Xeniidae (Cnidaria: Octocorallia) from the Red Sea with description of a new species

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Benayahu, Y. Xeniidae (Cnidaria: Octocorallia) from the Red Sea, with the description of a new species.

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Xenia verseveldti, a new species of the Xeniidae is described, based upon material from the coral reefs of the Sinai peninsula, Red Sea. Two other, closely related *Xenia* species are commented upon. The structure of *Xenia* sclerites is presented by scanning electron microscopy, indicating a unique structure of corpuscular aggregations. A systematic list of all Xeniidae recorded from the Red Sea, along with some new records, is presented.

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Introduction

There is a long history of taxonomic investigations of the Xeniidae of the Red Sea. Lamarck (1816) named the two oldest known genera, viz. *Xenia* and *Anthelia*, and their type species, *X. umbellata* and *A. glauca*. Further studies (e.g., Ehrenberg, 1834; Klunzinger, 1877; Kükenthal, 1902, 1904; Thomson & McQueen, 1907) yielded additional new species and records for this area.

In the report on the corals collected by the "Pola" Expedition in the Red Sea, Kükenthal (1913) listed ten xeniid species. Gohar (1940) described three additional new species and further discussed the taxonomy of previously known species from the northern Red Sea. In the course of the Israeli South Red Sea Expedition of 1962 some xeniids were collected, which were identified by Verseveldt (1965). Later comprehensive surveys of the coral reefs around the Sinai Peninsula (northern Red Sea) and the adjacent reefs yielded additional species and records for this region (Verseveldt, 1969, 1970, 1974a; Verseveldt & Cohen, 1971; Verseveldt & Benayahu, 1983). Among these it is especially worthy of mention the discovery of *Cespitularia exigua* Verseveldt, 1970, because it is the first and only record of a representative of this genus in the Red Sea.

During the years 1968-1989, in the course of many field trips and cruises to numerous reef sites, a large variety of habitats was examined by SCUBA diving to a maximal depth of 35 m. Approximately 250 samples of Xeniidae were collected, primarily by the author, at the coral reefs of the Gulf of Eilat, Gulf of Suez, the southern tip of Sinai, the Strait of Tiran, and the Strait of Gubal (fig. 1).

The present paper, dealing with the species composition of Xeniidae in the Red Sea, is mainly based on this collection, which for the major part is kept in the Zoological Museum, Department of Zoology, Tel Aviv University, Israel, and for a minor part in the Nationaal Natuurhistorisch Museum (Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands.

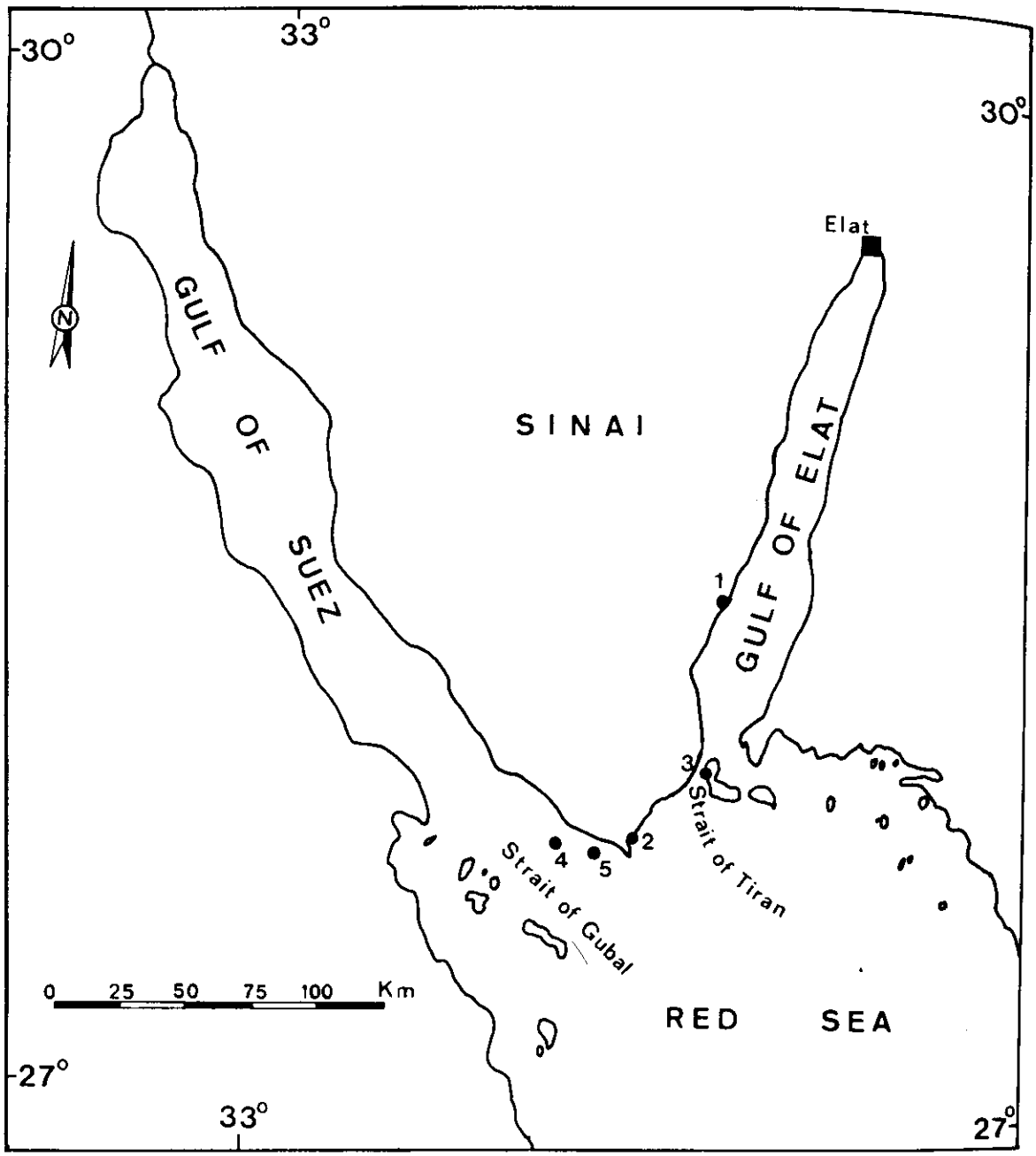

Fig. 1. Map of the study area indicating the collecting sites of *Xenia verseveldti* spec. nov. (1. Dahab; 2. Marsa Barieka), *X. novaecaledoniae* Verseveldt, 1974 (3. Tiran Island), and *X. nana* Hickson, 1931 (4. Shag Rock, 5. Shab el Utaf).

Eight species of *Xenia* are here reported for the first time from the area concerned, including one new species, *X. verseveldti*, to be described below. *Xenia verseveldti* spec. nov. is an unusual species of which the tentacles bear a single row of pinnules on each side, a character shared with only two previously known species, *X. novaecaledoniae* Verseveldt, 1974, and *X. nana* Hickson, 1931, which, otherwise, were also among the newly recorded Red Sea species. A comparison of the three species is made and differences are discussed.

The other newly recorded species are (with localities in parentheses): *Xenia crassa* Schenk, 1896 (Ras Gahra, Gulf of Suez, depth 4 m); *X. kuekenthali* Roxas, 1933 (Abu

Durba, Gulf of Suez, L. Fishelson; Ras Atantur, Gulf of Elat, L. Fishelson); *X. lillieae* Roxas, 1933 (Wadi Gnai, near Dahab, Gulf of Elat, depth 10 m); *X. novaebritanniae* Ashworth, 1900 (Ras Atantur, and Dahab, both Gulf of Elat, L. Fishelson; Ras Tanaka, Abu Durba, and Ras Gahra, all Gulf of Suez); and *X. viridis* Schenk, 1896 (Marsa Murach, south of Elat, Gulf of Elat, L. Fishelson, identification by J. Verseveldt). These last named species are not further discussed in this paper.

Materials and Methods

All material studied was fixed in 4% formalin in sea water, rinsed in fresh water after 24 hours, and then transferred to 70% ethyl alcohol. Sclerites were obtained by dissolving the organic tissues with sodium hypochlorite. They were carefully rinsed with double distilled water, dried at room temperature, coated with gold, and examined with a Joel JSM 840A scanning electron microscope operated at 25 kV.

The terminology used in this paper is in accordance with Bayer et al. (1983).

The following museum abbreviations are used: ZMTAU= Zoological Museum of Tel Aviv University; RMNH= Nationaal Natuurhistorisch Museum (Rijksmuseum van Natuurlijke Historie), Leiden; ZMA = Zoologisch Museum, Amsterdam.

Systematic part

Xeniidae Ehrenberg, 1828
Xenia Lamarck, 1816
Xenia verseveldti spec. nov.
(fig. 2)

Material. — Dahab, Gulf of Elat, Red Sea, depth 1 m, 9.xi.1979. Y. Benayahu. ZMTAU Co 26048, holotype and 4 paratypes. Marsa Bareika, southern tip of Sinai, Red Sea, depth 20 m, 10. viii. 1977. Y. Benayahu. ZMTAU Co 26047, 5 paratypes, RMNH Coel. no. 17978, 2 paratypes.

Description.— The stalk of the holotype is undivided and measures 10 mm in height, 4 mm at its basal part, gradually widening towards the capitulum to 12 mm. The length of the tentacles is 4-5 mm and their basal width is approximately 0.5 mm. Each tentacle bears one row of 13-15 pinnules on each side. The sclerites are mainly platelets of the normal xeniid type measuring 0.025-0.040 mm in maximal diameter (fig. 2a). Others resemble finger biscuits with a maximal length of 0.040 mm (fig. 2b). Each sclerite is composed of closely packed, round and flattened corpusculars. They measure 0.8-1.0 μm and have a rough surface (fig. 2c). In the tentacular rachis and pinnules the sclerites are predominantly concentrated along the aboral side.

Colour.— In alcohol the holotype is pinkish light brown.

Variability.— The other colonies are approximately of the same size as the holotype. Two paratypes (ZMTAU Co 26047) are bifurcated. The colour of the paratypes is light creamy.

Remarks.— This species is named after the late Dr. J. Verseveldt, the world's foremost expert on taxonomy of Alcyonacea, to whom I am greatly indebted for sharing with me his knowledge of Octocorallia.

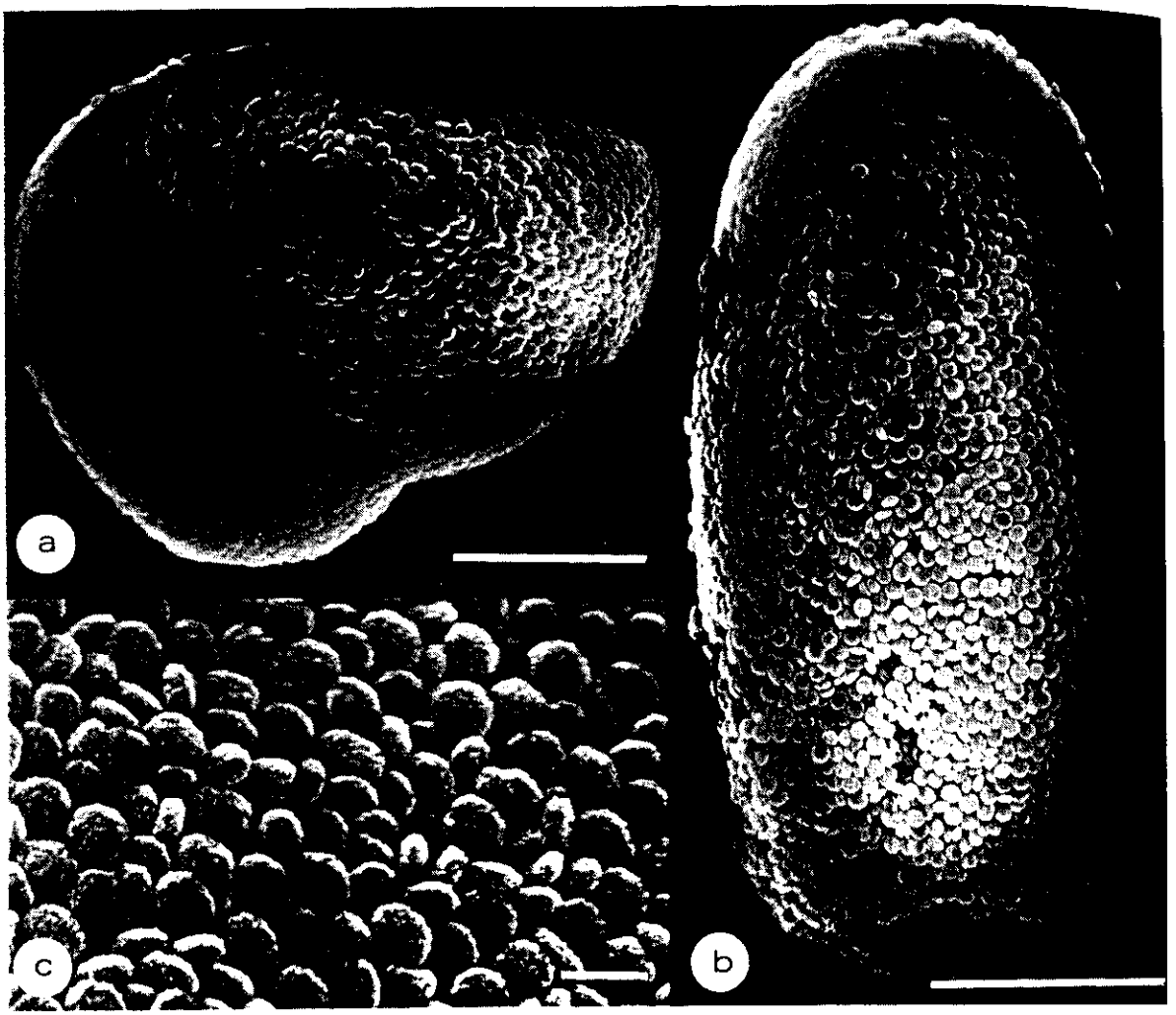

Fig. 2. *Xenia verseveldti* spec. nov., sclerites of holotype: a, platelet, scale bar = 10 µm; b, finger biscuit, scale bar = 10 µm; c, ultrastructure of a sclerite indicating the corpuscular aggregations, scale bar = 1 µm.

It is only the third known species of *Xenia* with tentacles possessing one row of pinnules on each side. The other two, *X. nana* Hickson, 1931, and *X. novaecaledoniae* Verseveldt, 1974, presently also recorded for the first time from the Red Sea, are discussed below. *Xenia verseveldti* spec. nov. differs from these two species in the number of pinnules on each of the tentacles and the size of the sclerites.

Xenia novaecaledoniae Verseveldt, 1974

Xenia novaecaledoniae Verseveldt, 1974b: 119-120, fig. 17.

Material.— Red Sea, Tiran Island, Lagoon, depth 4 m, 15. iii 1981. Y. Benayahu, ZMTAU Co 26040, 9 colonies, RMNH Coel. no. 17979, 3 colonies.

Remarks.— The tentacles have a single row of 16-20 pinnules on either side. Occasionally, there is an indication of a second row consisting of 2-3 pinnules. There are no sclerites in any part of the colonies. The original description of *X. novaecaledoniae* indicated the presence of 15-20 pinnules in a row, an indication of a second row of

pinnules, and the absence of sclerites. I have compared the holotype (ZMA, Coel no. 7426) with the present specimens and found no essential differences between them.

Distribution.— New Caledonia and the Red Sea.

Xenia nana Hickson, 1931
(fig. 3)

Anthelia sp.? Gravely, 1927: 25
Xenia nana Hickson, 1931: 84-87, fig. 2.

Material.— Red Sea, Shag Rock, Gulf of Suez, 14. vii. 1987. Y. Benayahu. ZMTAU, Co. 26043, 27 colonies, RMNH Coel. no. 17980, 3 colonies. Red Sea, Shab el Utaf, southern tip of Sinai, depth 10 m, 8. vii. 1986. Y. Benayahu, ZMTAU, Co 26044, 12 colonies.

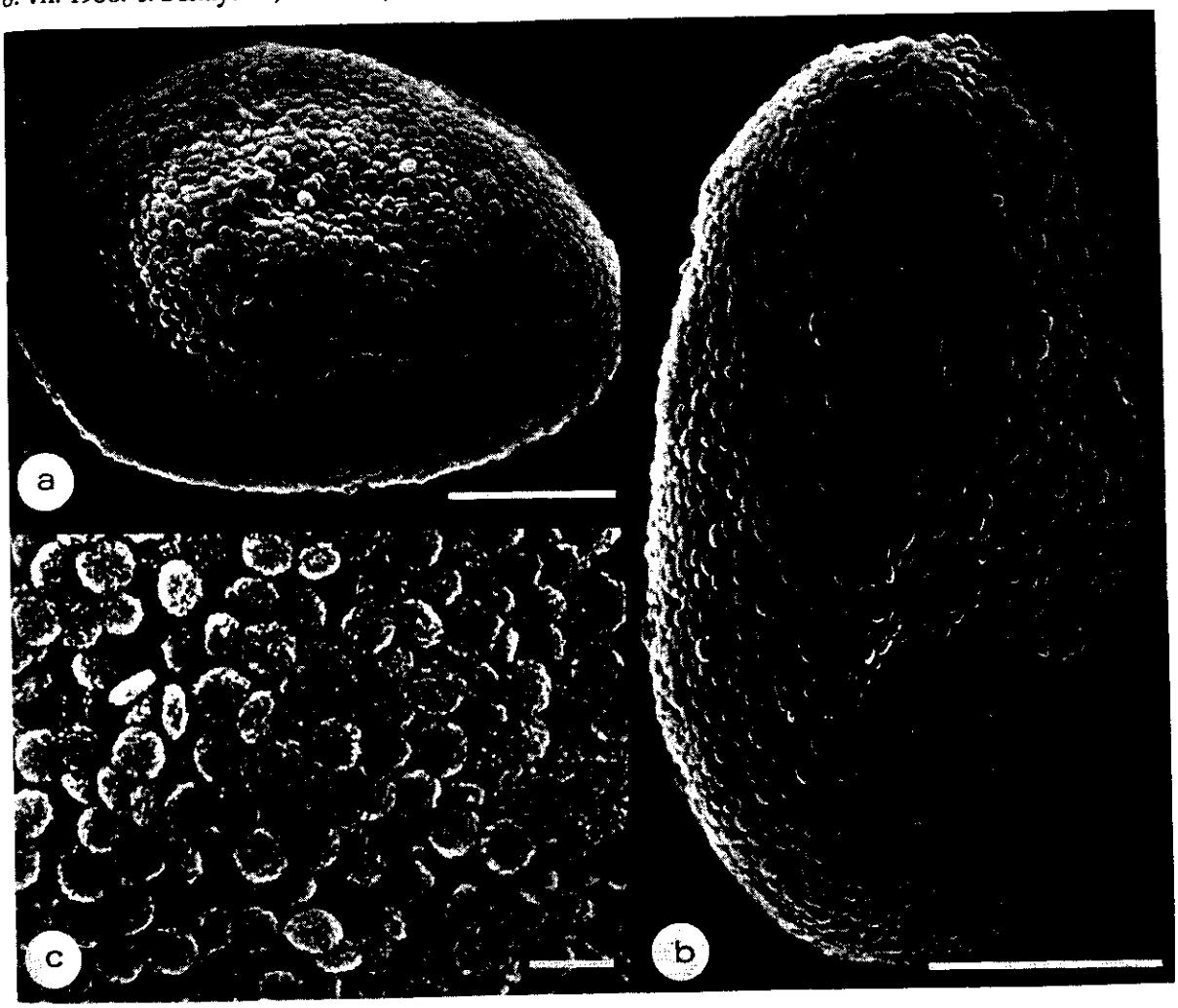

Fig. 3. *Xenia nana* Hickson, sclerites of ZMTAU Co 26043: a, platelet, scale bar = 10 µm; b, finger biscuit, scale bar = 10 µm; c, ultrastructure of a sclerite indicating the corpuscular aggregations, scale bar = 1 µm.

Description.— The base of the stalk of each colony is flat and attached to calcareous reef substrata. In some of the colonies the stalk is divided into a few primary branches which, may carry secondary branches. The colonies are rather small with a maximal height of 10 mm. At the base of the stalk the branches are narrow, measuring about 3-5 mm in width. Distally, they broaden to a diameter of 5-11 mm at the

level of the capitulum. The anthocodiae measure up to 2.5 mm in length and 1 mm in width. The tentacles are remarkably short and measure approximately 10 mm in length. The pinnules, arranged in one row on each side of the tentacles, are 0.8-1.2 mm long. Each row contains 6-8 pinnules. The sclerites are platelets 0.028-0.045 mm in diameter (fig. 3a), many of them finger biscuit-like (fig. 3b), and as with *X. verseveldti*, each sclerite is composed of round corpuscular aggregations (fig. 3c).

Colour.— In alcohol the colonies are light brown or cream.

Remarks.— The original description of *X. nana* indicated 5-8 pinnules in a row along the presence of sclerites measuring 0.050-0.025 mm in size. In these respects there are no significant differences between Hickson's specimens and the present material. The only difference concerns the dimensions of the colonies and their polyps. (see further notes below).

Geographical distribution.— Gulf of Manaar (between southern India and Sri Lanka) and the Red Sea.

Table 1. List of species of the Xeniidae recorded from the Red Sea with reference to their first documentation in this area. Note that the Red Sea is the type locality of no less than 15 species, which are indicated by an asterisk.

Species	Reference
* *Anthelia glauca* Lamarck, 1816	Lamarck, 1816
* *Anthelia fishelsoni* Verseveldt, 1969	Verseveldt, 1969
* *Cespitularia exigua* Verseveldt, 1970	Verseveldt, 1970
* *Heteroxenia coheni* Verseveldt, 1974	Verseveldt, 1974a
* *Heteroxenia fuscescens* (Ehrenberg, 1834)	Ehrenberg, 1834
* *Heteroxenia ghardaqensis* Gohar, 1940	Gohar, 1940
* *Sympodium caeruleum* Ehrenberg, 1834	Ehrenberg, 1834
* *Xenia biseriata* Verseveldt & Cohen, 1971	Verseveldt & Cohen, 1971
Xenia blumi Schenk, 1896	May, 1900
Xenia crassa Schenk, 1896	This study
* *Xenia faraunensis* Verseveldt & Cohen, 1971	Verseveldt & Cohen, 1971
Xenia garciae Bourne, 1895	Gohar, 1940
* *Xenia grasshoffi* Verseveldt, 1974	Verseveldt, 1974a
Xenia hicksoni Ashworth, 1899	Kükenthal, 1913
Xenia kuekenthali Roxas, 1933	This study
* *Xenia impulsatilla* Verseveldt & Cohen, 1971	Verseveldt & Cohen, 1971
Xenia lillieae Roxas, 1933	This study
* *Xenia macrospiculata* Gohar, 1940	Gohar, 1940
Xenia mayi Roxas, 1933	Verseveldt & Benayahu, 1983
Xenia membranacea Schenk, 1896	Verseveldt & Benayahu, 1978
Xenia nana Hickson, 1931	This study
Xenia novaebritanniae Ashworth, 1900	This study
Xenia novaecaledoniae Verseveldt, 1974	This study
* *Xenia obscuronata* Verseveldt & Cohen, 1971	Verseveldt & Cohen, 1971
Xenia plicata Schenk, 1896	Kükenthal, 1913
Xenia ternatana Schenk, 1896	Kükenthal, 1913
* *Xenia umbellata* Lamarck, 1816	Lamarck, 1816
* *Xenia verseveldti* spec. nov.	This study
Xenia viridis Schenk, 1896	This study

Further notes

The extensive studies of the Red Sea Alcyonacea revealed the presence of a considerable number of species of Xeniidae (e.g., Benayahu, 1985). Table 1 presents a list of all known genera and species, supplying evidence for the abundance and diversity of Xeniidae in the Red Sea.

Examination of a large number of live and preserved *Xenia* colonies in this study suggests a wide intraspecific variability in the dimensions of stalks, anthocodiae, tentacles and pinnules. Differences in colony size within a given species may reflect age differences or environmental impact (see also Verseveldt & Cohen, 1971). *Xenia* colonies collected from poorly illuminated habitats or deep reef zones tend to have elongate anthocodiae with slender tentacles and pinnules. I found that the number of rows, the number of pinnules in each row, as well as the size of the sclerites, are highly consistent within species and do not relate to colony size or polyp dimensions. Therefore, size differences between the recently collected *X. nana* and those mentioned in the original description of Hickson (1931) are most probably age related.

This study is the first to demonstrate by scanning microscopy the fine structure of sclerites of Xeniidae, which is unique among octocorals. The taxonomical significance of this structure in the systematics of Xeniidae remains to be studied.

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