34.383497	21.423547	15
<i>Korsaranthus natalensis</i>	H5433	14/07/1961	South Coast	Port Elizabeth	-33.896667	25.708333	32
<i>Korsaranthus natalensis</i>	H5603	11/03/2008	Algoa Bay	Riy Banks	-33.984947	25.862900	20
<i>Korsaranthus natalensis</i>	H4600	?	East Coast	Durban	-29.852783	31.041842	0
<i>Liponema multiporum</i>	H5281	02/08/1990	West Coast	Hondeklip Bay	-30.241667	14.895000	488
<i>Liponema multiporum</i>	H5378	14/01/1997	West Coast	Hondeklip Bay	-30.133333	15.050000	423
<i>Liponema multiporum</i>	H5395	07/05/1947	West Coast	Cape Columbine	-32.610000	16.733336	391
<i>Liponema multiporum</i>	H5283	25/02/1959	West Coast	Slangkop	-34.150000	18.246667	110
<i>Liponema multiporum</i>	H5180	21/01/2011	West Coast	Cape of Good Hope	-34.708814	18.320494	410
<i>Liponema multiporum</i>	H5196	14/01/2007	West Coast	Cape of Good Hope	-34.830000	18.423333	354
<i>Liponema multiporum</i>	H5376	22/05/1988	South Coast	St Francis Bay	-34.631667	25.255000	450
<i>Liponema multiporum</i>	3978	?	South Coast	Agulhas Bank	-35.180000	23.030000	500
<i>Litophellia octoradiata</i>	4052	?	East Coast	Isipingo	-29.981675	30.968706	0
<i>Metridium senile</i>	H4838	09/1995	West Coast	Table Bay	-33.902189	18.465675	9
<i>Metridium senile</i>	H5187	25/03/2009	South Coast	Alphard Bank	-35.233078	21.498178	115
<i>Metridium senile</i>	H5471	25/03/2009	South Coast	Alphard Bank	-35.233078	21.498178	115
<i>Metridium senile</i>	H5200	06/05/2011	South Coast	Alphard Bank	-35.226000	21.583000	115
<i>Metridium senile</i>	H5195	17/09/2008	South Coast	Alphard Bank	-35.216667	21.616669	116
<i>Metridium senile</i>	H5193	17/09/2008	South Coast	Alphard Bank	-35.216667	21.616669	116

<i>Metridium senile</i>	H5192	25/03/2009	South Coast	Agulhas Bank	-35.237431	21.694756	122
<i>Peachia parasitica</i>	H5202	27/10/2011	West Coast	Table Bay	-33.836397	18.428478	2
<i>Peachia sp.</i>	H5385	29/03/2002	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	1
<i>Phellia aucklandica</i>	H5328	25/07/1934	West Coast	Oudekraal	-33.986842	18.350033	0.5
<i>Phelliactis algoaensis</i>	H5226	09/12/1959	West Coast	Cape Point	-33.833333	16.500000	?
<i>Phelliactis algoaensis</i>	7184	1928	South Coast	Algoa Bay	-33.840022	25.810028	40
<i>Phelliactis capensis</i>	H5232	25/05/1976	East Coast	St Lucia	-28.630000	32.640000	1200
<i>Phelliactis capensis</i>	307	1938	South Coast	Seal Island	-34.180044	18.570031	768
<i>Preactis millardae</i>	H5359	07/10/1973	False Bay	Castle Rock	-34.233333	18.476517	18
<i>Preactis millardae</i>	H5595	23/03/2008	West Coast	Vulcan Rock	-34.066167	18.310450	27
<i>Preactis millardae</i>	H2822	07/10/1976	West Coast	Oudekraal	-33.985939	18.350144	15
<i>Preactis millardae</i>	H5452	26/01/2011	West Coast	South Paw	-33.938467	18.364833	20
<i>Preactis millardae</i>	H5159	13/12/2004	False Bay	Kalk Bay	-34.126847	18.449806	0.5
<i>Preactis millardae</i>	H5429	28/11/1992	West Coast	Cape of Good Hope	-34.368642	18.458383	1
<i>Preactis millardae</i>	H5542	03/12/1972	False Bay	Roman Rock	-34.181100	18.460125	10
<i>Preactis millardae</i>	H3030	10/04/1980	West Coast	Maclears Beach	-34.349469	18.467228	0
<i>Preactis millardae</i>	H1677	04/02/1973	South Coast	Onrust	-34.420856	19.177286	?
<i>Pseudactinia flagellifera</i>	H5422	27/10/1935	West Coast	Port Nolloth	-29.239683	16.852822	1
<i>Pseudactinia flagellifera</i>	H5624	08/02/1940	West Coast	Hondeklip Bay	-30.318708	17.271275	1
<i>Pseudactinia flagellifera</i>	H5616	19/04/1940	West Coast	Zout River	-31.241683	17.844669	1
<i>Pseudactinia flagellifera</i>	H5117	27/04/2001	Langebaan Lagoon	Hoedjes Point	-33.033333	17.966667	2
<i>Pseudactinia flagellifera</i>	H1519	30/04/1961	Langebaan Lagoon	Schapen Island	-33.088742	18.020383	1
<i>Pseudactinia flagellifera</i>	H5575	02/05/1951	Langebaan Lagoon	Schapen Island	-33.088519	18.021028	4
<i>Pseudactinia flagellifera</i>	H5641	05/05/1951	Langebaan Lagoon	Langebaan Lagoon	-33.137739	18.026956	1
<i>Pseudactinia flagellifera</i>	H5392	24/04/1949	Langebaan Lagoon	Skrywers Hoek	-33.200606	18.108828	1
<i>Pseudactinia flagellifera</i>	H5615	27/07/1938	West Coast	Lamberts Bay	-32.113111	18.300367	1
<i>Pseudactinia flagellifera</i>	H1333	25/08/1898	West Coast	Sea Point	-33.913500	18.386881	1
<i>Pseudactinia flagellifera</i>	H1349	25/04/1898	West Coast	Sea Point	-33.909031	18.390100	1
<i>Pseudactinia flagellifera</i>	H4958	16/03/2002	False Bay	Wooleys Pool	-34.132689	18.445706	1
<i>Pseudactinia flagellifera</i>	H5668	22/04/1953	False Bay	Oatland Point	-34.208203	18.462628	2
<i>Pseudactinia flagellifera</i>	H1525	30/05/1961	False Bay	Dalebrook	-34.124589	18.452617	1

<i>Pseudactinia flagellifera</i>	H1336	12/11/1902	False Bay	Seal Island	-34.146000	18.564372	20
<i>Pseudactinia flagellifera</i>	H5361	16/02/1965	False Bay	Seal Island	-34.137556	18.581975	4
<i>Pseudactinia flagellifera</i>	H1335	08/10/1902	False Bay	Rocky Bank	-34.415500	18.591667	45
<i>Pseudactinia flagellifera</i>	H5237	26/02/1964	False Bay	Strandfontein S	-34.091667	18.646675	17
<i>Pseudactinia flagellifera</i>	H5282	16/02/1965	False Bay	Strandfontein S	-34.083333	18.688333	8
<i>Pseudactinia flagellifera</i>	H5428	02/07/1939	South Coast	Hermanus	-34.421686	19.243875	1
<i>Pseudactinia flagellifera</i>	H5430	15/01/1968	South Coast	Arniston	-34.691675	20.236397	1
<i>Pseudactinia flagellifera</i>	H5416	04/01/1932	South Coast	Still Bay	-34.391539	21.429689	1
<i>Pseudactinia flagellifera</i>	H5598	08/03/2008	Algoa Bay	Phluffy Reef	-34.183133	22.162417	15
<i>Pseudactinia flagellifera</i>	H5272	18/01/1956	South Coast	Mossel Bay	-34.079725	22.218331	26
<i>Pseudactinia flagellifera</i>	H5270	15/07/1947	South Coast	Knysna	-34.045539	23.045828	4
<i>Pseudactinia flagellifera</i>	H5270	15/07/1947	South Coast	Knysna	-34.045539	23.045828	4
<i>Pseudactinia flagellifera</i>	H5447	11/02/1962	South Coast	Plettenberg Bay	-34.058333	23.383333	18
<i>Pseudactinia flagellifera</i>	H5500	19/07/2009	South Coast	Jeffreys Bay	-34.034158	24.933578	0.5
<i>Pseudactinia flagellifera</i>	H5658	19/07/2009	South Coast	Jeffreys Bay	-34.034158	24.933578	1
<i>Pseudactinia flagellifera</i>	H5663	19/07/2009	South Coast	Jeffreys Bay	-34.034158	24.933578	0
<i>Pseudactinia flagellifera</i>	H5431	07/07/1936	South Coast	Port Elizabeth	-33.983369	25.671136	1
<i>Pseudactinia flagellifera</i>	H5600	14/03/2008	South Coast	Evans Peak	-33.842919	25.816450	28
<i>Pseudactinia flagellifera</i>	H5245	19/08/1958	South Coast	Port Alfred	-33.616667	26.943333	46
<i>Pseudactinia flagellifera</i>	H5520	06/07/1937	South Coast	East London	-33.045136	27.889442	1
<i>Pseudactinia flagellifera</i>	H5354	05/01/1939	East Coast	Port St. Johns	-31.632211	29.550361	1
<i>Pseudactinia flagellifera</i>	H5606	19/03/2008	East Coast	NE Pinnacles	-30.259983	30.828733	16
<i>Pseudactinia sp.</i>	H5588	11/03/2008	Algoa Bay	Riy Banks	-33.984950	25.862900	20
<i>Pseudactinia sp.</i>	H5599	11/03/2008	Algoa Bay	Riy Banks	-33.984483	25.864017	17
<i>Pseudactinia varia</i>	H5676	25/04/1949	Langebaan Lagoon	Skrywers Hoek	-33.200606	18.108828	1
<i>Pseudactinia varia</i>	H5531	30/03/2006	West Coast	Kommetjie	-34.140714	18.320119	0.5
<i>Pseudactinia varia</i>	H4955	16/03/2002	False Bay	Wooleys Pool	-34.132694	18.445700	1
<i>Pseudactinia varia</i>	H5432	09/03/1950	False Bay	Fish Hoek	-34.141667	18.450000	18
<i>Pseudactinia varia</i>	H5484	26/02/1953	False Bay	Oatland Point	-34.208408	18.461622	1.2
<i>Pseudactinia varia</i>	H5494	12/03/1953	False Bay	Oatland Point	-34.208408	18.461622	5
<i>Pseudactinia varia</i>	H5488	09/03/1953	False Bay	Oatland Point	-34.208203	18.462628	2

<i>Pseudactinia varia</i>	H5493	22/04/1953	False Bay	Oatland Point	-34.208203	18.462628	2
<i>Pseudactinia varia</i>	H5474	05/03/1952	False Bay	Spaniard rock	-34.216667	18.466667	11
<i>Pseudactinia varia</i>	H5487	25/06/1952	False Bay	Gordons Bay	-34.154997	18.835000	18
<i>Pseudactinia varia</i>	H5602	15/01/1968	South Coast	Arniston	-34.691675	20.236397	1
<i>Pseudactinia varia</i>	H5601	15/01/1968	South Coast	Arniston	-34.691675	20.236397	1
<i>Pseudactinia varia</i>	H5251	13/01/1956	South Coast	Mossel Bay	-34.147222	22.122222	12.5
<i>Pseudactinia varia</i>	H5253	16/01/1956	South Coast	Mossel Bay	-34.168886	22.133333	9
<i>Pseudactinia varia</i>	H5644	08/03/2008	Algoa Bay	Phluffy Reef	-34.183133	22.162417	15
<i>Pseudactinia varia</i>	H5305	05/04/1954	South Coast	Port Elizabeth	-33.928333	25.620000	9
<i>Pseudactinia varia</i>	H5496	05/12/1962	South Coast	Port Elizabeth	-33.866667	25.641667	7
<i>Pseudactinia varia</i>	H5652	14/03/2008	South Coast	Bell Buoy	-33.980292	25.692958	15
<i>Pseudactinia varia</i>	H5605	13/03/2008	Algoa Bay	Flat Rocks	-33.999783	25.685383	0
<i>Pseudactinia varia</i>	H5454	10/07/2009	South Coast	Woody Cape	-33.770111	26.447611	0.5
<i>Pseudactinia varia</i>	H5632	21/01/1939	South Coast	Kowie	-33.603786	26.901042	1
<i>Pseudactinia varia</i>	H5327	05/07/1937	South Coast	Shelly Beach	-33.040019	27.907092	1
<i>Sagartia ornata</i>	H5465	02/05/1959	Saldanha Bay	Saldanha Bay	-33.091658	17.925011	56
<i>Sagartia ornata</i>	H5693	03/05/1960	Saldanha Bay	South Head	-33.113333	17.951667	33
<i>Sagartia ornata</i>	H5726	03/05/1960	Saldanha Bay	South Head	-33.113333	17.951667	33
<i>Sagartia ornata</i>	H5537	25/03/2008	West Coast	Kraal Bay	-33.137658	18.027419	0.5
<i>Sagartia ornata</i>	H5646	25/03/2008	Langebaan Lagoon	Langebaan Lagoon	-33.096494	18.028889	0
<i>Sagartia ornata</i>	H5459	12/07/2008	Langebaan Lagoon	Shipwreck	-33.105647	18.032769	0.5
<i>Sagartia ornata</i>	H5470	12/07/2008	Langebaan Lagoon	Shipwreck	-33.105647	18.032769	1
<i>Sagartia ornata</i>	H5585	25/03/2008	Langebaan Lagoon	Oostewaal	-33.124567	18.048867	0.5
<i>Sagartia ornata</i>	H5648	25/03/2008	Langebaan Lagoon	Langebaan Lagoon	-33.124567	18.048867	0.5
<i>Sagartia ornata</i>	H5727	31/03/2002	Langebaan Lagoon	Church Haven	-33.167581	18.058686	1
<i>Sagartia ornata</i>	H5383	01/04/2002	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	1
<i>Sagartia ornata</i>	H5540	01/04/2006	Langebaan Lagoon	Oostewaal	-33.121461	18.051825	0.5
<i>Sagartia ornata</i>	H1579	27/04/1963	Langebaan Lagoon	Skrywers Hoek	-33.200492	18.109739	1
<i>Telmatactis natalensis</i>	88	1936	East Coast	Isipingo	-29.980000	30.970000	0
<i>Urticinopsis crassa</i>	H5175	30/01/2011	West Coast	Strandfontein N	-31.622717	16.387500	358
<i>Urticinopsis crassa</i>	H5172	25/01/2011	West Coast	Cape Columbine	-32.342883	16.512703	420

<i>Urticinopsis crassa</i>	H4599	?	West Coast	Cape of Good Hope	-34.384550	17.685481	1024
<i>Urticinopsis crassa</i>	H5176	21/01/2011	West Coast	Cape of Good Hope	-34.708814	18.320494	410
<i>Urticinopsis crassa</i>	H5168	19/01/2011	South Coast	Cape Point	-35.138725	18.534158	455

Appendix E – Photographic credits

Table 5.3: Photographic credits listing all photographers that contributed towards the images printed in this thesis. Where no acknowledgement is listed, images were photographed by the author.

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Atkinson, Lara Dr.	Plate 1 Figs B&C, Plate 5 Fig. G, Plate 6 Fig. C, Plate 20 Fig. F
Clark, Barry Dr.	Plate 2 Fig. I
Daly, MaryMegan Ass. Prof.	Figs 2.2 C&D
Griffiths, Charles Prof.	Fig. 1.2 C, Fig. 2.5 C, Plate 1 Fig. F, Plate 3 Fig. B, Plate 4 Fig. B, Plate 7 Fig. D, Plate 9 Figs B&D, Plate 10 Figs F&H, Plate 12 Fig. C, Plate 14 Fig. G, Plate 21 Fig. B
Fautin, Daphne	Plate 17 Fig. E
Johnson, Adriaan	Plate 1 Fig. J
Jones, Georgina	Fig. 1.3 C
Lange, Louise Dr.	Plate 8 Fig. E
Leslie, Rob	Plate 1 Fig. I, Plate 6 Fig. E, Plate 8 Fig. C, Plate 20 Fig. D
Melidonis, Matthew	Plate 1 Figs E&H, Plate 3 Fig. G, Plate 4 Fig. D, Plate 5 Figs B&H, Plate 6 Figs B, H&I, Plate 7 Figs B&G, Plate 8 Figs B&F, Plate 10 Figs C&I, Plate 11 Figs C, F&I, Plate 12 Fig. B, Plate 13 Figs B, E, H&I, Plate 14 Fig. H, Plate 15 Fig. C, Plate 16 Figs B, C&I, Plate 17 Fig. G, Plate 19 Fig. E, Plate 21 Figs G&I
Perissinotto, Renzo Prof.	Fig. 1.3 B, Figs 2.2 A&B, Plate 2 Figs E&F
Picton, Bernard Dr.	Fig. 1.2 A, Fig. 1.3 A, Fig. 2.5 B, Plate 2 Fig. C, Plate 3 Figs E&F, Plate 4 Fig. C, Plate 6 Fig. G, Plate 10 Figs B&E, Plate 11 Figs E&H, Plate 12 Figs F&I, Plate 14 Fig. D, Plate 15 Fig. H
Rodríguez, Estefanía Dr.	Fig. 1.4 A-D, Fig. 1.6 A-F, Fig. 2.5 A
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Tunley, Karen	Plate 18 Fig. H, Plate 22 Fig. B
Van Jaarsveld, Christo	Plate 16 Fig. F, Plate 19 Fig. B
Velasquez, Claudio	Plate 12 Fig. E
Zsilavec, Guido	Plate 2 Fig. H, Plate 3 Figs I&J

PLATE 1

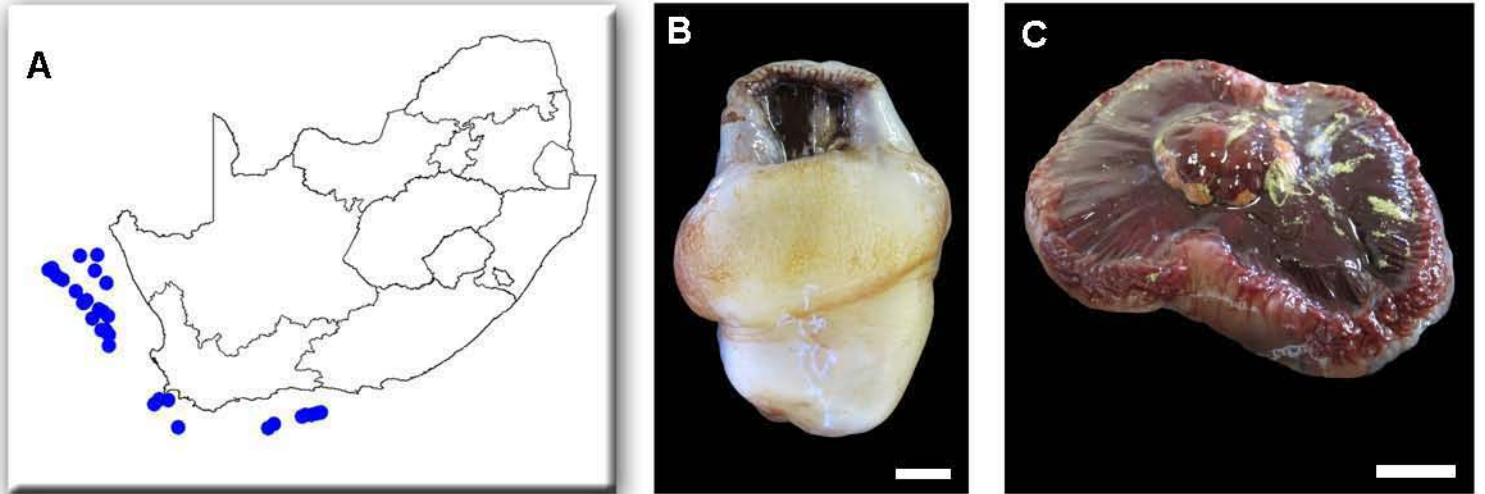


Fig. A. Distribution record of *Actinoscyphia plebeia* (p. 70). B. Preserved contracted specimen (scale 40 mm). C. Live relaxed specimen with maroon oral disc and tentacles (scale 20 mm).

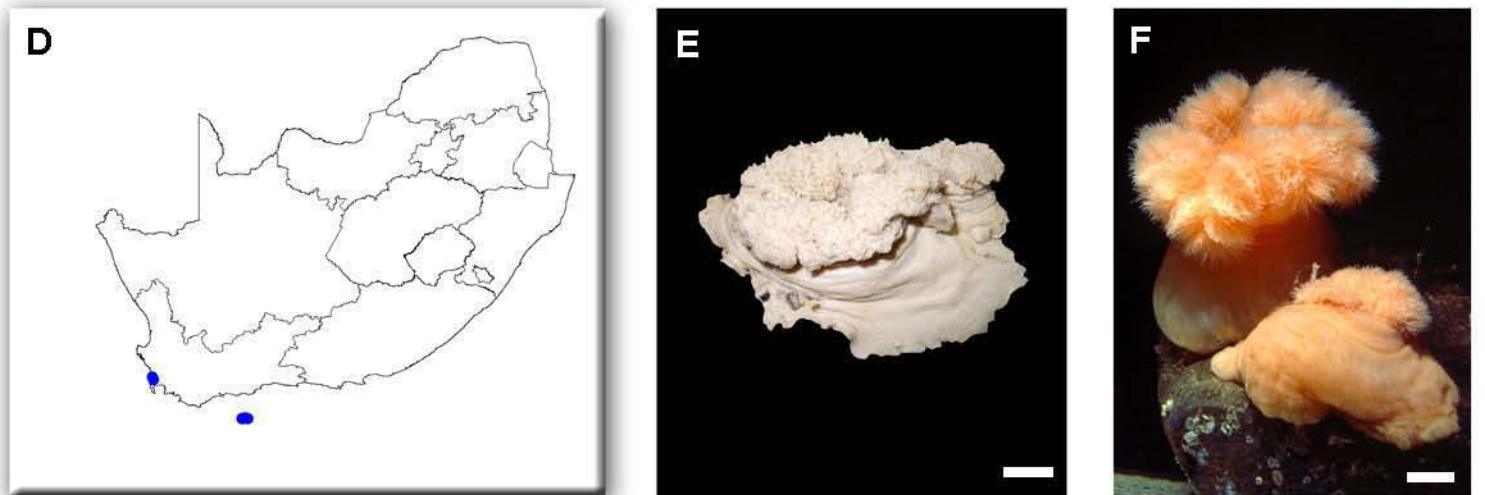


Fig. D. Distribution record of *Metridium senile* (p. 72). E. Preserved specimen (scale 20 mm). F. Live specimens with fluffy tentacles (scale 30 mm).

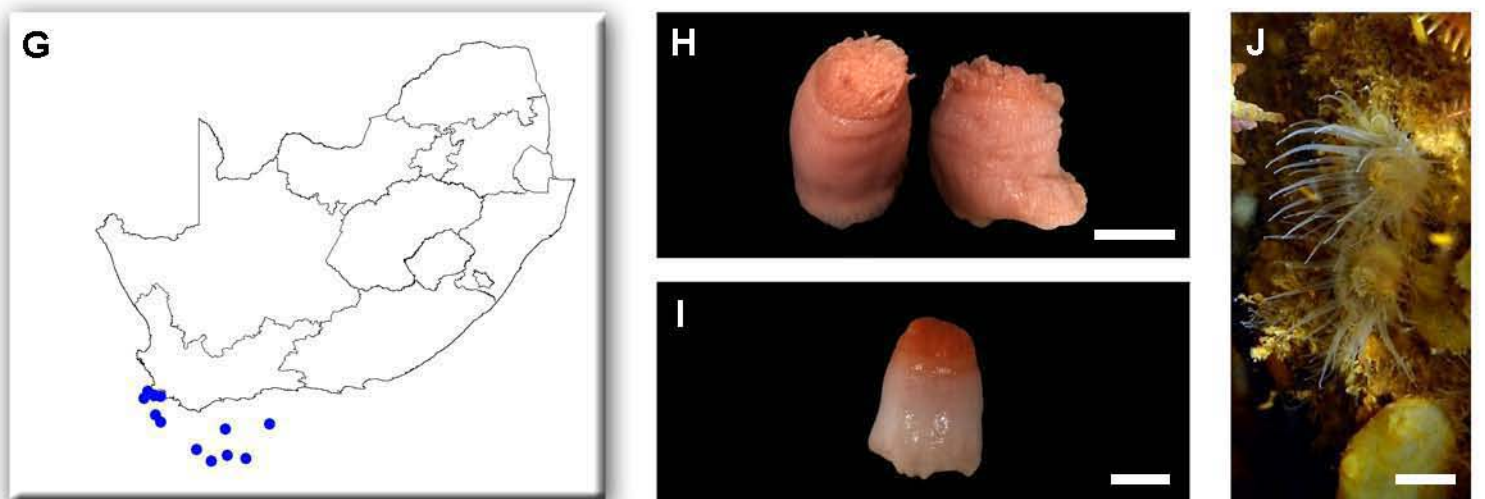


Fig. G. Distribution record of *Halcurias capensis* (p. 75). H. Preserved specimens (scale 15 mm). I. Live specimen collected by trawl. J. Expanded specimens photographed while SCUBA diving (scales 20 mm).

PLATE 2

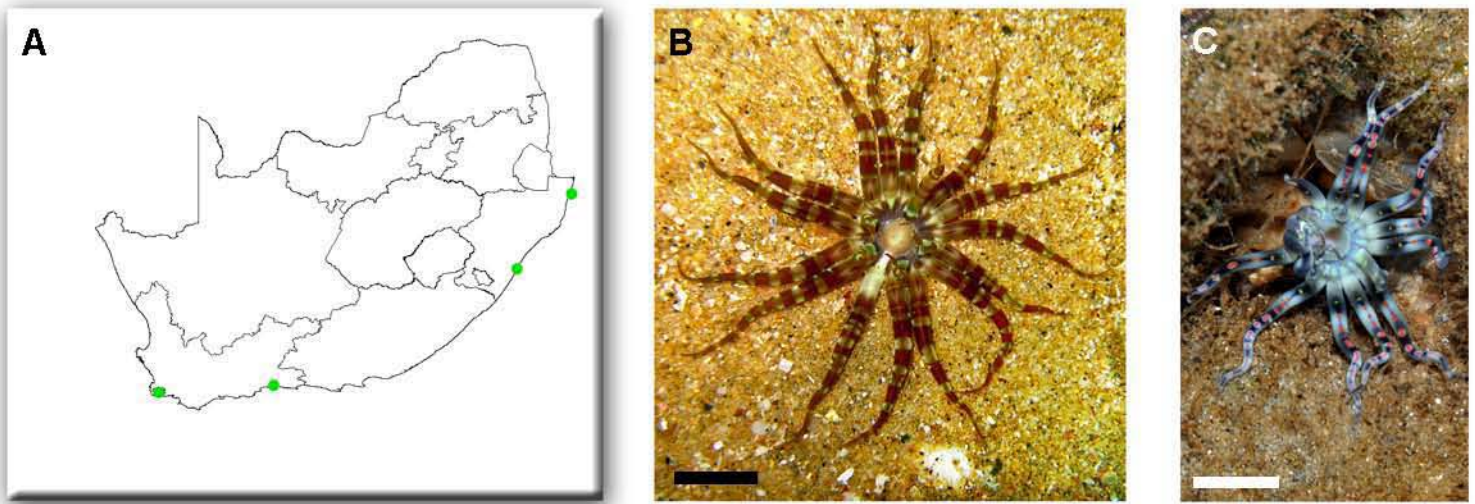


Fig. A. Distribution record of *Edwarsia capensis* (p. 77). B, C. Colour variations of live specimens (scales 20 mm) from Sodwana Bay and Durban respectively.

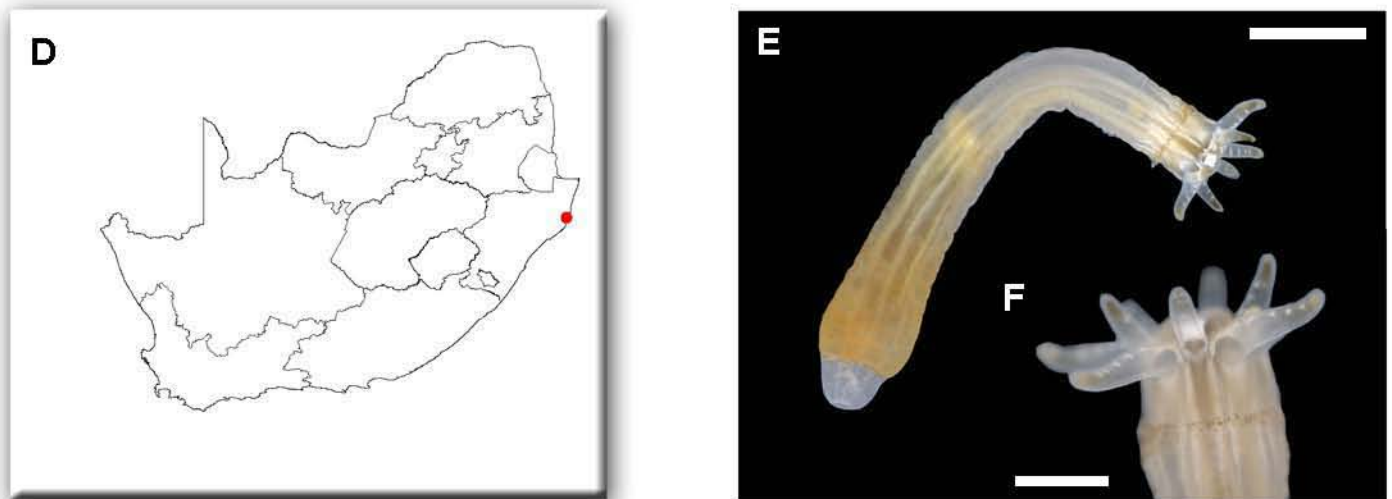


Fig. D. Distribution record of *Edwarsia isimangaliso* (p.79). E. Live specimen showing physa and column with scapus and scapulus (scale 2 mm). F. Live specimen showing tentacles (scale 1 mm).

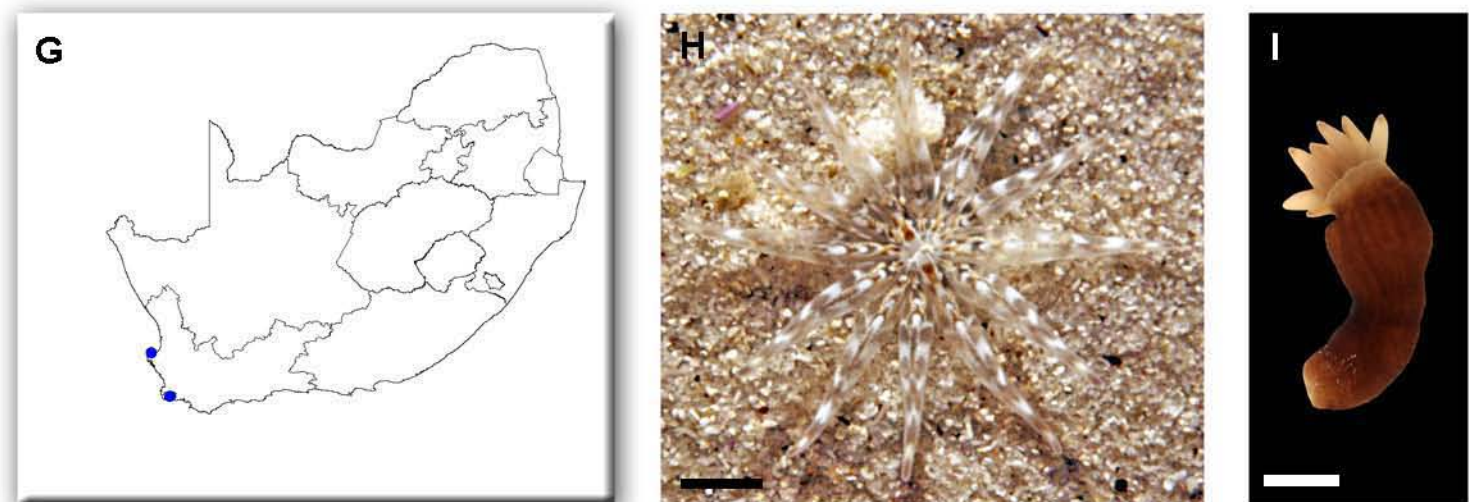


Fig. G. Distribution record of *Halcampa capensis* (p. 81). H, I. Live specimens found in sand (scales 10 mm).

PLATE 3

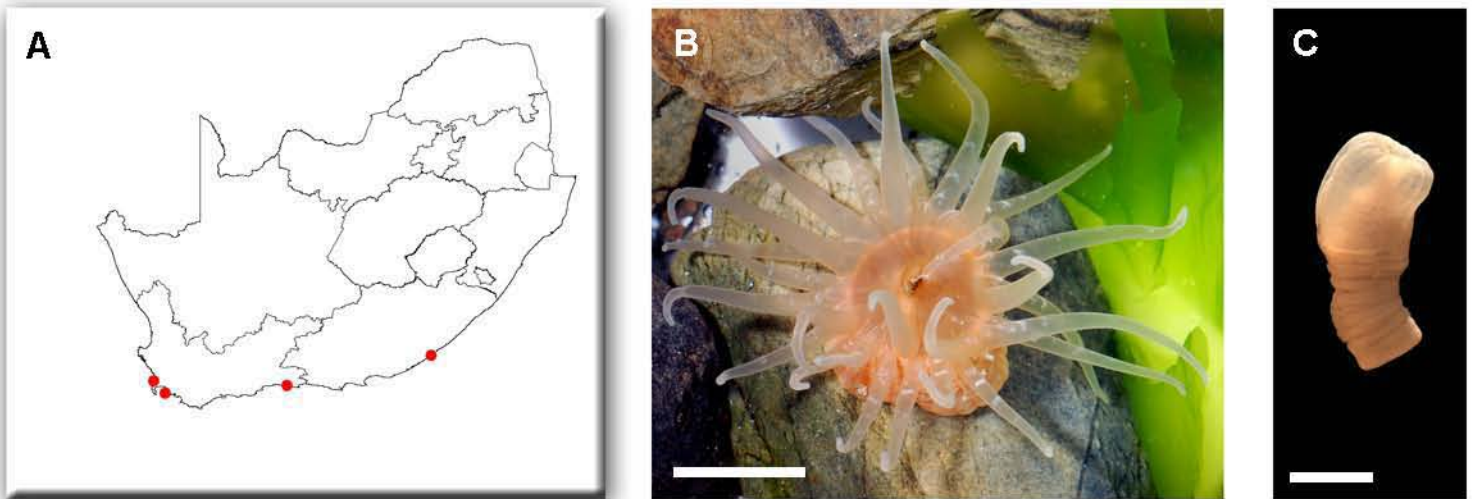


Fig. A. Distribution record of *Halcampaster teres* (p. 82). B. Live specimen (scale 10 mm). C. Preserved specimen (scale 2 mm).

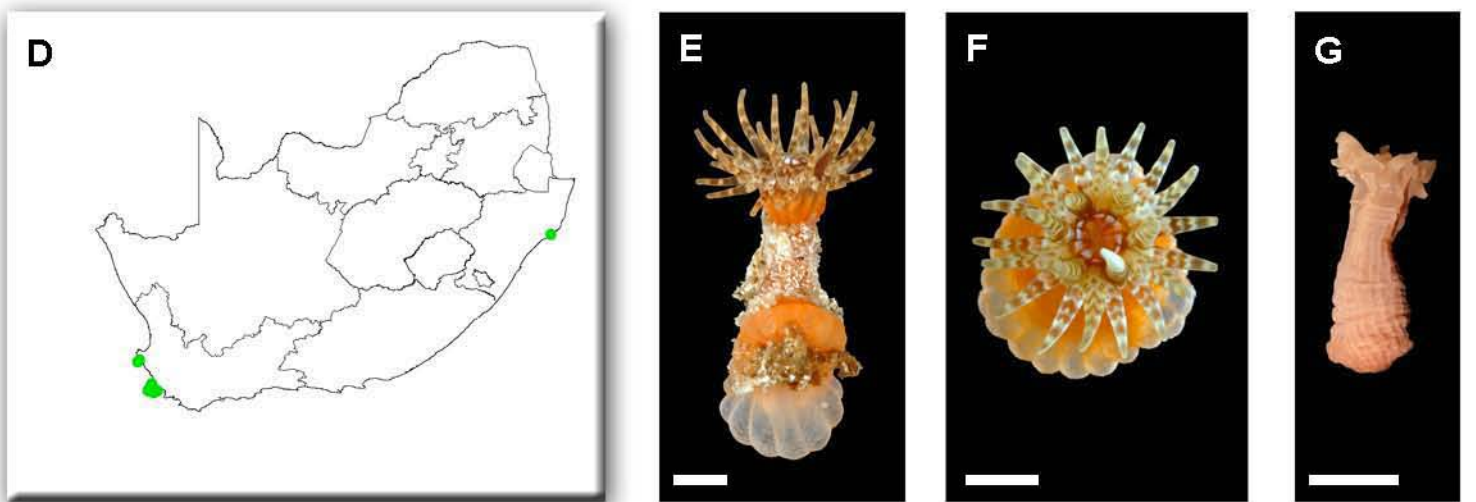


Fig. D. Distribution record of *Halianthella annularis* (p. 84). E, F. Live specimen from False Bay. G. Preserved specimen collected at Oudekraal (scales 10 mm).

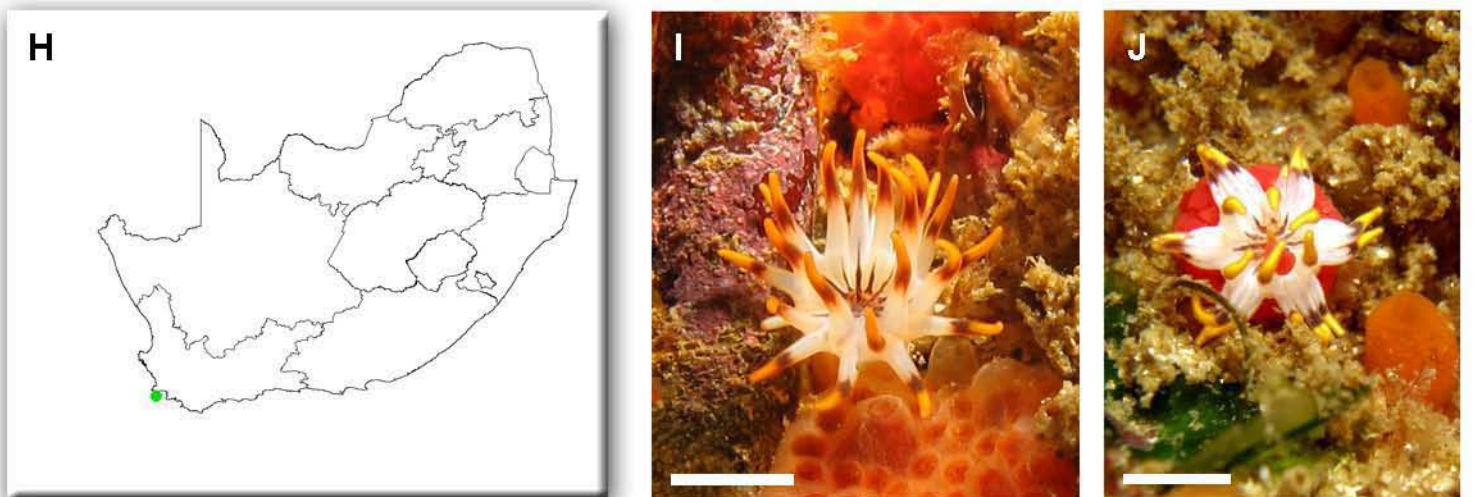


Fig. H. Distribution record of *Halianthella* n. sp. (p. 85). I, J. Live specimens are difficult to spot due to their small size (scales 3 mm).

PLATE 4

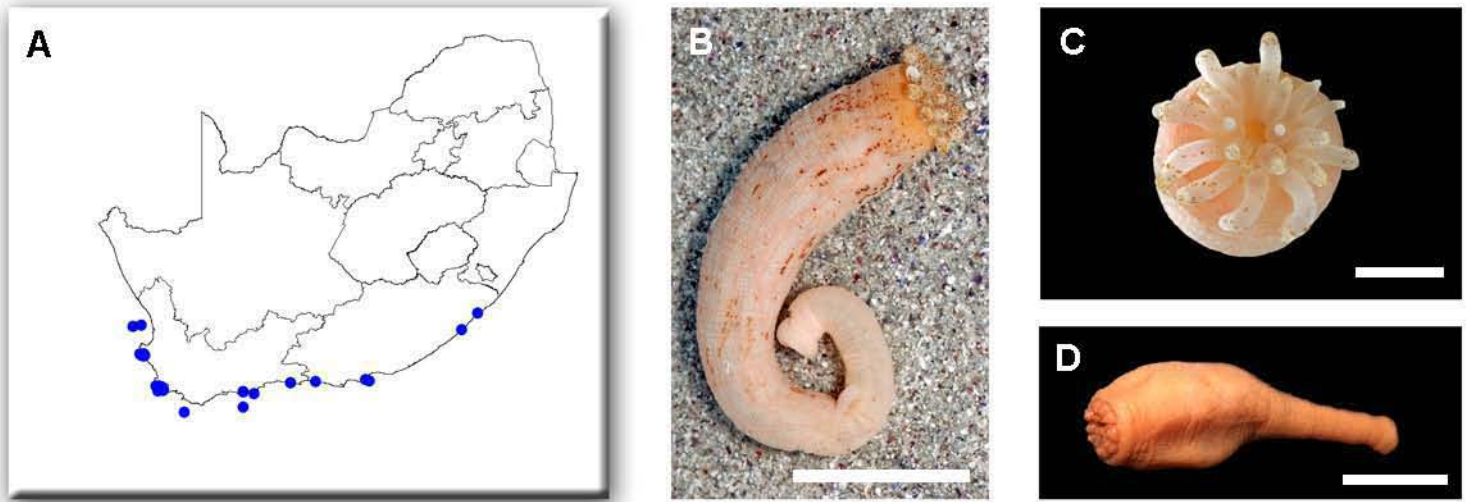


Fig. A. Distribution record of *Haloclava capensis* (p. 87). B, C. Live specimens showing short, pale tentacles flecked with brown dots. D. Preserved specimen (scales 10 mm).

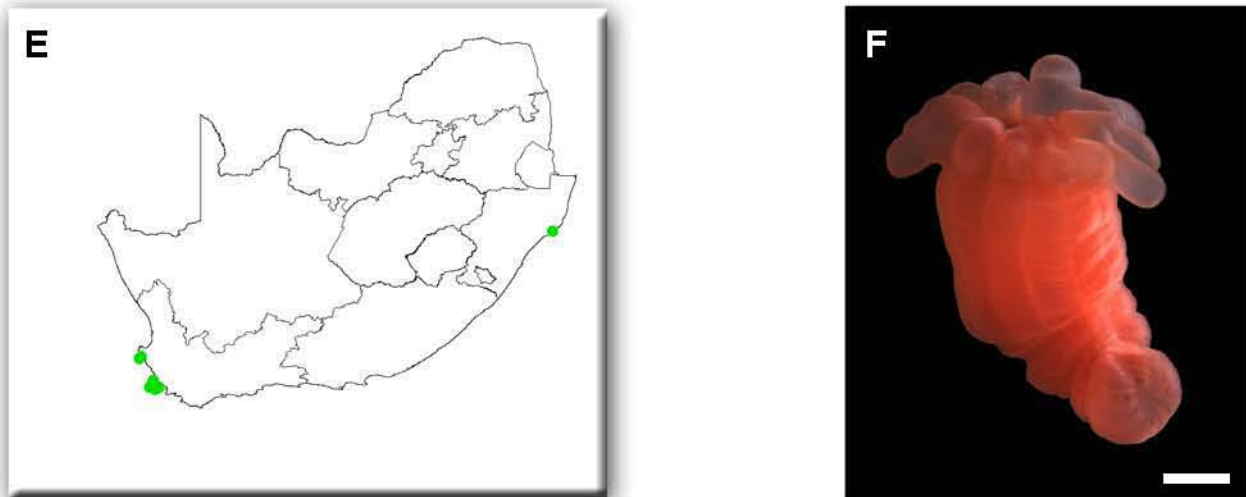


Fig. E. Distribution record of *Peachia parasitica* (p. 89). F. Live specimen (scale 2 mm).

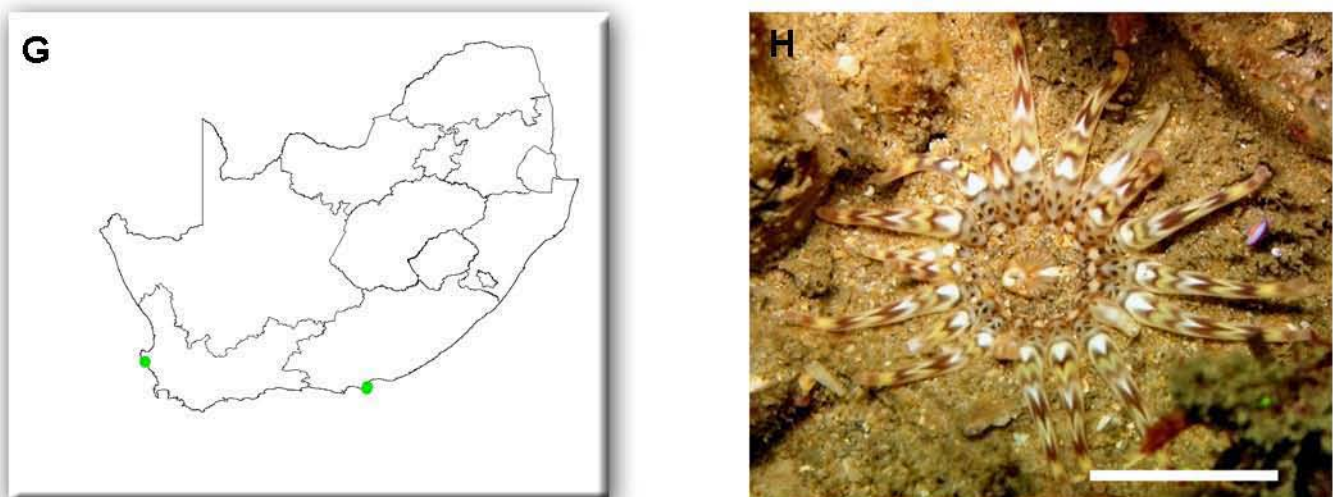


Fig. G. Distribution record of *Peachia* sp. (p. 90). H. Live specimen (scale 20 mm).

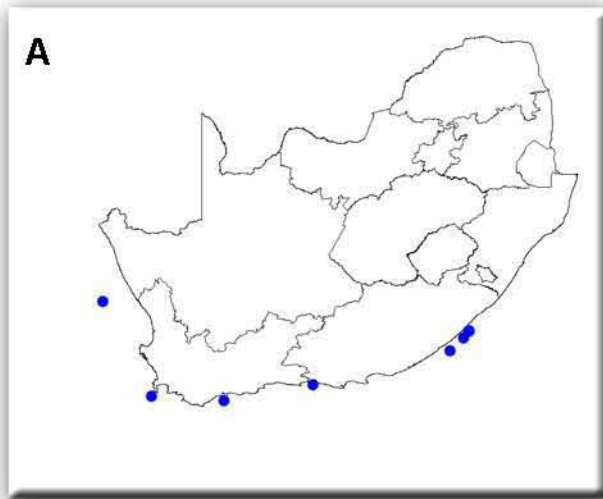


Fig. A. Distribution record of *Acontiphorum mortenseni* (p. 92). B. Preserved specimens (scale 10 mm).

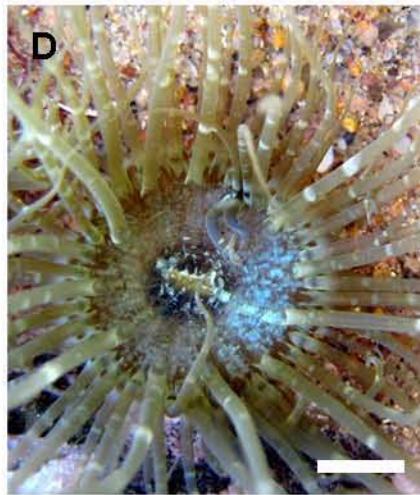
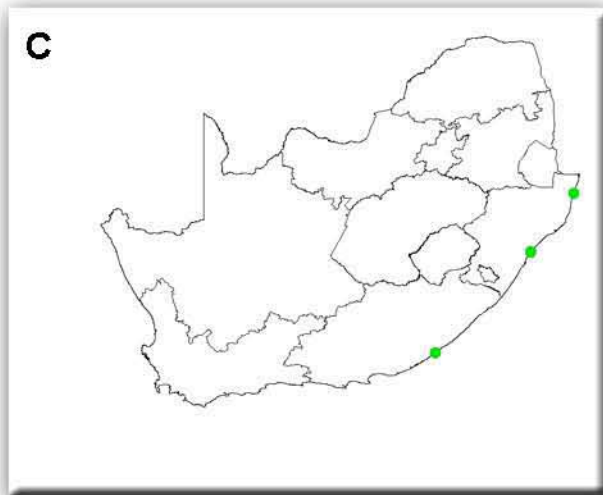


Fig. C. Distribution record of *Aiptasia parva* (p. 93). D, E. Live specimens with long, slender tentacles photographed in a tidal pool on the east coast (scales 10 mm).

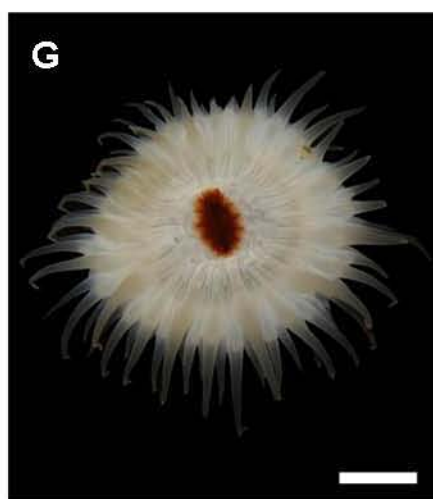
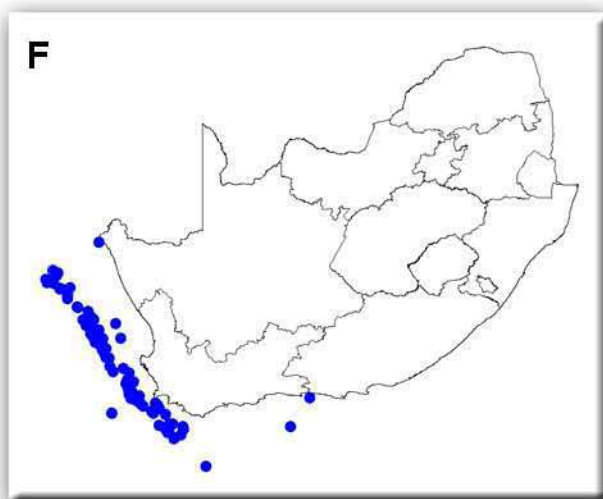


Fig. F. Distribution record of *Actinauge granulata* (p. 95). G. Live specimen with translucent tentacles, a white oral disc and a deep-brown mouth. H. Preserved specimen (scales 50 mm).

PLATE 6

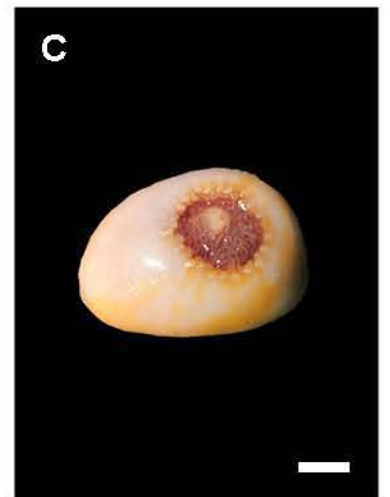
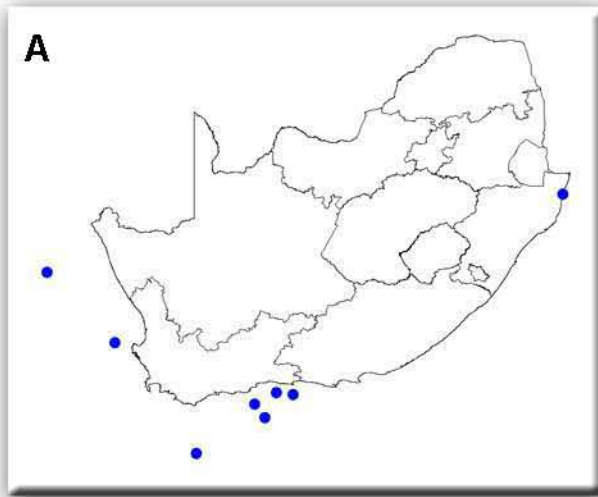


Fig. A. Distribution record of *Amphianthus capensis* (p. 97). B Preserved specimens. C. Live specimen (scale 10 mm).

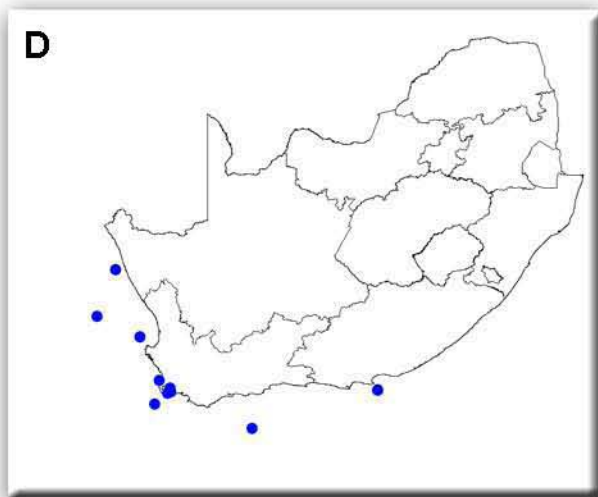


Fig. D. Distribution record of *Amphianthus laevis* (p. 98). E. Preserved specimens (scale 15 mm).

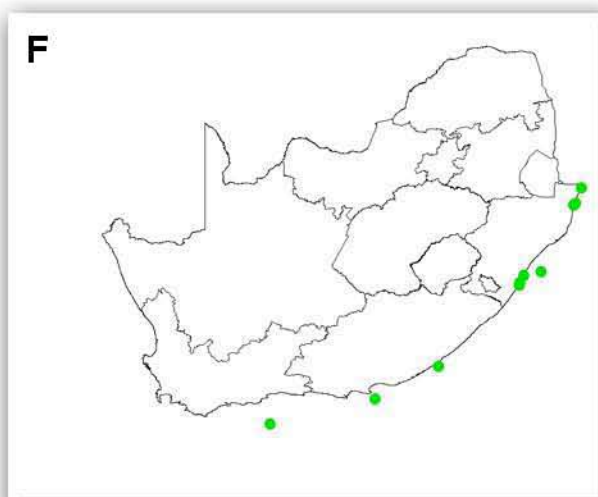


Fig. F. Distribution record of *Amphianthus natalensis* (p. 99). G, H. Colour variations of live specimens. I. Preserved specimens (scales 10 mm).

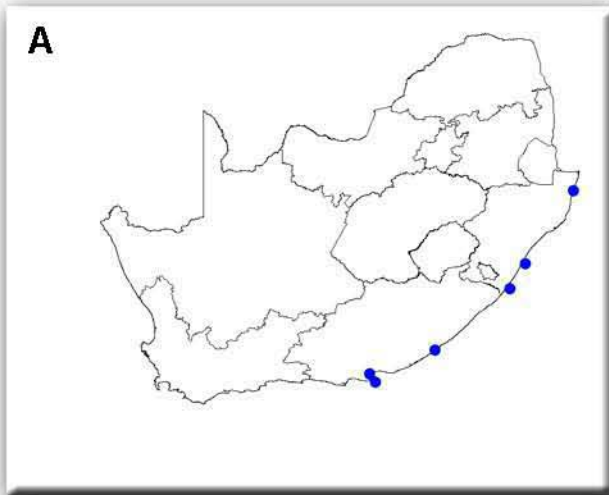


Fig. A. Distribution record of *Calliactis algoaensis* (p. 101). B. Preserved specimen (scale 25 mm).

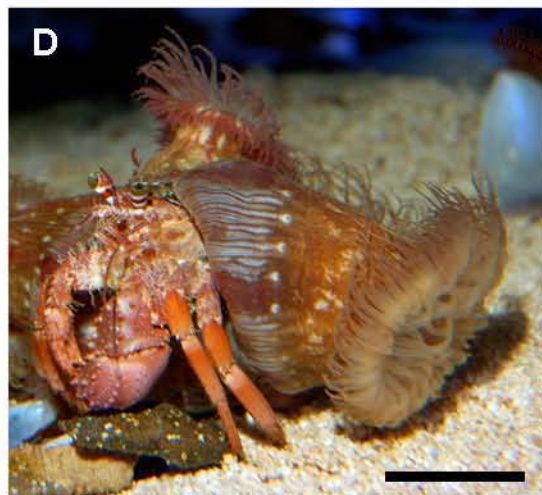
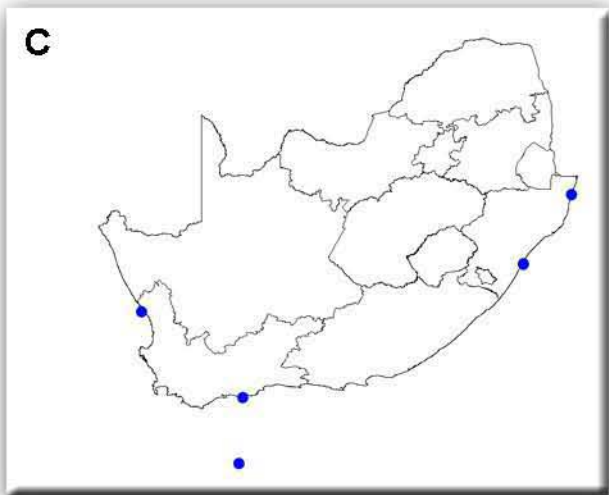


Fig. C. Distribution record of *Calliactis polyopus* (p. 102). D. Live specimens commensal with hermit crab. E. Preserved specimen (scales 30 mm).

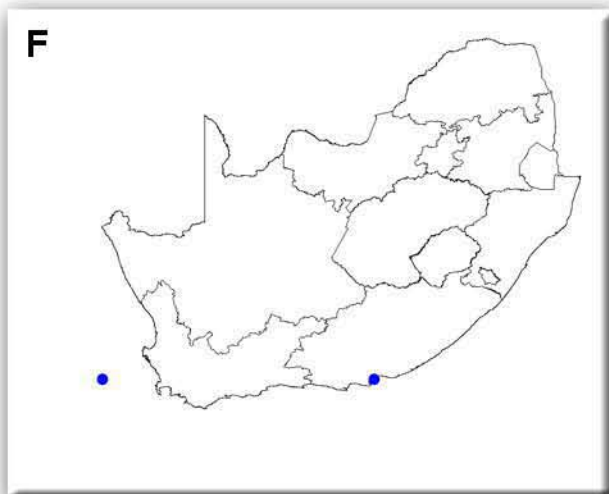


Fig. F. Distribution record of *Phelliactis algoaensis* (p. 105). G. Preserved specimen (scale 20 mm).

PLATE 8

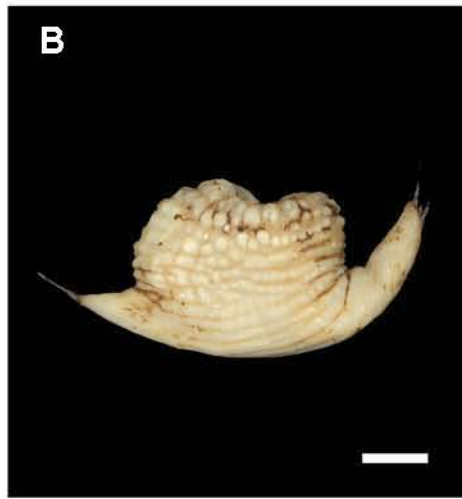
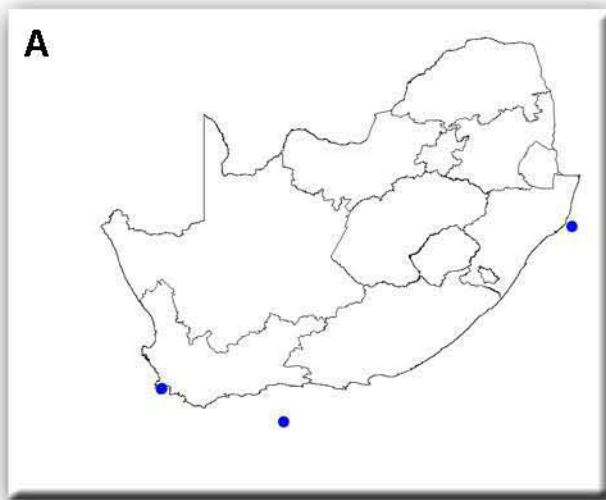


Fig. A. Distribution record of *Phelliactis capensis* (p. 106). B. Preserved specimen (scale 20 mm). C. Live specimen (scale 40 mm).

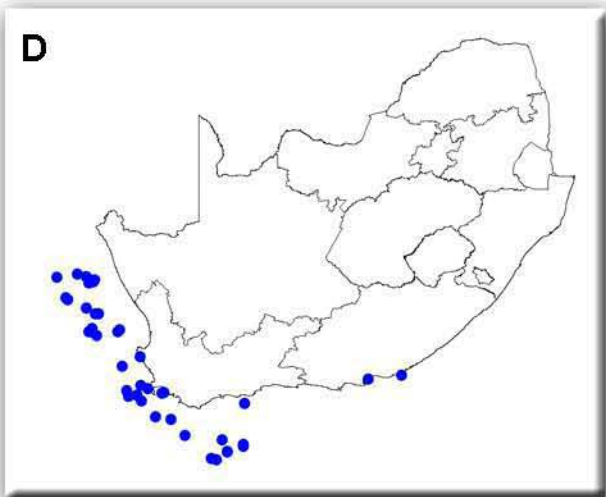


Fig. D. Distribution record of *Isophellia algoaensis* (p. 108). E. Live specimens with translucent column through which mesenterial insertions can be seen (scale 20 mm). F. Preserved specimen (scale 10 mm).

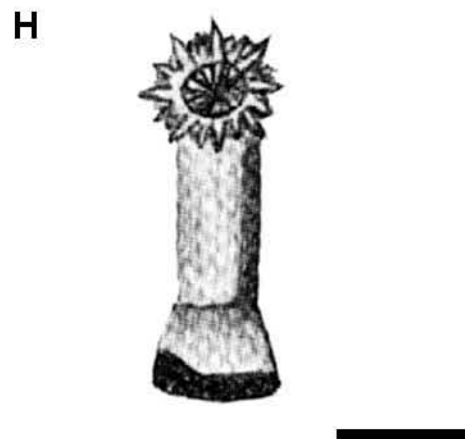
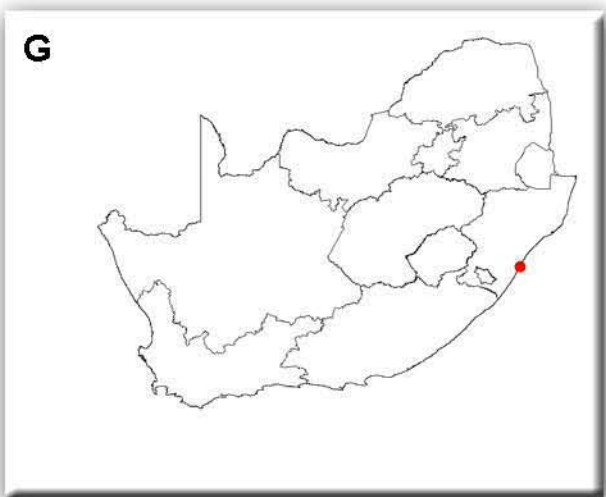


Fig. G. Distribution record of *Litophellia octoradiata* (p. 109). H. As figured by Carlgren (1938) (scale 3 mm).

PLATE 9

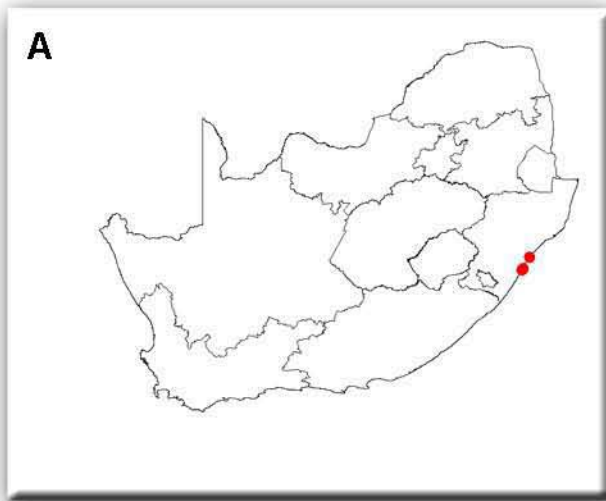


Fig. A. Distribution record of *Telmatactis natalensis* (p. 111). B. Live specimen photographed in Isipingo, Durban (scale 30 mm).

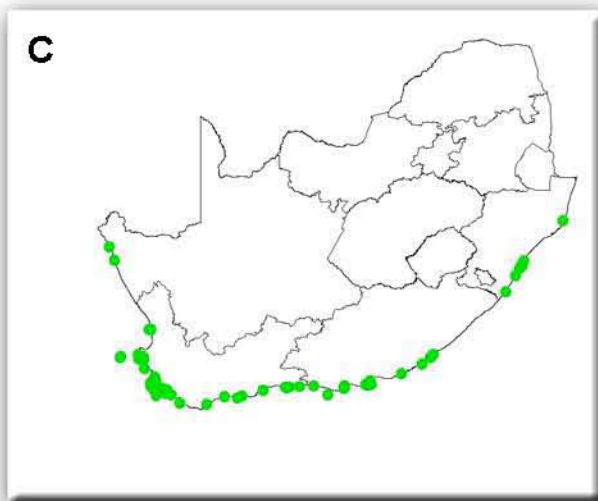


Fig. C. Distribution record of *Anthothoe stimpsonii* (p. 113). D-H. Colour variations of live specimens. The larger orange and white specimens more commonly found on the South Coast (scales 10 mm).

PLATE 10

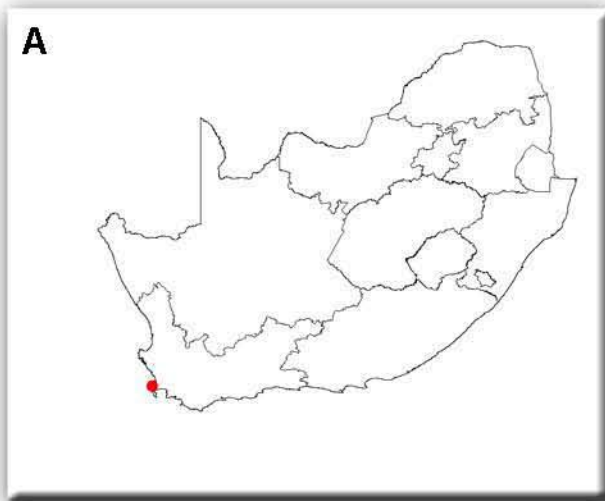


Fig. A. Distribution record of *Phellia aucklandica* (p. 115). B. Live specimen with adhesive tenaculi visible. C. Preserved specimen (scales 10 mm).

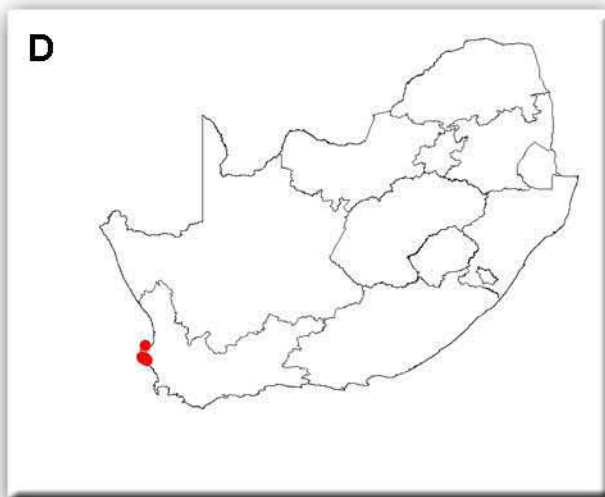


Fig. D. Distribution record of *Sagartia ornata* (p. 117). E. Live specimen from Langebaan Lagoon. F. Preserved specimen with juveniles visible through translucent column (scales 10 mm).

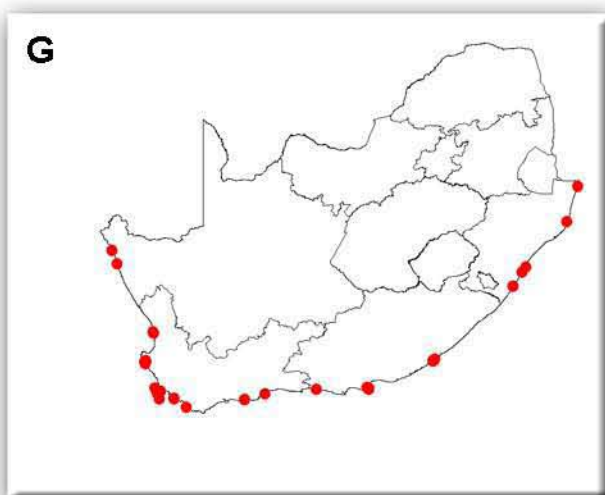


Fig. G. Distribution record of *Actinia ebhayiensis* (p. 119). G. Live specimen attached to a boulder on the high shore. I. Preserved specimen (scales 5 mm).

PLATE 11

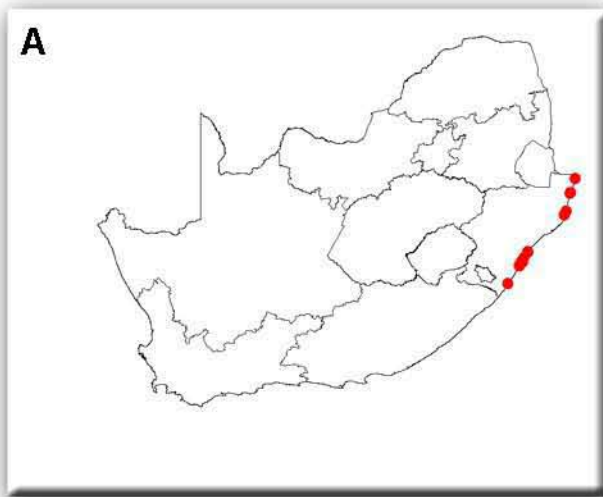


Fig. A. Distribution record of *Anemonia natalensis* (p. 121). B. Live specimen. C. Preserved specimen (scales 10 mm).

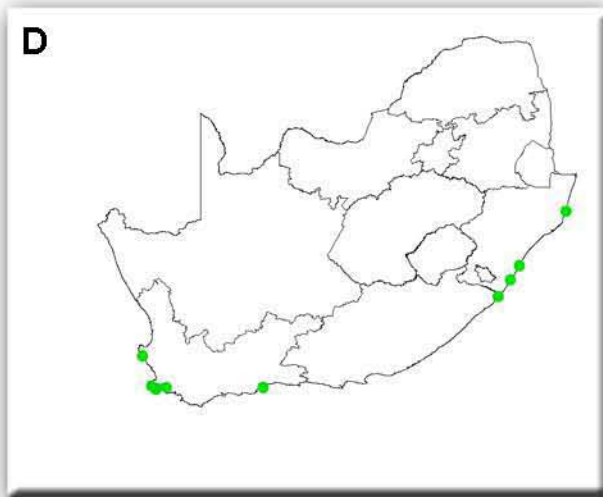


Fig. D. Distribution record of *Anthopleura annea* (p. 123). E. Live specimen. F. Preserved specimen with longitudinal rows of verrucae visible (scales 15 mm).

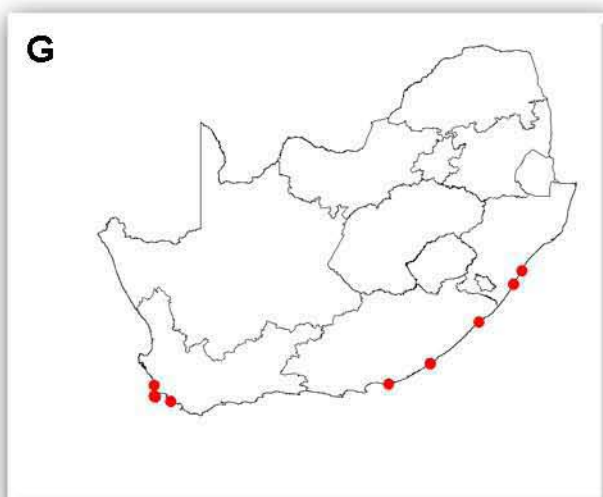


Fig. G. Distribution record of *Anthopleura insignis* (p. 124). H. Live specimen with sand grains adhering to column. I. Preserved contracted specimen (scales 15 mm).

PLATE 12

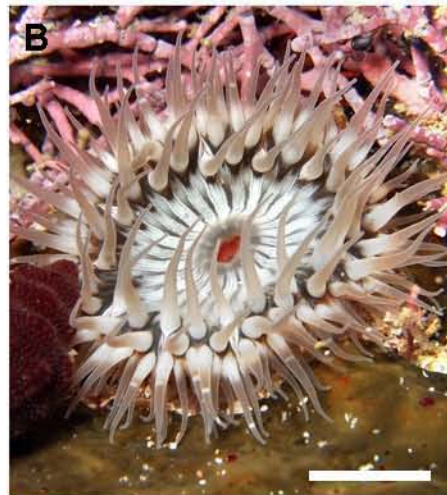
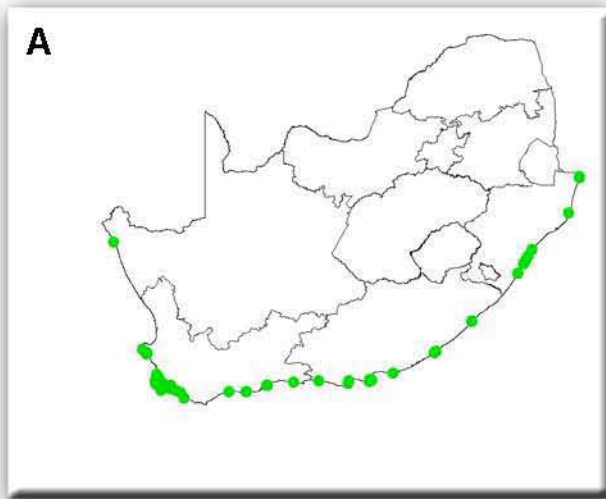


Fig. A. Distribution record of *Anthopleura michaelsoni* (p. 125). B, C. Live specimens (scales 20 mm).

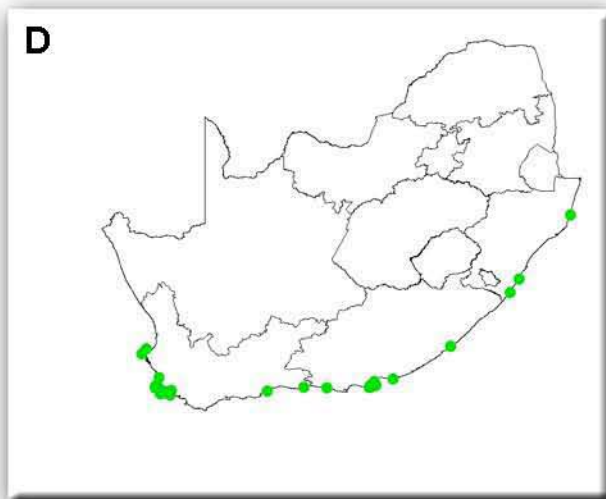


Fig. D. Distribution record of *Anthostella stephensoni* (p. 127). E, F. Live specimens with large purple acrorhagi and longitudinally arranged dots on column (scales 25 mm).

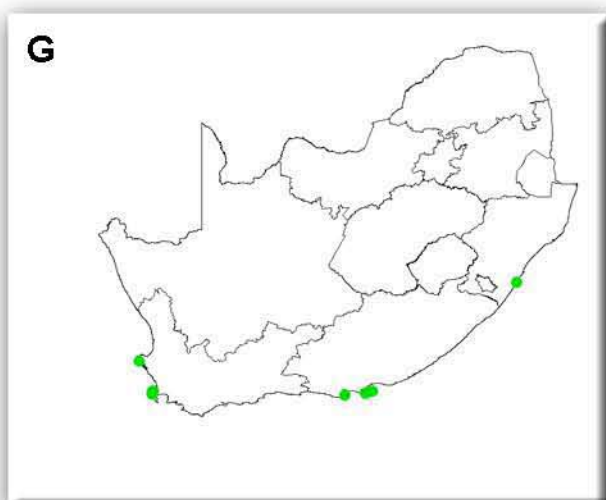


Fig. G. Distribution record of *Anthostella* n. sp. (p. 128). H, I. Live specimens smaller than those of *Anthostella stephensoni*. Photographed on rocky reef walls (scales 10 mm).

PLATE 13

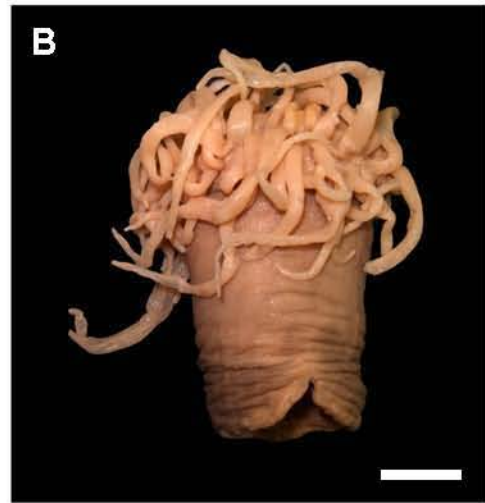
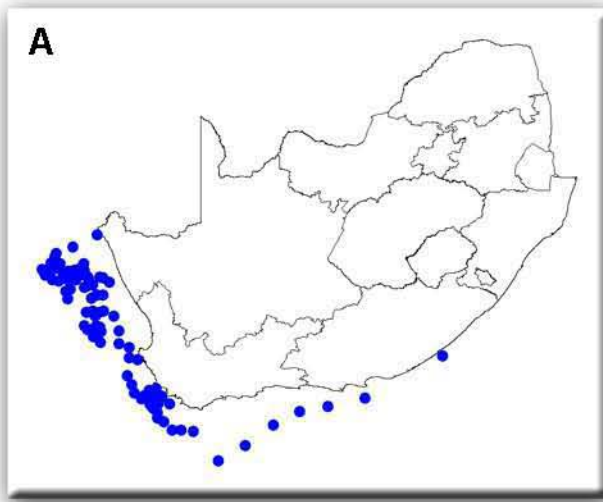


Fig. A. Distribution record of *Bolocera kerguelensis* (p. 130). B. Preserved specimen (scale 15 mm).

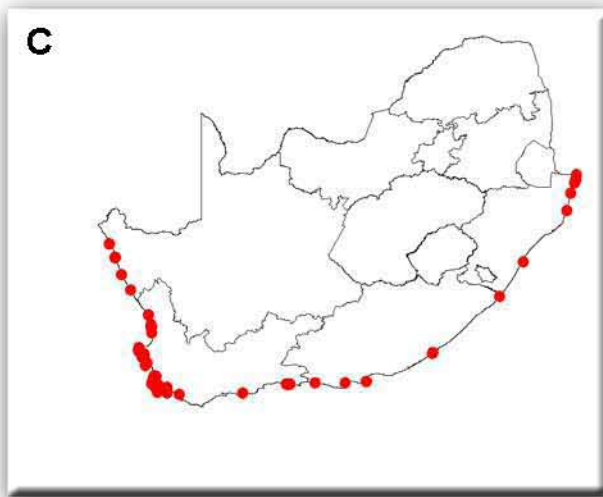


Fig. C. Distribution record of *Bunodactis reynaudi* (p. 132). D. Live specimen with mossy texture to column. E. Preserved specimen with veruciae clearly visible (scales 20 mm).

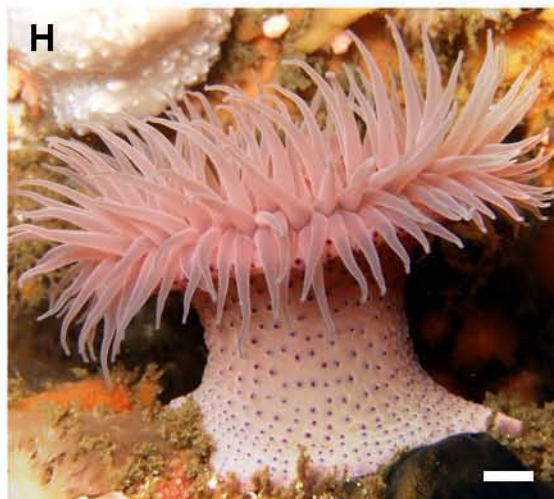
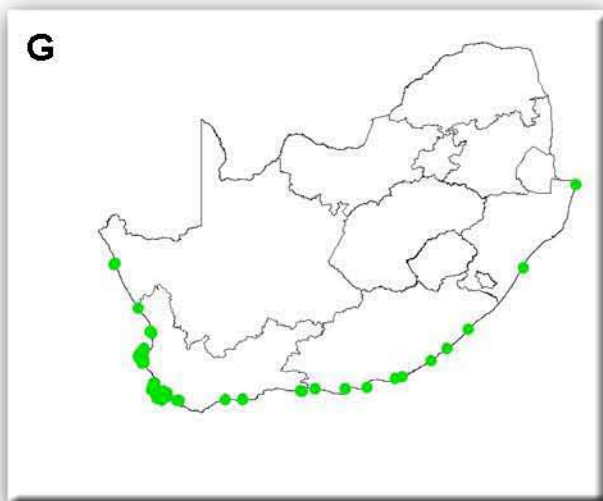


Fig. G. Distribution record of *Bunodosoma capense* (p. 134). H. Live specimen with non-adhesive vesicles visible as dark spots on column. I. Preserved specimen (scales 10 mm).

PLATE 14

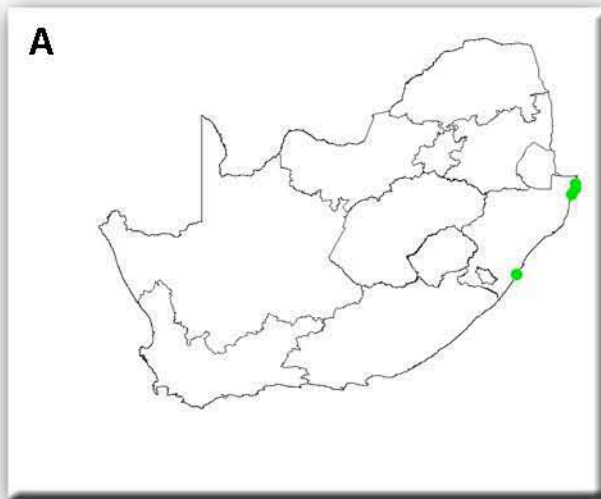


Fig. A. Distribution record of *Entacmaea quadricolor* (p. 136). B. Live specimen with commensal anemone fish (scale 40 mm).

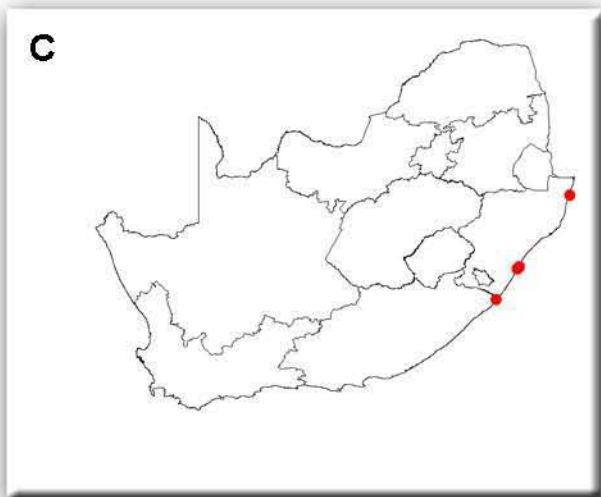


Fig. C. Distribution record of *Gyractis sesere* (p. 138). D. Live specimen photographed amongst zoanthids in the intertidal zone (scale 10 mm).

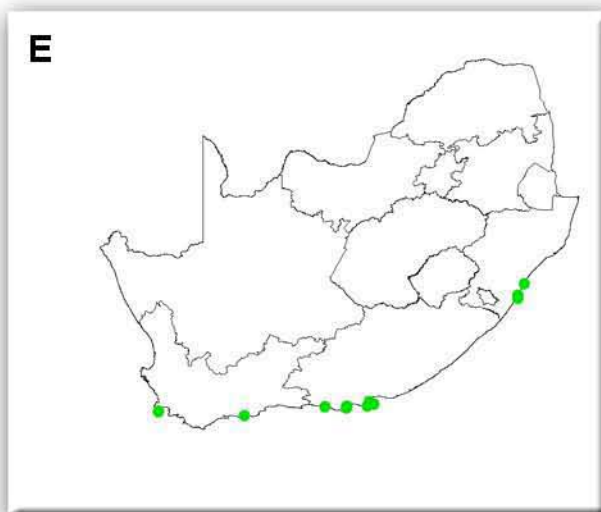


Fig. G. Distribution record of *Korsaranthus natalensis* (p. 140). F-H. Live specimens with longitudinally striped columns (scales 10 mm).

PLATE 15

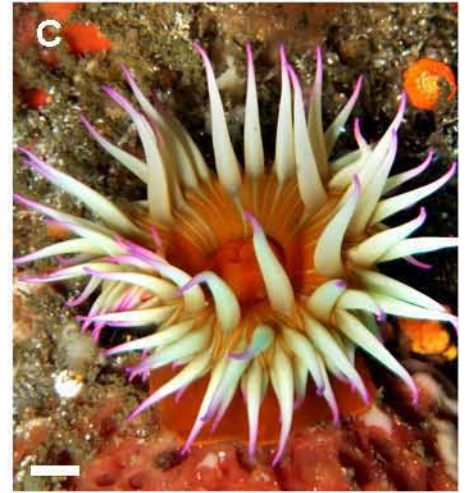
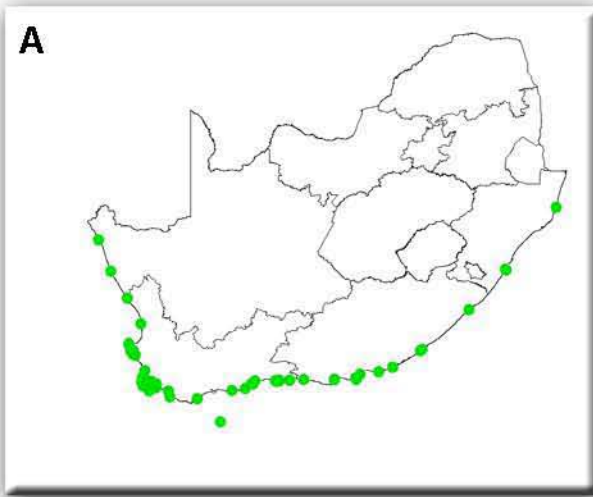


Fig. A. Distribution record of *Pseudactinia flagellifera* (p. 142). B. Live specimen with hyperstome extended (scale 30 mm). C. Live specimen with common orange colouration (scale 20 mm).

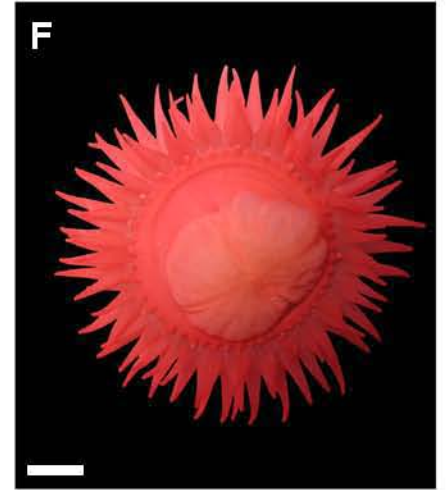
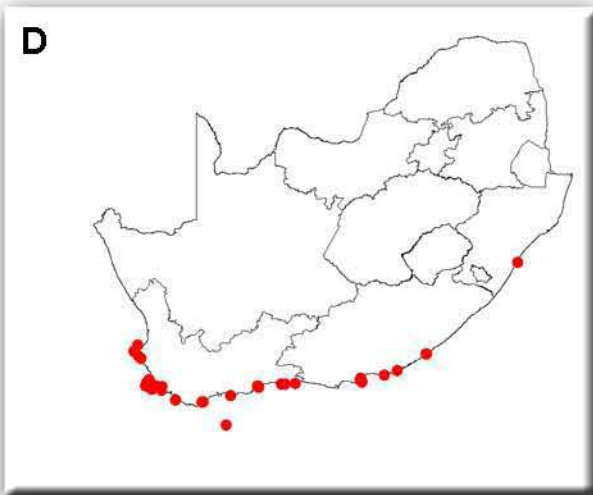


Fig. D. Distribution record of *Pseudactinia varia* (p. 144). E. Live specimens of different colour variations. F. Live specimen with pedal disc and vesicles visible (scales 10 mm).

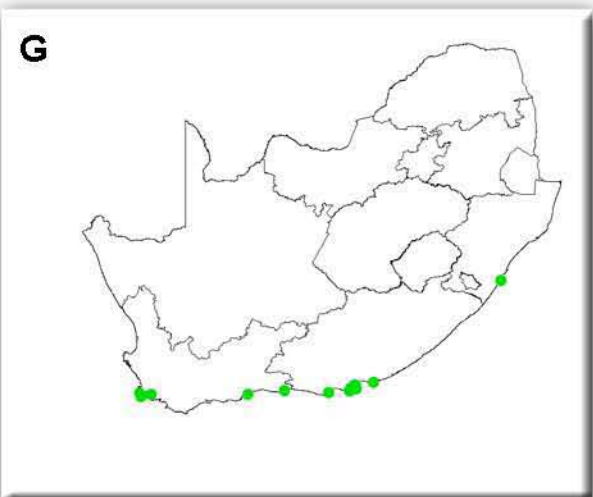


Fig. G. Distribution record of *Pseudactinia* sp. (p. 145). H. Live specimen with mottled column (scale 10 mm). I. Orange colour variation with distinct white stripes on filled oral disc and tentacles with purple tips (scale 20 mm).

PLATE 16

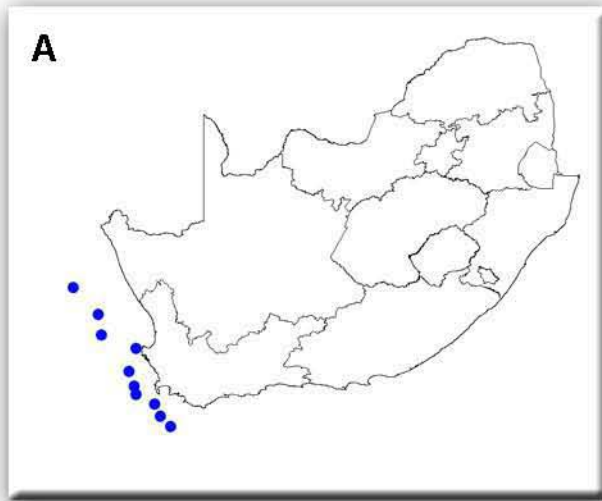


Fig. A. Distribution record of *Urticinopsis crassa* (p. 146). B. Preserved specimen with tentacles withdrawn. C. Preserved specimen attached to gastropod shell (scales 10 mm).

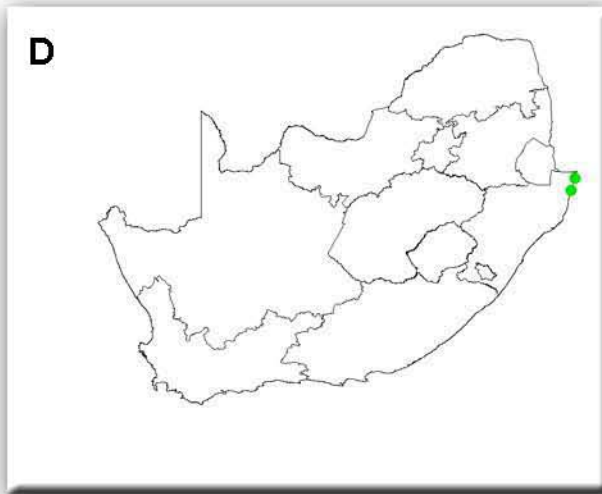


Fig. D. Distribution record of *Megalactis griffithsi* (p. 148). E. Live specimen housing porcelain crab (scale 10 mm). F. Live specimen with grape-like bunches on tentacles (scale 30 mm).

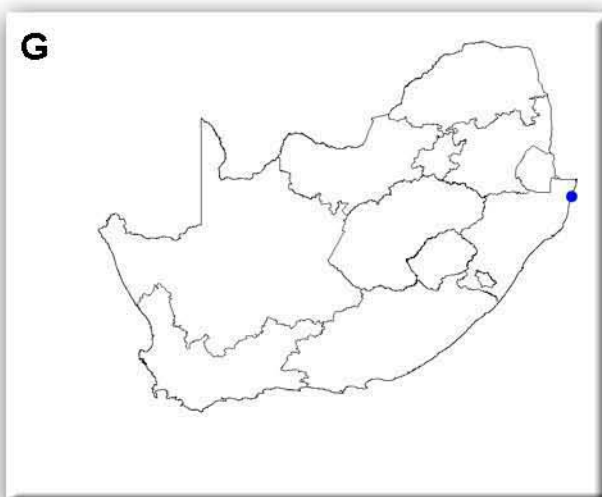


Fig. G. Distribution record of *Alicia sansibarensis* (p. 150). H, I. Preserved specimens with long, slender tentacles and column with bunches of vesicles (scales 20 mm).

PLATE 17

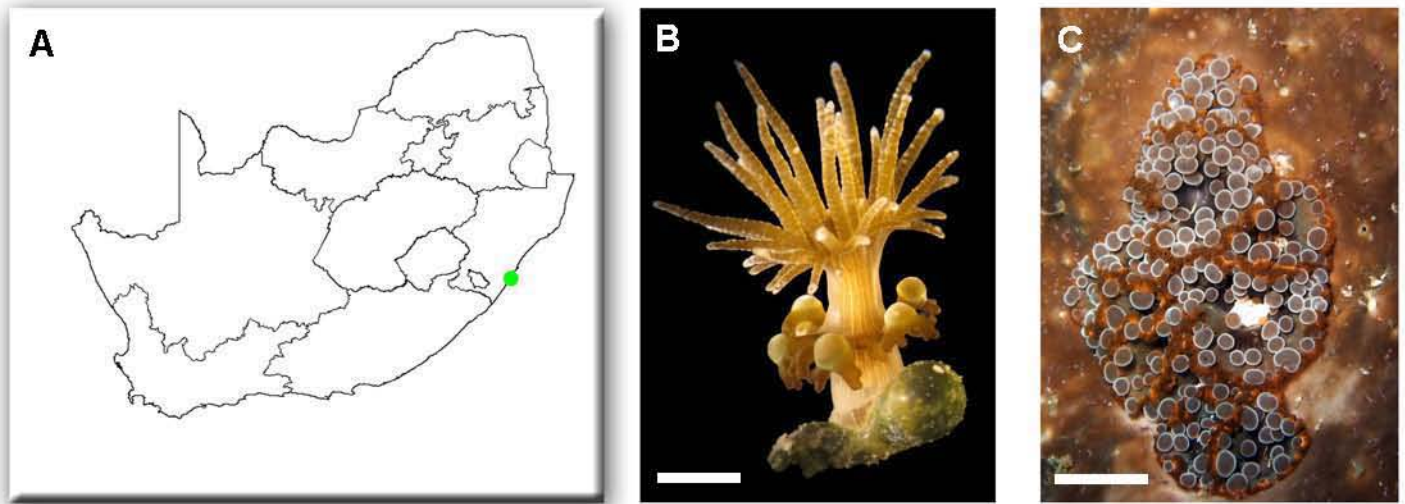


Fig. A. Distribution record of *Triactis producta* (p. 152). B. Live specimen photographed at night when tentacles are extended (scale 10 mm). C. Live specimen photographed during the day when pseudotentacles are extended (scale 30 mm).

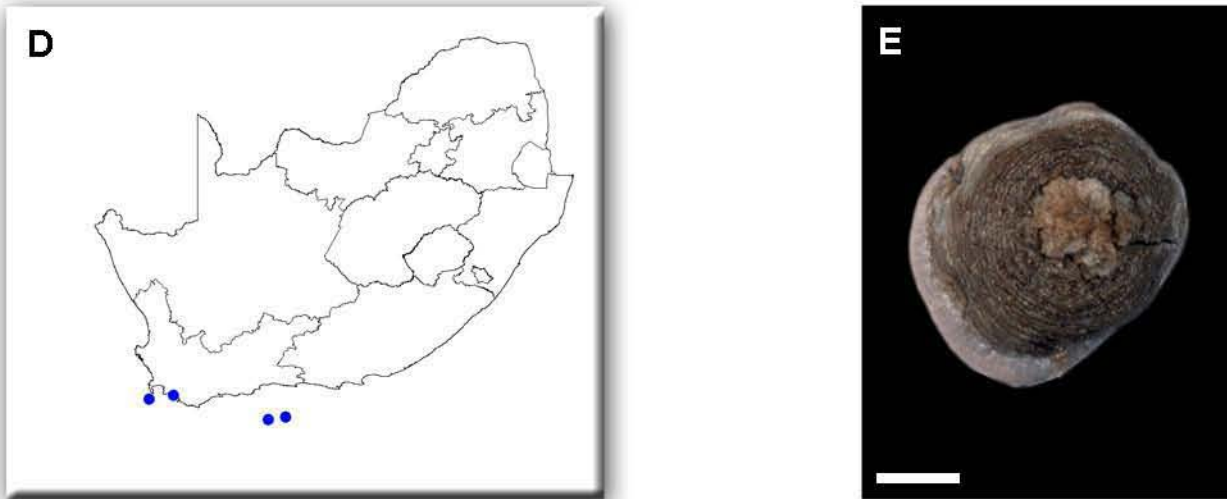


Fig. D. Distribution record of *Condylanthus magellanicus* (p. 154). E. Preserved specimen (scale 10 mm).

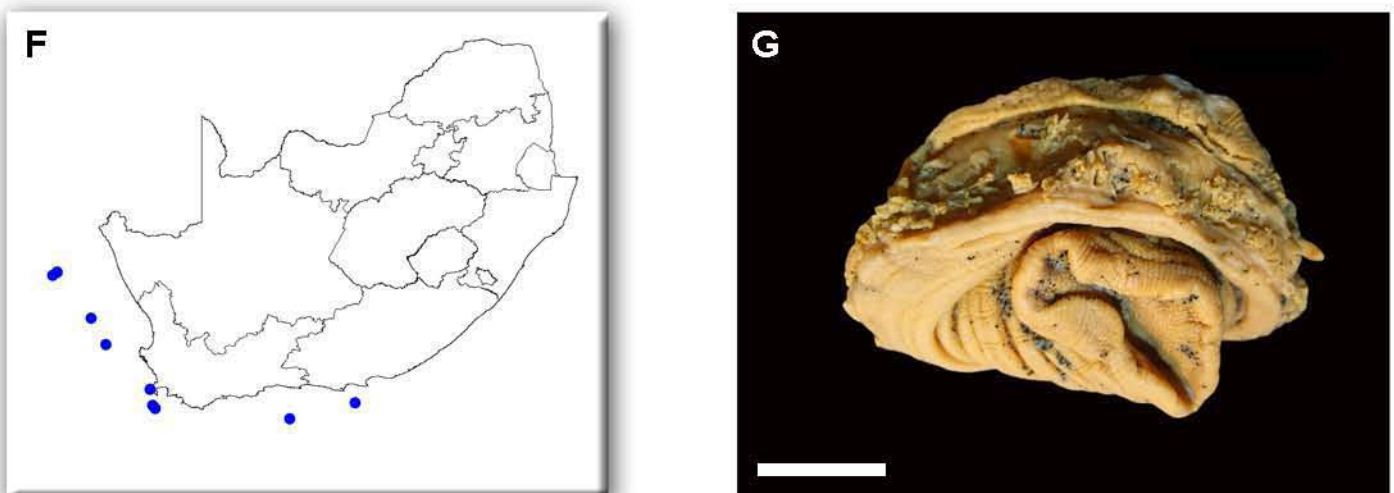


Fig. F. Distribution record of *Liponema multiporum* (p. 156). G. Preserved, contracted specimen. All tentacles were shed during collection (scale 40 mm).

PLATE 18

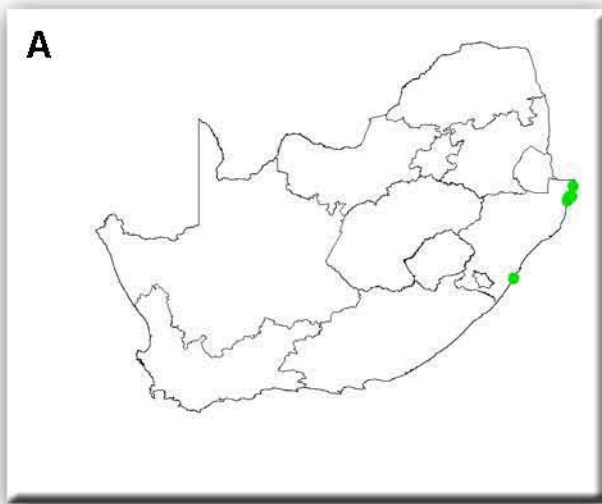


Fig. A. Distribution record of *Heteractis aurora* (p. 158). B. Live specimen with commensal anemone fish (scale 50 mm). C. Live, contracted specimen (scale 20 mm).

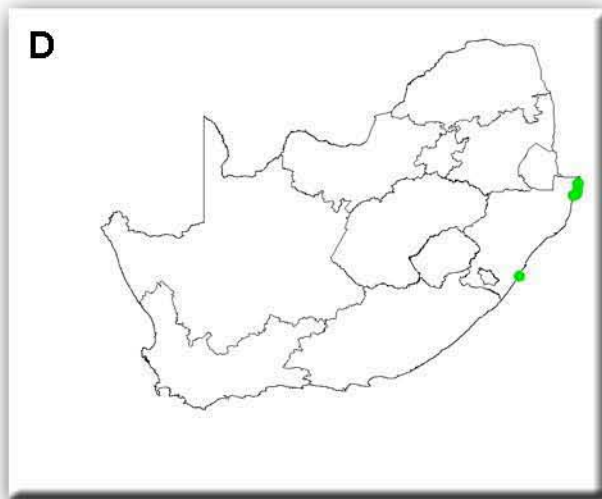


Fig. D. Distribution record of *Heteractis crispa* (p. 160). E, F. Live specimens with snake-like tentacles outstretched (scale 50 mm).

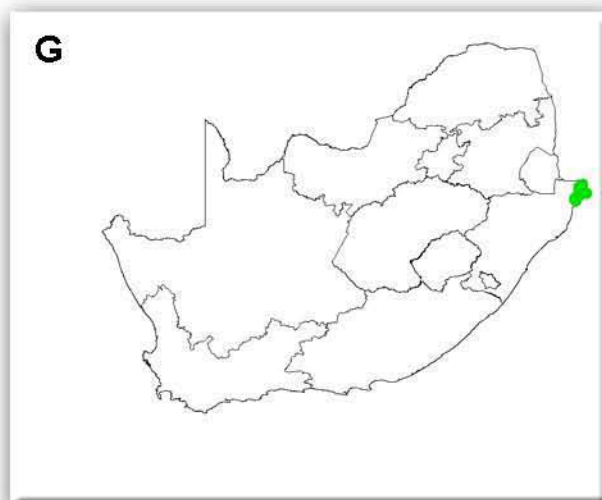


Fig. G. Distribution record of *Heteractis magnifica* (p. 162). H. Live specimen with brilliant orange column (scale 100 mm).

PLATE 19

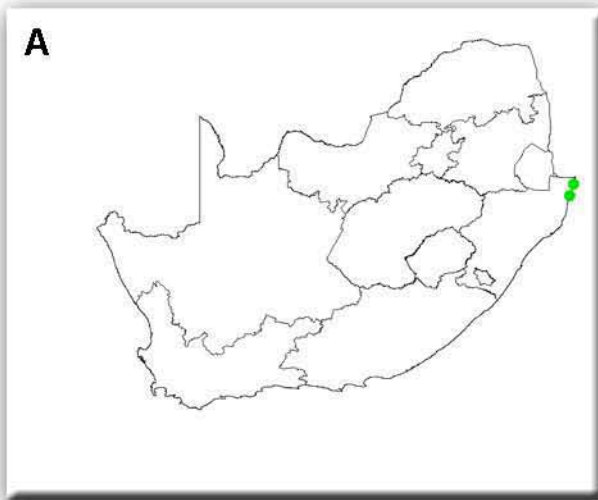


Fig. A. Distribution record of *Heteractis malu* (p. 164). B. Live specimen (scale 40 mm).

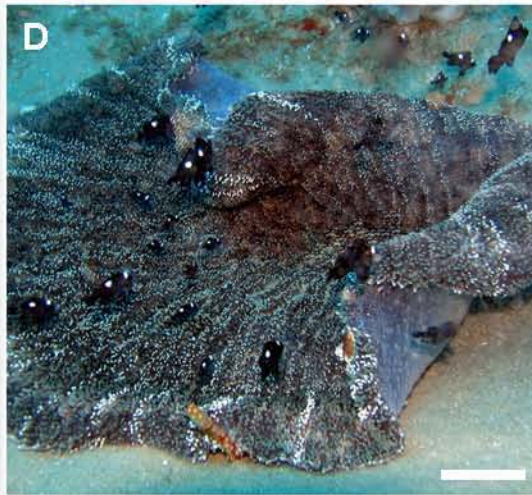
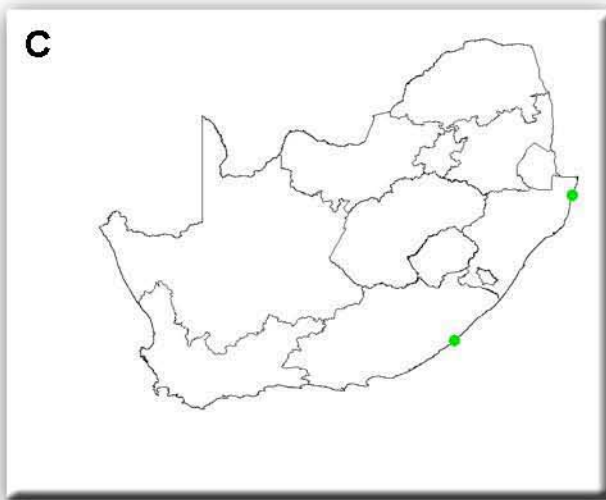


Fig. C. Distribution record of *Stichodactyla haddoni* (p. 166). D. Live specimen with commensal anemone fish (scale 1000 mm). E. Preserved, contracted specimen (scale 20 mm).

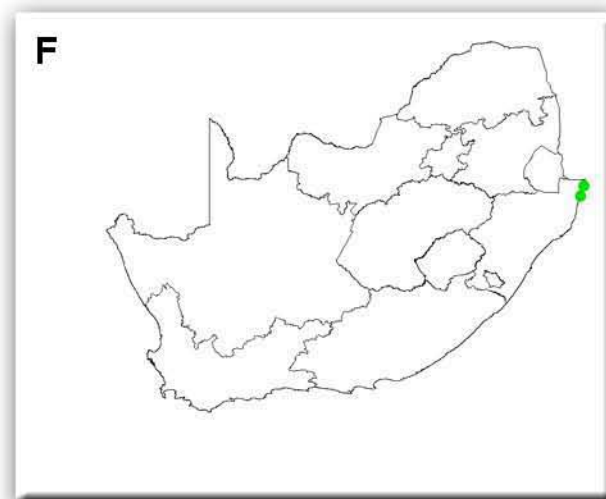


Fig. F. Distribution record of *Stichodactyla mertensii* (p. 167). G. Live specimen with commensal anemone fish (scale 50 mm).

PLATE 20

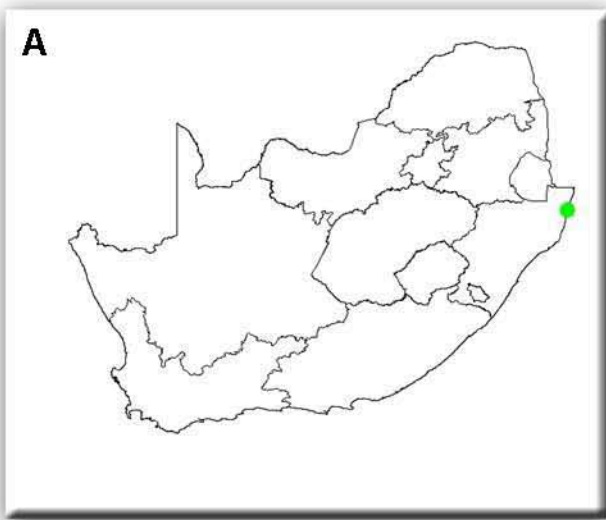


Fig. A. Distribution record of *Cryptodendrum adhaesivum* (p. 170).
B. Live specimen (scale 150 mm).

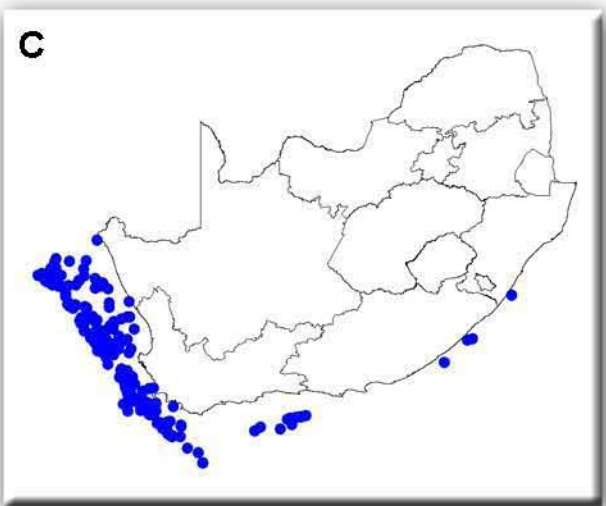


Fig. C. Distribution record of *Actinostola capensis* (p. 173). D. Live specimen (scale 30 mm).

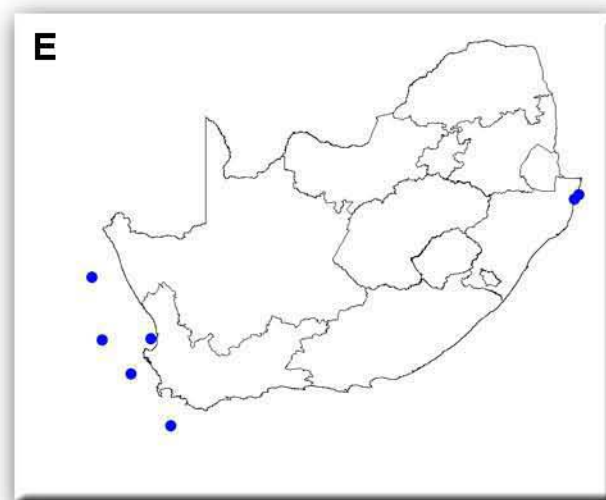


Fig. E. Distribution record of *Anthosactis capensis* (p. 174). F. Live specimen (scale 5 mm).

PLATE 21

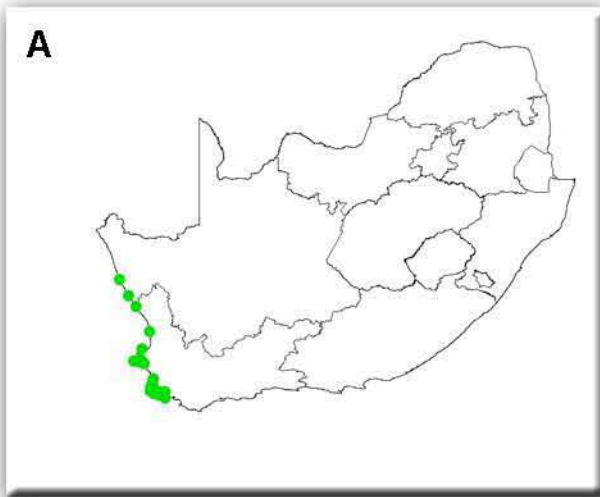


Fig. A. Distribution record of *Isanthus capensis* (p. 176). B. Live specimens (scale 10 mm).

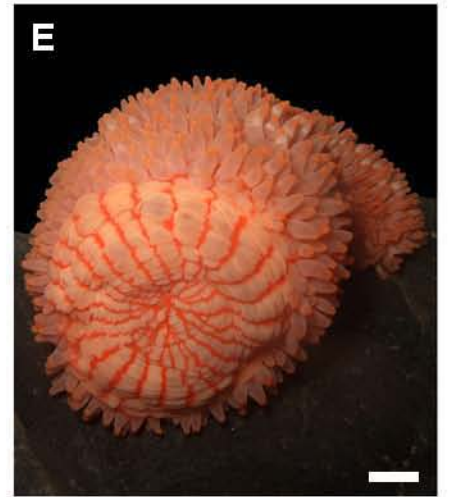
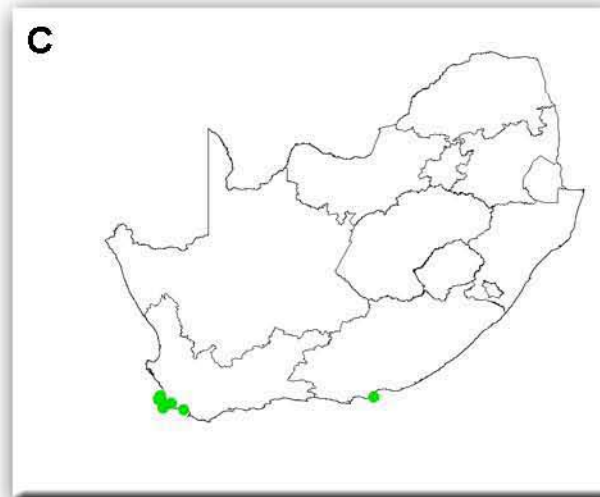


Fig. C. Distribution record of *Preactis millardae* (p. 178). D. Live specimen hanging from reef wall. E. Live specimen with a view of striped pedal disc (scales 10 mm).

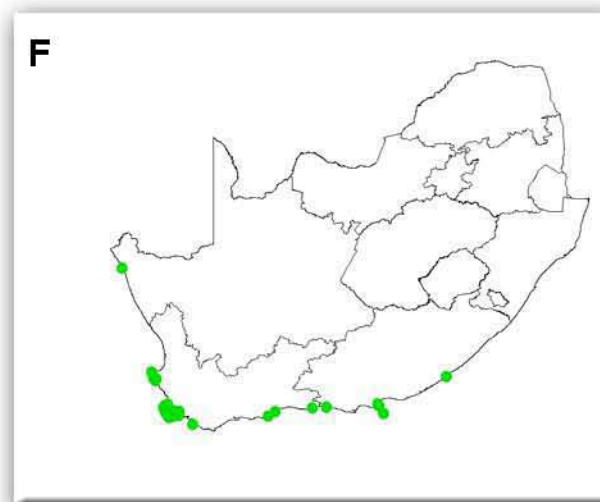


Fig. F. Distribution record of *Corynactis annulata* (p. 181). G, H. Live specimens varying in colour from pink to red. I. Preserved specimens (scales 10 mm).

PLATE 22

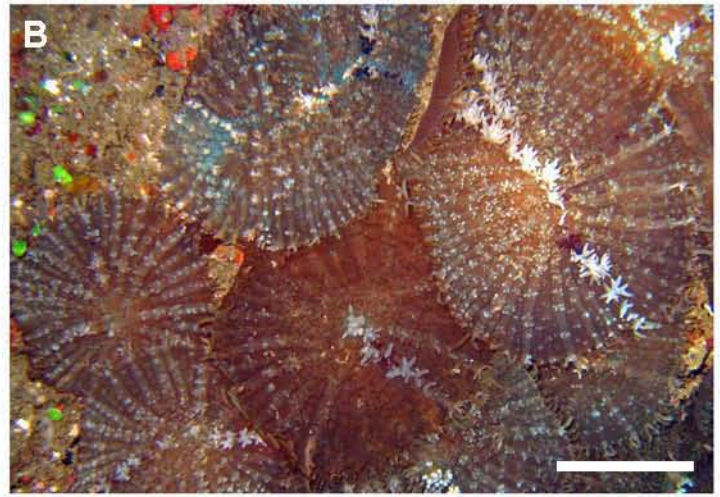
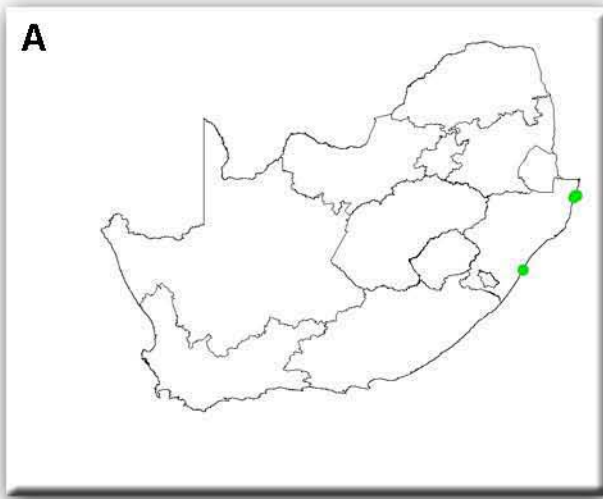


Fig. A. Distribution record of *Rhodactis rhodostoma* (p. 183). B. Live specimens with branched and unbranched tentacles arranged in rows radiating out from mouth (scale 30 mm).