Abc Taxa

Field guide to the brittle and basket stars (Echinodermata: Ophiuroidea) of South Africa

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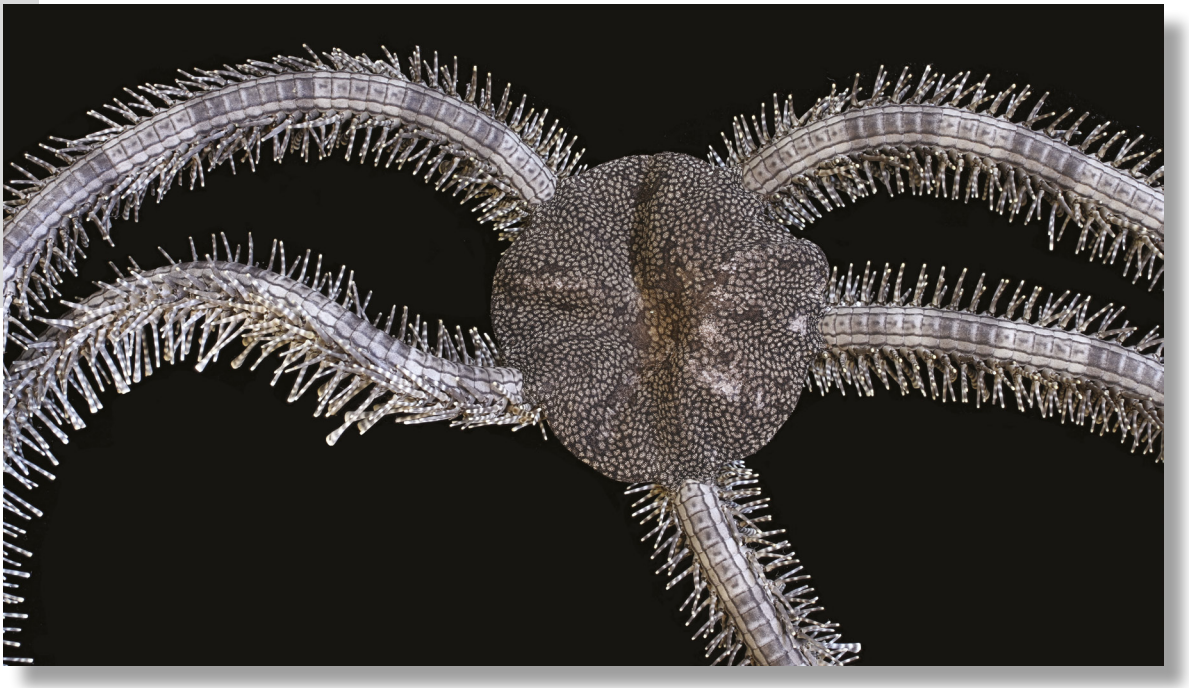

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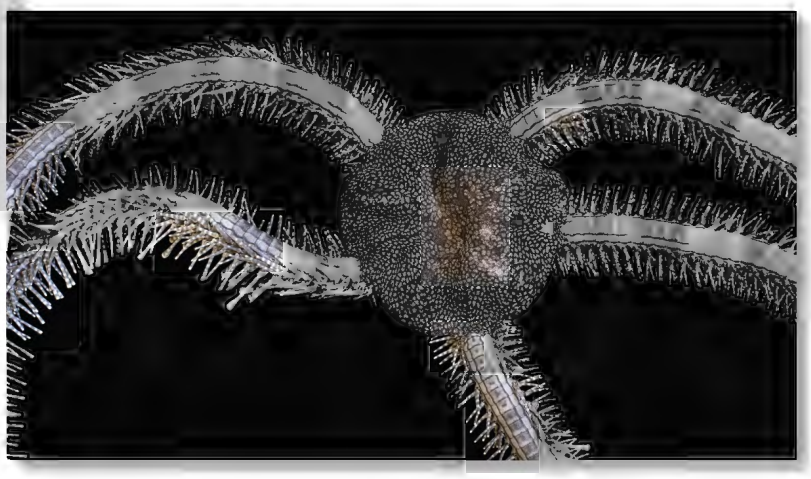

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Abc Taxa

the Series of Manuals
Dedicated to Capacity Building
in Taxonomy and
Collection Management

CEBioS

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http://www.abctaxa.be

Cover illustration: dorsal view of *Ophiarachna affinis* Lütken, 1869 from the shallow-waters of KwaZulu-Natal (photo by Yves Barette).

Inner page photograph: top: upon re-surfacing, one is reminded of the recreational value of the scenery and its biodiversity; **bottom left**: a colony of mushroom soft-coral (*Sarcophyton* sp.), with a small giant clam (*Tridacna* sp.) in the middle of the picture and with, a.o., colonial tunicates (*Didemnum molle* Herdmann, 1866) at the top of the picture; **bottom right**: close encounters of a fish kind: big-eye stumpnoses (*Rhabdosargus thorpei* Smith, 1979) swarm around; not known if this species feeds on ophiuroids.

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Field guide to the brittle and basket stars (Echinodermata: Ophiuroidea) of South Africa

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Abstract

Brittle and basket stars (ophiuroids) are one of five extant classes of the phylum Echinodermata and have a fossil record dating back almost 500 million years to the Early Ordovician. Today, they remain diverse and widespread, with over 260 described genera and 2,077 extant species globally (Stöhr *et al*. 2018), more than any other class of echinoderm. Ophiuroid species are found across all marine habitats from the intertidal shore to the abyss. In southern Africa, the ophiuroid fauna has been studied extensively by a number of authors and is relatively well-known. The last published review of the southern African Ophiuroidea however was by Clark & Courtman-Stock in 1976. It included 101 species reported from within the boundaries of South Africa. In the 40 years since that publication the number of species has risen to 136. This identification guide includes a taxonomic key to all 136 species, and gives key references, distribution maps, diagnoses, scaled photographs (where possible), and a synthesis of known ecological and depth information for each. The guide is designed to be comprehensive, well illustrated and easy to use for both naturalists and professional biologists. Taxonomic terms, morphological characteristics and technical expressions are defined and described in detail, with illustrations to clarify some aspects of the terminology. A checklist of all species in the region is also included, and indicates which species are endemic (33), for which we report significant range extensions (23), which have been recorded as new to the South African fauna (28) since the previous monograph of Clark & Courtman-Stock (1976) and which have undergone taxonomic revisions since that time (28).

Keywords

Taxonomy, biodiversity, new records, Indian Ocean

Preface

The Republic of South Africa is widely recognized as being highly bio-diverse. With a coastline of some 3,650 km and an Exclusive Economic Zone of just over 1 million km^2, South Africa is bordered by the Southern Atlantic and Indian Oceans and dominated by the cold Benguela Current along the Atlantic coast to the west and the warm Agulhas Current along the Indian Ocean coast to the east. This offers marine life diverse habitats in which to flourish: cold and warm water, strongly wave exposed and sheltered coastlines, areas of low (nutrient poor) and high (upwelling) productivity with known biodiversity hotspots both in the water and on adjacent surrounding coastal plains.

Despite its status as a developing nation, South Africa has a relatively strong history of marine taxonomic research maintaining well-curated museum collections totaling over 291,000 records (Griffiths *et al*. 2010). The coastline is divided into five regions nine marine bioregions, with 33% of the biota listed as endemic species. Marine speciation in general, gets progressively richer to the (more tropical) east, whereas some taxa attain maximum species richness in the temperate southwest, with range-restricted species strongly concentrated on the boundaries or ‘‘ecoregions’’ where the Atlantic and Indian Oceans meet, especially around Cape Point.

The volume here reports on the diversity of the most species rich group of echinoderms, the ophiuroids. At the level of major phyla, Echinodermata surprisingly have some of the lowest levels of endemism on the current record (3.6%), so what did they find in the current studies? Importantly, what opportunities do ophiuroids offer man in further understanding the productivity and sustainability of our oceans, especially at this time when man-made pressures, like the impacts from direct exploitation, the introduction of non-native marine species, climate change, habitat modification, pollution, and habitat alternation, harmful invasive species are rapidly changing our marine systems? Questions of food security, livelihoods, economic and socio-cultural benefits that productive and sustainable marine systems offer are critical to South Africa’s development, and also central to the strategic objective of the United Nations Food and Agriculture Organization. FAO invests to ensure that fisheries and aquaculture ensure food security of the world’s peoples, with all its implications for resource conservation, livelihoods and maintaining sustainability and ecosystem services.

So why examine and gain further understanding of ophiuroid biodiversity? Why bother? What we have found is that we need to develop better tools and indicators of human pressures, to describe a consolidated view of impacts of human pressures on the health of benthic and pelagic communities. We also have to continue to look for potential species to support the livelihoods of a growing world population. Are there eco-tourism opportunities, potential pre-cursors for the development of new medicines, or other opportunities (e.g., supply the aquarium industry) that such taxonomic enquiry can offer? Might ophuiroids be a good taxon group to help train our future marine scientists? What insights or opportunities can and will they offer?

The South African marine biota supports a wide range of fisheries and ecotourism and recreation based on South Africa's marine environment that has developed significantly along with its growing population. FAO has a relatively long history when it comes to the taxonomy of edible taxa (http://www.fao.org/fishery/fishfinder/en), mainly to improve the capacity of countries to identify and record artisanal and commercially exploited fish species, for improving the definition of country fish records. FAO also supports countries in gaining a greater understanding of the scope and importance of their biodiversity, not just of target species in fisheries but also for 'associated' and 'dependent' species. The work reported here aims to drive better understanding, communication and action to manage and conserve our marine environment.

Luckily a new generation of taxonomists[1] is being supported by the South African National Biodiversity Institute (SANBI) and the South African Biosystematics Initiative (SABI) that are increasing the availability of funding for such work, and encouraging young researchers to enter this field. For, a.o., ophiuroids, these budding taxonomists also can count on the support of the Belgian Development Cooperation and this through the Belgian Global Taxonomy Initiative (www.taxonomy.be), through for instance its flagship capacity building product: *Abc Taxa* (www.abctaxa.be). Such enquiry will no doubt lead to greater care, and resilience of our oceans.

Kim Friedman[2]
December 2017

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1) The primary marine invertebrate collections in the region are housed at the Iziko South African Museum in Cape Town and comprise some 129,000 records, offering significant coverage of all major marine taxonomic groups.

2) Dr Kim Friedman (Kim.Friedman@fao.org) is a Senior Fishery Resources Officer with the Fisheries and Aquaculture Department of the Food and Agriculture Organization of the United Nations (FAO). Kim leads the FishFinder program and has leadership and coordination responsibilities for biodiversity issues within the Marine and Inland Fisheries Branch of FAO.

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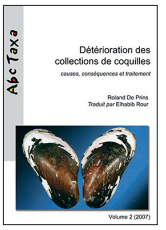

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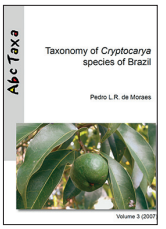

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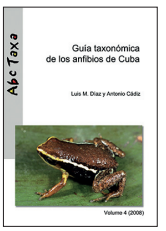

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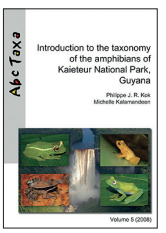

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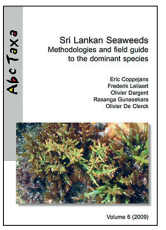

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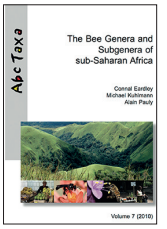

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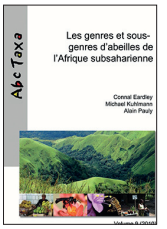

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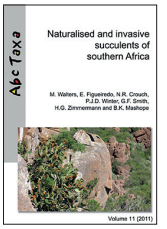

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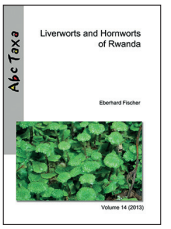

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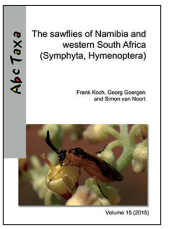

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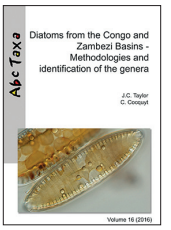

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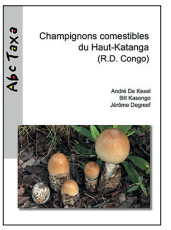

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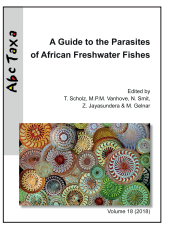

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Field guide to the brittle and basket stars (Echinodermata: Ophiuroidea) of South Africa

Brittle stars, including the charismatic basket stars, are not as easily observed in the field as their more conspicuous cousins, the sea stars, because many brittle star species have a cryptic lifestyle, hiding in crevices, in the sediment or under rocks. Nevertheless, they are important members of their ecosystem, and their beauty in form and colour is astounding. Brittle stars occur in all marine habitats around the globe, at all depths, and display a multitude of life strategies, feeding habits, and reproduction modes. With over 2,000 described species, they are the most diverse group of echinoderms, but much remains to be learnt about their diversity, evolutionary history and biology. Entry into the subject has long been difficult, because many species are inadequately described and rarely figured, making them hard to identify.

This book presents the rich and varied fauna of brittle and basket stars found in the Exclusive Economic Zone of South Africa. More than 40 years have passed since the last compilation of South African brittle stars, and this new review adds many species to the list, updates distribution ranges and finds a high degree of endemism. The authors provide a thorough introduction to the taxonomy, morphology and identification of brittle stars, with clear illustrations of important features and a key to all South African species. Practical advice on collecting procedures is also included. Each species is presented with several photographs, a distribution map and a taxonomic diagnosis, using an easy to understand terminology, which will make this book useful for amateurs and professionals alike. Since many of the included species are not limited to South African waters, the book will for a long time serve as an excellent identification tool for collected material in future studies in adjacent marine areas.

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