INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCE AND ENGINEERING (IJESE)
Vol. 7: 51- 62 (2016)
http://www.pvamu.edu/research/activeresearch/researchcenters/texged/international-journal
Prairie View A&M University, Texas, USA

Fouling bryozoan fauna from Hurghada, Red Sea, Egypt. I. Erect species

Khaled Mahmoud Abdelsalam
National Institute of Oceanography and Fisheries, Alexandria, Egypt.

ARTICLE INFO
Article History
Received: May 9, 2016
Accepted: June 22. 2016
Available online: Jan. 2017

Keywords:
Fouling,
Bryozoa,
Erect species,
Systematic,
Red Sea,
Egypt.

ABSTRACT

The current study aims to present taxonomically informative data about erect fouling bryozoan fauna collected from Hurghada, Red Sea, Egypt. During September 2015, samples of fouling were scraped from an area beneath the jetty of the National Institute of Oceanography and Fisheries, Red Sea branch, Egypt. The study revealed the presence of five species of erect fouling bryozoans in five genera, belonging to orders Ctenostomata and Cheilostomata. These are *Savignyella lafontii*, *Licornia jolloisii*, *Nolella gigantea*, *Synnotum aegyptiacum* and *Aspiscellaria* sp. The last three species are new records from Hurghada. Descriptions of the recorded species are delivered with illustrative photos, as well as, their geographical distribution and habitats.

1. INTRODUCTION

Bryozoans are major components of marine fouling communities (Ryland, 1965; Gordon & Mawatari, 1992). Studies of natural history and the first bryozoans described from the Egyptian Red Sea began with the collection of material during the Napoleon's campaign in the period (1798-1801), illustrated by Savigny (1817) and described by Audouin (1826). Dumont (1981) indicated that Audouin (1826) described 67 bryozoan species, ten from the Mediterranean, 17 from the Red Sea, and the collecting sites for the rest of the species were not mentioned. However, Ostrovsky *et al*. (2011) reported that this number is uncertain since a few of them were possibly illustrated and described twice under different names. Waters (1909 and 1910) published two papers on the bryozoan fauna of the coast of Sudan, which collectively referred to 99 Red Sea bryozoan species. Hastings (1927) described 24 species collected during the Cambridge Expedition to the Suez Canal (1924) including 2 entoproct species, and gave some details on their reproduction. Most of these species were collected from nine localities along the Canal from Port Said to Port Taufiq. Regarding the materials collected from the Red Sea, the Siboga monographs of Harmer (1926, 1957) include descriptions of 35 bryozoans (four new), some of which were collected by Harmer during his visit to the biological station at Hurghada (Ghardaqa), northern Red Sea, in 1934. Balavoine (1959) published a paper describing 44 bryozoan species, from the northern Red Sea (Gulf of Aqaba, Gulf of Suez and Suez Canal) that had been collected in 1928-1929 by Dollfus during his oceanographic studies in Egypt. In this study, two new genera, namely *Chaperina* and *Scorpiodinipora* were erected. Fourteen bryozoan species collected from the Suez Canal,

* Corresponding author: kh.abdelsalam@gmail.com
ISSN 2156-7530

were identified by Eitan (1972), among which, 11 were new for this area in addition to the three previously known species: *Bugula neritina* (Linnaeus), *Watersipora subovoidea* (d'Orbigny) and *Celleporaria aperta* (Hincks). He briefly discussed the exchange of bryozoan fauna between the Red and the Mediterranean Seas. Five cyclostome bryozoans from Eilat (Gulf of Aqaba) were identified by Brood (1980), among which *Tubulipora samuelsoni* was described as new. Dumont (1981) gave a list of 86 species (four of them new records from different locations) collected along the central Sudanese coast. D'Hondt (1988) identified 37 species from the Gulf of Suez, Gulf of Aqaba, Gulf of Eilat, and Haifa Bay. Among them, two species namely *Chaperia infundibulate* and *Celleporaria trispiculata* were described as new records. Alvarez (1995) described one new species (*Disporella boutani*) from the northern Red Sea, and Tilbrook (1998, 1999, and 2001) described five species (one from Hurghada, and another from Suez Bay, Egypt, in addition to three from Massawa Harbour, Eritrea). Moreover, Scholz (2000) listed 45 species (three supposedly new records in location) collected from the Gulf of Aqaba in his monograph. One further species (*Petraliella magna*) has been described by Tilbrook and Cook (2005) from Hurghada. A new clarification has been given by d'Hondt (2006) for the plates of "Polypes-Bryozoa" in the description of Egypt presented by Audouin (1826). Harmelin (2006) described a new species (*Puellina vaceleti*) from the Gulf of Aqaba. Winston and Woollacott (2008) re-described two red-pigmented *Bugula* species (*B. minima* and *B. crosslandi*) from the northern Red Sea (Hurghada and Abu Shaar, Egypt). Recently, Ostrovsky *et al*. (2011) provided a comprehensive account of bryozoan research in the Red Sea. Moreover, Ostrovsky and his colleagues constructed a web site of the Bryozoan collection from the Northern Bay of Safaga, about 70 km south of Hurghada (https://www.univie.ac.at/Palaeontologie/Sammlung/Bryozoa/ Safaga_Bay/Safaga_Bay.html).

Knowledge of the Egyptian records of fouling bryozoans in the Red Sea is fragmentary. Available papers generally provide species lists with no comment. Ghobashy *et al*. (1980) listed 13 species in the Suez Canal, Ghobashy and El-Komi (1981a, b) recorded, respectively 5 and 10 species from Lake Timsah and South region of Suez Canal. Ramadan (1986) recorded 19 species of fouling bryozoans in the northern part of the Suez Canal from Port Said in the north to El-Ferdan in the south. El-Komi *et al*. (1998) recorded 7 species in Suez Bay and Emara (2002) listed 4 species in the northern region of the Suez Gulf. Emara and Belal (2004) recorded 8 species in the Bitter Lakes and Lake Timsah along the Suez Canal. In contrast, El-Komi (1992) had studied the marine fouling in Ghardaqa (Hurghada) and listed only 3 encrusting species of bryozoans. However, there is no recent study concerning the taxonomy of the fouling bryozoan fauna from Hurghada, Red Sea, Egypt.

Therefore, the objective of this study is to fill gaps about the erect species of fouling bryozoans from Hurghada, Red Sea.

2. MATERIAL AND METHODS

During September 2015, samples of marine fouling were scraped from some areas beneath the jetty of the National Institute of Oceanography and Fisheries, Red Sea branch, Hurghada, Egypt (Fig. 1). Samples were preserved in 10% formalin.

In the laboratory, samples of erect bryozoan fauna were sorted and isolated for identification. Specimens were examined by a zoom stereoscopic light microscope (model Novex P-20, with total magnification up to 80 X) and monoscopic microscope (model BEL Bio-1-T, with total magnification up to 400 X), and photographed by Nikon digital camera (model D5000) equipped with a special adaptor for attaching to the microscopes. Descriptions of the recorded species are provided with illustrative photos;

as well as; their geographical distribution and habitats. In the present work, relevant literatures were consulted for identification (e.g. Harmer, 1926, 1957; Balavoine, 1959; d'Hondt, 1988, 2006; Hayward and Parker, 1994; Tilbrook, 2006; Tilbrook *et al*., 2001; Ryland et al., 2009; Vieira *et al*., 2013a, b, 2014). The current higher-taxonomic position of the species is given according to *www. bryozoa.net*.

Fig. 1: Location map. (A). Geographical location of Hurghada at the Egyptian Red Sea coast. (B). Enlarged map showing the sampling area (the jetty of the National Institute of Oceanography and Fisheries).

In the text, measurements of bryozoan zooids (in micrometers) are given as mean plus or minus standard deviation, observed range, and (in parentheses) the number of specimens examined. Autozooid length (ZL) and width (ZW) were measured at the colony surface.

3. RESULTS

Five taxa of erect fouling bryozoans are recorded in the current study. These taxa were ascribed to 5 genera in four families and three suborders (Victorellina, Neocheilostomina, andAscophora) of the orders Ctenostomata and Cheilostomata.

Systematic accounts:

Class: GymnolaemataAllmann, 1856

Order: Ctenostomata Busk, 1852

Suborder: VictorellinaJebram, 1973

Superfamily: Victorelloidea Hincks, 1880

Family: Nolellidae Harmer, 1915

Genus: *Nolella* Gosse, 1855

3.1. *Nolella gigantea* (Busk, 1856) Figure 2 (A-B)

Synonyms:

Farella gigantea Busk, 1856: 93, pl. 5, Figs. 1, 2;

Cylindroecium giganteum Hincks, 1880: 535, pl. 77, Figs. 3, 4; Waters, 1910: 251.

Nolella gigantea: Marcus, 1937: 131; Marcus, 1940: 328; Prenant and Bobin, 1956: 235, fig. 103; Harmelin, 1968:1187; d'Hondt, 1983: 45; d'Hondt, 1988: 193.

Description: Autozooids packed together in dense clumps, attaching to substratum; cylindrical, measuring ZL (2900 ± 730 µm), 2600-3800 µm (n= 12), ZW (190 ± 25 µm), 160-220 µm (n = 12), opaque grey-brown, somewhat annulated, coated with detrital particles. Proximal part of autozooid tapered, stoloniform, linked to neighboring autozooids. As all lophophores are retracted, no data about the number of tentacles is available.

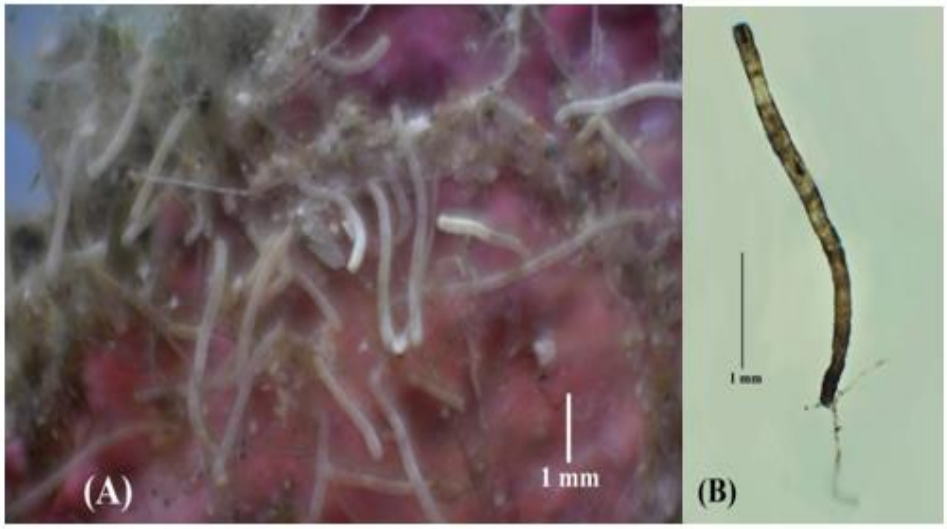

Fig. 2*: **Nolella gigantea.*** **A. Colony creeping on a substratum. B. Single zooid showing slender proximal portinos.**

Remarks: In the present species, the proximal portion of the autozooid is tapered, without a basal dilatation. This character is significant for discriminating the present species from the other species *N. dilatata* in which the proximal portion below the peristomial tube typically dilates at the base. *Nolella gigantea* was recorded from Haifa Bay along the Mediterranean coast of Israel by d'Hondt (1988). D'Hondt (1983) indicated that the lophophore has 10-12 tentacles.

General distribution and habitat: *Nolella gigantea* is cosmopolitan in distribution, absent in Arctic, Antarctic and Subantarctic areas (d'Hondt, 1983). *Nolella stipata*, which has similar features, was previously recorded from the Sudanese Red Sea (Waters, 1910). Specimens in the present study were attached to rocks.

Local distribution: The present record of *Nolella gigantea* is the first from Hurghada. No fouling records of *N. gigantea* were registered from the Egyptian studies in the Red Sea (Ghobashy *et al*., 1980; Ghobashy and El-Komi, 1981a, b; Ramadan, 1986; El-Komi, 1992; El-Komi *et al*., 1998; Emara, 2002; Emara and Belal, 2004).

Order: Cheilostomata Busk, 1852
Suborder:Neocheilostomina d'Hondt, 1985
Superfamily: Buguloidea Gray, 1848
Family: Epistomiidae Gregory, 1893
Genus: Synnotum Pieper, 1881

3.2. *Synnotum aegyptiacum* (Audouin, 1926)
Figure 3 (A-C)

Synonyms:

Loricaria aegyptiaca in the text of Audouin, 1826: 243; but as *Gemellaria aegyptiaca* in the plates of Savigny, 1817: pl. 13, Figs 4^1-4^5.

Gemellaria (?) aviculare Pieper, 1881: 43, 47, pl. 2, Figs 5-7.

Synnotum aviculare Osburn, 1914: 191; Hastings, 1927: 332.

Synnotum aegyptiacum : Harmer, 1926: 398, pl. 27, Figs 3, 4; Winston, 1982: 127, fig. 53; Gordon, 1984: 43, pl. 10, Figs E, F; Tilbrook, Hayward & Gordon, 2001: 52, Fig. 6A, C; d'Hondt, 2006: 76.

Description: Colonies of *Synnotum aegyptiacum* are branched and stolonate, resembling a string; jointed and attached to the substratum by rhizoids. Internode consists of zooids arranged in pairs, back to back along branches; wide distally but tapering proximally to a point. The most proximal part of autozooid terminates at the distal end of next proceeding. Individual zooids measuring ZL (345 ± 40 µm), 310-410 µm (n= 10), ZW (130 ± 45 µm), 110-150 µm (n = 10). The semi-circular operculum is obliquely orientated, in relation to the main axis of the branch. Box-shaped, disto-laterally situated avicularium is present on one, seldom two, distal zooecial parts of

the internode; most avicularia are sessile but sometimes stalked. The mandible of the avicularium is hooked. No ovicells were detected.

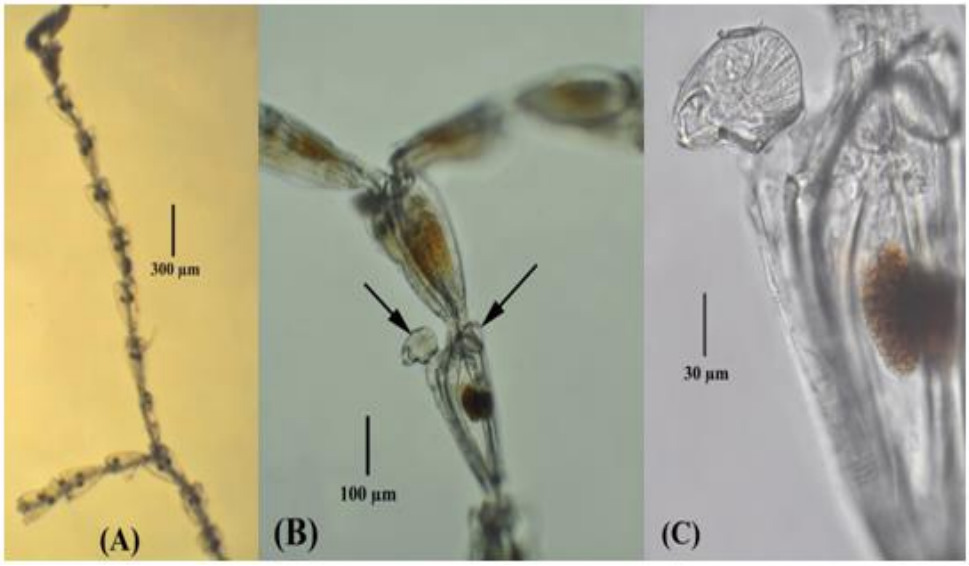

Fig. 3: *Synnotum aegyptiacum*. A. General aspect. B. Enlarged part showing avicularia (arrows) situated on distal zooecial part. C. Lateral view of sessile avicularium showing hooks of mandible.

Remarks: The recorded specimen was lightly calcified and is somewhat flexible. This finding agrees with other authors (e.g. Harmer, 1926; Gordon, 1984) who have commented on the less heavily calcified specimens of this species. This species is characterized by its single sessile and single pedunculate avicularia per internode (Tilbrook, 2006). Zabala & Maluquer (1988) indicated that the hypertrophied autozooids of an ordinary internode or the most proximal zooids of a double internode is the place where embryos are brooded.

General distribution and habitat: *Synnotum aegyptiacum* has been recorded circum-globally in warm temperate and tropical waters at depths down to 82 m. Tilbrook (2006) reported that this species was found in the Solomon Islands (East of Australia), encrusting a piece of coral debris. However, their occurrences in the Tertiary (Miocene to Pliocene) of Indonesia, central and northern South of America, were confirmed by Lagaaij (1968). It was also recorded in Western Atlantic from Cape Hatteras to Brazil and Gulf of Mexico (Winston, 1982).

Local distribution: This species was previously recorded as *Loricaria aegyptiaca* by Audouin (1826), but the precise location of the sample (Mediterranean or Red Sea) was not indicated (d'Hondt, 2006). Hastings (1927) recorded it as *Synnotum aviculare* in the Suez Canal and Port Said. The present record of *Synnotum aegyptiacum* is the first from Hurghada, which may demonstrates its Southward distribution to the Seuz Canal and Port Said. However, it is recorded and illustrated in the web site dealing with bryozoans from the Northern Bay of Safaga.

Family: Candidae d'Orbigny, 1851

In the present work, this family is represented by two genera: *Licornia* van Beneden, 1850; and *Aspiscellaria* Vieira *et al*., 2014.

Genus: *Licornia* van Beneden, 1850

3.3. *Licornia jolloisii* (Audouin, 1826)

Figure 4 (A-D)

Synonyms:

Acamarchis jolloisii Audouin, 1826: 240 [Savigny, 1817: 11, fig. 2].

Scrupocellaria jolloisii Waters 1909: 132, pl. 10, Figs. 5-11; Hastings 1927: 334; Balavoine 1959: 267, pl. 3, Figs. 1-2.

Scrupocellaria mansueta Waters, 1909: 134, pl. 10, fig. 15.
Scrupocellaria (Retiscrupocellaria) jolloisi d'Hondt 1988: 198, Figs. 4^1 - 4^3.
Retiscrupocellaria jolloisii d'Hondt 2006: 66.
Licornia jolloisii: Vieira *et al*., 2013b: 1912, Figs 1C, D, 2A-F, 7A, B; Harmelin, 2014: 313, Fig. 4A-C.

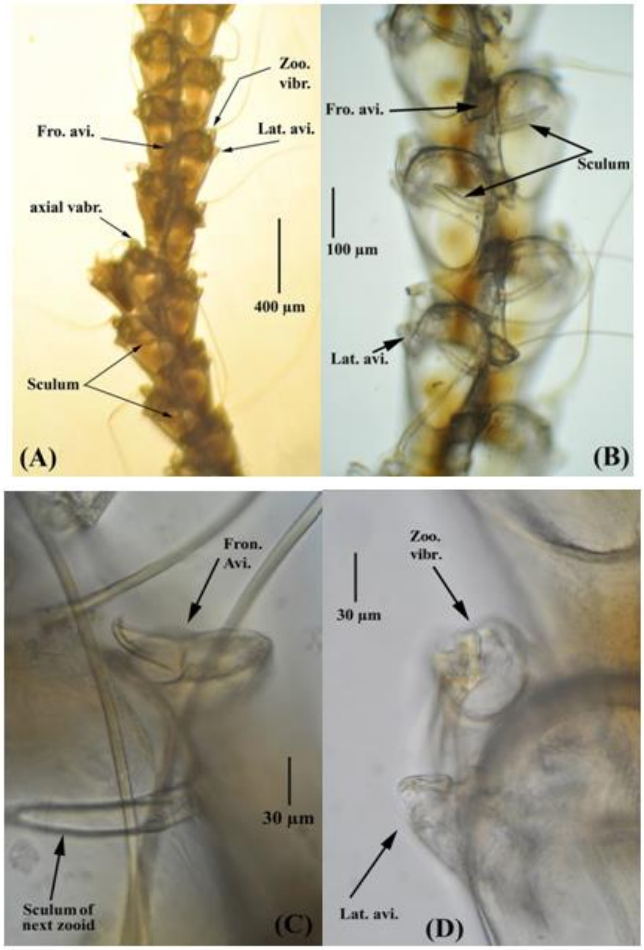

Fig. 4: *Licornia jolloisii*. **A**. General aspect. **B**. Enlarged part of branch showing lateral avicularium (Lat. Avi.) and frontal avicularium (Fron. Avi.).**C**. Enlarged photo of the large frontal avicularium (Fron. Avi.).**D**. Enlarged photo of the small lateral avicularium (Lat. avi.) and Zooidal vibraculum (Zoo. vibr.).

Description: Colonies erect, branching tufts, up to 1.5 cm height in the present material; branches dividing dichotomously; yellowish-white in color. Branches consisting of two alternating autozooid series. Autozooids elongate, measuring ZL (400 ± 80 µm), 350-510 µm (n= 10), ZW (195 ± 35 µm), 165-220 µm (n = 10), which slightly narrower proximally. The oval opesia almost occupying over one-half of total frontal length. Scutum in the form of small cane, overlapping the margins of the membranous area, located in the first half of opesia, and directed disto-medially. For each zooid, there are two types of avicularia. One lateral, small, often present laterally at outer corner of zooid. The other one is frontal, larger, located slightly below the proximal end of the opesia-inner edge. Both avicularia with distinctive mandible. There is one zooidal vibraculum at the outer proximal corner of the zooid, behind the next zooid; having long smooth seta. One axial vibraculum exists between each dichotomy. In the procured specimen, no data about ovicells is available.

Remarks: Based on the figures of Savigny (1817), *Acamarchis jolloisii* had been explained by Audouin (1826). The occurrence of *Scrupocellaria jolloisii* was reported by Hastings (1927) along the Suez Canal, including different stations. Vieira *et al*. (2013b) resurrected the genus *Licornia* for *Scrupocellaria jolloisii* and related species. It is likely that the spine-like unbran ched scutum arising at the median region

of opesia is characteristic for discriminating *Licornia jolloisii*.

General distribution and habitat: This species is distributed in the Red Sea and the Indian Ocean (Hastings, 1927). It was recorded from the Suez Bay by Waters (1909), the Suez Canal by Hastings (1927), the Suez Canal and the Suez Gulf by Balavoine (1959), and from the Mediterranean Sea by d'Hondt (1988) and Harmelin (2014). *Licornia jolloisii* has also been found on the West Atlantic coasts where it is recorded from Florida and Brazil (Vieira *et al*. 2013b). It is a benthic epifaunal bryozoan species.

Local distribution: This species was previously recorded from the Egyptian Red Sea (Audouin, 1826; Hastings, 1927; Balavoine, 1959), the Sudanese coast (Waters, 1909) and the Indo-Pacific region (Harmer, 1926). While, the results of Al Sayad survey (Balavoine, 1959) indicated that this species was frequent in the Gulf of Suez; no fouling records were added from the more recent Egyptian studies (Ghobashy *et al*., 1980; Ghobashy and El-Komi, 1981a, b; Ramadan, 1986; El-Komi, 1992; El-Komi *et al*., 1998; Emara, 2002; Emara and Belal, 2004).

Genus: *Aspiscellaria* Vieira *et al*., 2014

3.4. *Aspiscellaria* sp.

Figure 5 (A-F)

Synonyms:

Scrupocellaria van Beneden, 1850 *Aspiscellaria* Vieira *et al*., 2014: 12, Fig. 12.

Description: Colony erect. Biserial rows of zooecia. Autozooids measuring ZL (430 ± 70 µm), 380-530 µm (n= 10), ZW (210 ± 25 µm), 180-220 µm (n = 10), with large, smooth, proximal gymnocystal area, cryptocyst around opesia very narrow and smooth. Oval scutum with internal channels (ornamentation), is situated at or slightly below the median region of the inner part of the opesia, and overlapping the frontal opesia. Three spines on the outer distal corner of the autozooid; the most outer one is long and branched, and 2 shorter spines on the inner corner. Most spines appear as open tubes.

Fig. 5: *Aspiscellaria* sp. **A**. General Aspect. **B**. Enlarged part of branch showing ovicells and different shapes of scutum. **C**. Enlarged zooid showing magnified scutum. **D**. Enlarged zooid showing outer distal spines (O.D.S.), inner spines (I.S.) and scutum (Scu.). **E**. Enlarged zooid showing frontal avicularia (arrows). **F**. Enlarged zooid showing lateral avicularium (Lat. Avi.).

Two types of avicularia occur; small lateral avicularia on distolateral corners of autozooids; and larger frontal avicularia almost situated proximally to the opesia, against the neighbouring zooid and the ovicell of its predecessor. Both rostrum and mandible have sharp hooked tips. Each zooid has D-shaped operculum with proximal straight side. Ovicells smooth with many circular pores. Single axial vibraculum present. Vibracular chamber trapezoidal have setal groove straight directed transversely, with setal length as long as zooid length or little more.

Remarks: The outermost spine of the autozooid is long and branched and the scutum is oval with internal channels. Species of *Aspiscellaria* are distinguished from *Licornia* in having trapezoidal vibracular chambers with a straight setal groove directed transversely. The present material is determined to genus; only a single small colony is found and more material is needed, as well as electron microscope examination; in order to determine the species.

General distribution and habitat: Members of genus *Aspiscellaria* have a circumtropical distribution in shallow waters (Vieira *et al*., 2014).

Local distribution: Although the present record of the genus *Aspiscellaria* is the first from Hurghada, members of the genus *Scrupocellaria* were recorded from the Sudanese Red Sea and Suez by Waters (1909), the Suez Canal by Hastings (1927) and the Suez Canal and the Suez Gulf by Balavoine (1959). At the northern part of the Suez Canal, Ramadan (1986) reported *S. bertholettii* and *S. scruposa* from El-Tina and Port Said, respectively. The latter species was registered by other Egyptian studies in the Suez Canal and Suez Gulf (Ghobashy & El-Komi, 1981a, b; El-Komi *et al*., 1998; Emara & Belal, 2004).

Suborder: Ascophora Levinsen, 1909
Superfamily: *Catenicelloidea* Busk 1852
Family: Savignyellidae Levinsen, 1909
Genus: *Savignyella* Levinsen, 1909
3.5. *Savignyella lafontii* (Audouin, 1826)
Figure 6 (A-C)

Synonyms:

Eucratea lafontii Audouin, 1826: 242; Savigny, 1817: pl.13, Figs. 2^1-2^5.

Alysidium lafontii Busk, 1852: 14, pl.14, Figs. 1-5.

Catenaria lafontii Waters 1909: 131; Hastings 1927: 346; Hastings, 1930: 732.

Savignyella lafontii: Osburn, 1927: 126; Marcus, 1937: 78, pl.16, Fig.41; Harmer, 1957: 761-763, pl.51, Figs 11,12; Balavoine, 1959: 278-279 ; Winston, 1982: 136, Fig.62; 1986: 27; Cook, 1985: 142, Fig.26d; Gautier, 1962: 102; Hayward, 1988: 327; Gordon, 1989: 453, Figs. 11, 12; Tilbrook, Hayward & Gordon, 2001: 60, Fig. 8B; Hayward & McKinney, 2002: 40, Figs. 17 D-F.

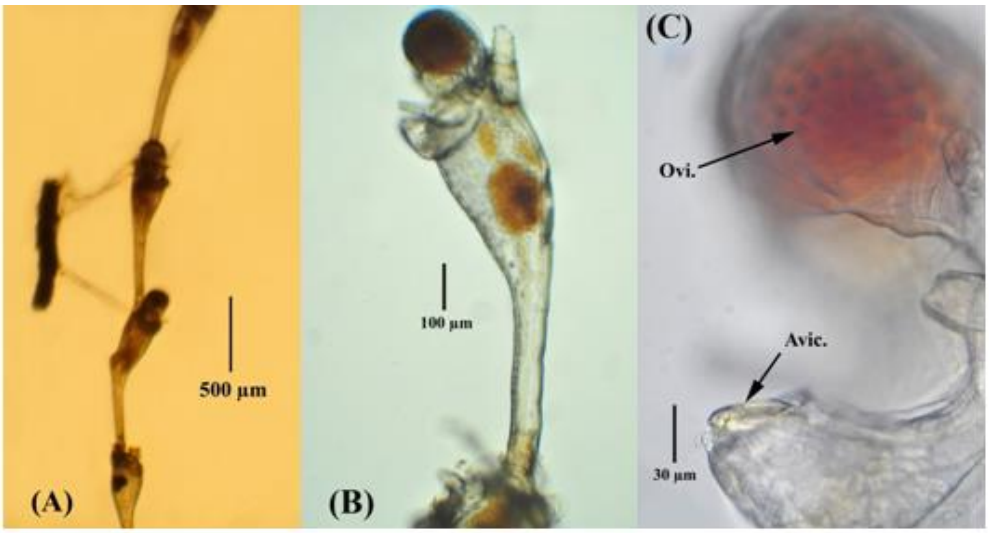

Fig. 6: *Savignyella lafontii*.**A**. General aspect. **B**. Single zooid. **C**. Enlarged part of zooid showing ovicell (Ovi.) and the median suboralavicularium (Avic.).

Description: Colony brownish, erect, branching jointed, to 5.5 mm in the present material, with uniserial chains of unizooidal internodes. Zooids are claviform, consisting of a proximal tube comprising about one-half of its total length and a fusiform distal portion bearing the frontal membrane. Autozooids measuring, ZL (1010± 65 µm), 990-1200 µm (n= 10), ZW (250 ± 25 µm), 220-310 µm (n = 10); with regularly and evenly porous frontal shield. Primary orifice terminal, D-shaped, with straight proximal edge, and short spines equally spaced around lateral and distal margins. A sessile median suboral avicularia present on disto-basal surfaces of some autozooids, partly obscuring orifice. Ovicell borne on distal rim of the orifice, globular; the endooecium densely perforated, the ectooecium largely membranous except for a smooth proximal rim. Tentacle number not recorded for the present material.

Remarks: No data about number of the retracted tentacles. Marcus (1937) indicated that the polypide of *S. lafontii* has 17-19 tentacles.

General distribution and habitat: *Savignyella lafontii* has a virtually cosmopolitan distribution in the warm temperate and tropical waters (Hayward & McKinney, 2002).Waters (1909) recorded it in the Red Sea. As well, it was recorded from Haifa, Israel (d'Hondt, 1988). It has been reported also on numerous occasions from the Adriatic, and its wider distribution in the western Mediterranean was detailed by Gautier (1962). Its wide distribution, spreading from the Indo-Pacific Realm and the tropical to the warm temperate Atlantic was reported by Lagaaij (1968) in his guide. Miocene specimens from the Gulf of Mexico and the Caribbean were also documented by the same author.

The fragmentary specimens of *Savignyella lafontii* can be found, in loose debris and within cavities in pieces of coral rubble. In addition, it was found in association with other bryozoan species such as *Vasignyella otophora* and *Beania hexamicorum* (Tilbrook *et al*., 2001).

Local distribution: It was recorded as *Eucratea lafontii* by Audouin, 1826 in the Egyptian Red Sea (d'Hondt, 2006; Ostrovsky *et al*., 2011), and as *Catenaria lafontii* in the Suez Canal and Port Taufiq (Hastings, 1927). However, no fouling records were added from more recent Egyptian studies in the Red Sea (Ghobashy *et al.*, 1980; Ghobashy and El-Komi, 1981a, b; Ramadan, 1986; El-Komi, 1992; El-Komi *et al*., 1998; Emara, 2002; Emara and Belal, 2004).

4. CONCLUSION

The present study provides taxonomic information about the erect fouling bryozoan fauna sampled from Hurghada, the Egyptian Red Sea coast. Five species were recorded; most of them are Indo-Pacific in origin. *Licornia jolloisii* has been recorded in the Mediterranean Sea, indicating its migration either through the Suez Canal or as fouling attached to ship hulls. *Savignyella lafontii* has a virtually cosmopolitan distribution in the warm temperate and tropical waters, and is recorded in both the Mediterranean and the Red Seas. The other three taxa: *Nolella gigantea*, *Synnotum aegyptiacum* and *Aspiscellaria* sp. are new records from Hurghada, Red Sea waters; therefore they represent an addition to the biodiversity of the Hurghada fauna. Greater sampling effort in that area is needed to obtain a more accurate assessment of the bryozoan diversity in Hurghada.

5. ACKNOWLEDGEMENTS

The author would like to thank Dr. Leandro M. Vieira, Marine Biology Center, University of São Paulo, São Paulo, Brazil for providing some references.

6. REFERENCES

Alvarez, J.A. (1995). New data on the family Lichenoporidae Smitt (Bryozoa: Cyclostomida) from Mediterranean region. *Journal of Natural History*, 29: 1067-1079.

Audouin, J.V. (1826). Explication sommaire des Planches de Polypes de l'Egypte et de la Syrie de J.C. Savigny, p. 225-244. In: *Description de l'Êgypte, Histoire Naturelle, Quatrième partie*, Paris.

Balavoine, P. (1959). Bryozoaires. Mission Robert Ph. Dollfus en Egypte (Décembre 1927-Mars 1929). S. S. "Al Sayad". *Résultats Scientifiques 3e partie*, 34: 257-280.

Brood, K. (1980). Note on cyclostomatous Bryozoa from Eilat, Israel. *Zoologica Scripta*, 9: 139-140.

Busk, G. (1886). Report on the Polyzoa collected by H.M.S. Challenger during the years 1873-1876. Part II. The Cyclostomata, Ctenostomata, and Pedic-ellinea. *Report on the Scientific Results of the Voyage of the H.M.S. "Challenger", Zoology* 17(1): viii + 47 pp., 10 pls.

Cook, P.L. (1985). Bryozoa from Ghana.A preliminary survey. *Musée Royal de l'Afrique Centrale, Tervuren, Belgique, Sciences Zoologiques,* 238: 1-315.

D'Hondt, J. L. (1983). Tabular keys for the identification of the recent Ctenostom-atous Bryozoa. *Mémoires de l'Institut océanographique de Monaco*, 14: 1-134.

D'Hondt, J. L. (1985). Contribution à la systématique des Bryozoaires Eurystomes. Apports récents et nouvelles propositions. *Annales des Sciences naturelles, Zoologie & Biologie animale*, 7: 1-12.

D'Hondt, J.-L. (1988). Bryozoans from the coast of Israel. *Bollettino di Zoologia*, 3: 191-203.

D'Hondt, J.-L. (2006). Nouvelles explications des planches de 'Polypes' de la description de l' Egypte. *Institut d'Orient*. Paris, 86 pp.

D'Orbigny, A. (1851). *Paléontologie française, Terrains Crétacés, V, Bryozoaires* [1], pp.1-188. Victor Masson, Paris.

Dumont, J.P.C. (1981). A report on the Cheilostome Bryozoa of the Sudanese Red Sea. *Journal of Natural History*, 15: 623-637.

Eitan, G. (1972). Additions to the bryozoan fauna of the Suez Canal. *Israel Journal of Zoology*, 21: 377-384.

El-Komi, M.M. (1992). Observations on the fouling settlement in the Red Sea waters (El-Ghardaga). *Bulletin of High Institute of Public Health,* 22(3): 637-648.

El-Komi, M.M.; Emara , A.M. and Mona, M. H. (1998). Ecology and settlement of marine fouling in the Suez Bay, Egypt.*Proceeding of the 8th International Conference on 'Environmentprotection is a must',* edited by Badawy, H. & Emara, H.; Alexandria, Egypt; pp. 234-251.

Emara, A.M. (2002). A comparison study of marine fouling organisms in the Northern region of the Gulf of Suez, Red Sea. *Journal of the Egyptian Academic Society of Environment and Development,* (D-Environmental studies) 3(2): 159-185.

Emara, A.M. and Belal, A.A. (2004). Marine fouling in Suez Canal, Egypt. *Egyptian Journal of Aquatic Research*, 30(A): 189-206.

Gautier, Y. V. (1962). Recherches écologiques sur les Bryozoaires chilostomes en Méditerranée occidentale. Thèse Marseille, Recueil des travaux de la Station Marine d'Endoume 38: 1-434.

Ghobashy, A.F.A. and El-Komy, M.M. (1981a). Fouling in Lake Timsah (Egypt). *Hydrobiological Bulletin* (Amsterdam), 14(3): 169-178.

Ghobashy, A. F. A. and El-Komy, M. M. (1981b). Fouling in the southern region of the Suez Canal. *Hydrobiological Bulletin* (Amsterdam), 14(3): 179-185.

Ghobashy, A.F.A. El-Komy, M.M. and Ramadan, Sh. E. (1980). Fouling in the Suez Canal. *Proceeding 5th International Congress on Marine Corrosion &Fouling,* edited and published by Marine Biology; Madrid, Spain; pp.75-92.

Gordon, D.P. (1984). The marine fauna of New Zealand: Bryozoa: Gymnolaemata from the Kermadec Ridge. *New Zealand Oceanographic Institute Memoirs,* 91: 1-198.

Gordon, D. P. (1989). Intertidal bryozoans from coral reef-flat rubble, Sa'aga, Western Samoa. *New Zealand Journal of Zoology*, 16(3):447-463.

Gordon, D.P. and Mawatari, S.F. (1992). Atlas of marine fouling Bryozoa of New Zealand ports and harbours. Miscellaneous Publications New Zealand Oceanographic Institute, 107: 1-52.

Gosse, P. H. (1855). Notes on some new or little-known animals. *Annals and Magazine of Natural History*, (2)16: 27-36.

Gregory, J. W. (1893). On the British Palaeogene Bryozoa. *Transactions of the Zoological Society of London*, 13: 219-279.

Harmelin, J.-G. (1968). Bryozoaires récoltés au cours de la campagne du Jean Charcot en Mediterranée occidentale (a Oût-septembre 1967). 1. Dragages. *Bulletin du Muséum national d'histoire naturelle*, 40: 1178-1208.

Harmelin, J. G. (2006). The *Puellina flabellifera* species complex: a remarkable example of worldwide species radiation in cribrimorph bryozoans. *Courier Forschungs Institut Senckenberg*, 257: 73-91.

Harmelin, J.-G. (2014). Alien bryozoans in the eastern Mediterranean Sea-new records from the coast of Lebanon. *Zootaxa*, 3893 (3): 301-338.

Harmer, S.F. (1915). The Polyzoa of the Siboga Expedition. Part 1.Entoprocta, Ctenostomata and Cyclostomata. *Siboga Expeditie*, 28A:1-180.

Harmer, S.F. (1926). The Polyzoa of the Siboga Expedition.Part 2.Cheilostomata Anasca. *Siboga-Expeditie Monogr*.28B, i–viii, pp.181-501, pls. 13-34.

Harmer, S.F. (1957). The Polyzoa of the Siboga Expedition. Pt. 4, Cheilostomata Ascophora. *Siboga Expedition Report*, 28d: 641-1147.

Hastings, A.B. (1927). Cambridge Expedition to the Suez Canal, 1924.Pt. 20. Report on the Polyzoa. *Transactions of the Zoological Society of Londo*, 22: 331-354.

Hayward, P.J. (1988). Mauritian cheilostome Bryozoa. *Journal of Zoology, London* 215: 269-356.

Hayward, P. J. and McKinney, F. K. (2002). Northern Adriatic Bryozoa from the vicinity of Rovinj, Croatia. *Bulletin of the American Museum of Natural History*, 270: 1-139.

Hayward, P.J. and Parker, S. A. (1994). Notes on some species of *Parasmittina* Osburn, 1952 (Bryozoa: Cheilostomatida). *Zoological Journal of the Linnean Society*, 110: 53-75.

Hincks, T. (1880). *A history of British Marine Polyzoa.* London: Van Voorst. Vol. 1, cxli+601pp, Vol. 2, 83 pls.

Jebram, D. (1973). Stolonen-Entwicklung und Systematikbei den Bryozoa Ctenostomata. *Zeitschriftfür zoologische Systematik und Evolutionsforschung* 11: 1-48.

Lagaaij, R. (1968). First fossil finds of six genera of Bryozoa Cheilostomata. *Attidella Societàitaliana di scienzenaturali,e del Museocivico di* storianaturale, 108:345-360.

Levinsen, G. M. R., (1909). *Morphological* and *systematic studies on the cheilostomatous Bryozoa* pp.1-431. Nationale Forfatterers Forlag, Copenhagen.

Marcus, E. (1937). Bryozoarios marinhosbrasileiros I. *Boletim da Faculdade de filosofia, ciências e letras, Universidade di Sao Paolo, Zoologia* 1: 5-224.

Marcus, E. (1940). Mosdyr (Bryozoaeller Polyzoa). Danmarkfauna, Kjrilbenhavn 46: 1-40l.

Osburn, R. C. (1914). The Bryozoa of the Tortugas Islands, Florida. *Carnegie Inst. Washington Pub*., 182: 183-222.

Ostrovsky, A.N.; Cáceres-Chamizo, J.P.; Vávra, N. and Berning, B. (2011). Bryozoa of the Red Sea: history and current state of research. In: Wyse Jackson, P. N., Spencer Jones, M.E. (eds), *Annals of Bryozoology 3*. International Bryozoology Association, Dublin, pp. 67-97.

Pieper, F. W. (1881). Eineneue Bryozoe der Adria, *Gemellaria* (?) avicularia. *Jahresbericht der Westfälischen Provinzialvereinsfür Wissenschaft und Kunst, Münster pro 1880*, 9: 43-48.

Prenant, M. and Bobin, G. (1956). Bryozoaires, 1ère partie. Entoproctes, Phylactole`mes, Ctenostomes. Faune de France, Paris, Lechevalier Éd. 60: 1-398.

Ramadan, Sh. E. (1986). Ecological and systematic studies on the marine fouling of the northern part of the Suez Canal. PhD dissertation, Mansoura University, 428 pp.

Ryland, J. S. (1965). Catalogue of main fouling organisms (found on shipscoming

into European waters). Vol. 2: Polyzoa. O.C.D.E., 84pp.

Ryland, J.S.; De Blauwe, H.; Lord, R. and Mackie, J. A. (2009). Recent discoveries of alien *Watersipora* (Bryozoa) in Western Europe, with redescriptions of species. *Zootaxa*, 2093: 43-59.

Savigny, J. C. (1817). Description de l'Egypte, ouRecueil des observations et des recherches qui ontétéfaites en Egypte pendant l'expédition de l'arméefrançaise. Histoire Naturelle. Planches "Polypes*"* 1–14. Paris.

Scholz, J. (2000). Eine Feldtheorie der Bryozoen, Mikrobenmatten und Sediment-Oberflachen. *Abhanlungen der Senckenbergischen Naturforschenden Gesellschaft*, 552: 1-193.

Tilbrook, K. J. (2006). Cheilostomatous bryozoan from the Solomon Islands. Santa Barbara Museum of Natural History Monographs No. 4, Studies in Biodiversity No.3, 385pp.

Tilbrook, K. J. and Cook, P. L. (2005). Petraliellidae Harmer, 1957 (Bryozoa: Cheilostomata) from Queensland, Australia. *Systematics and Biodiversity*, 2(3):319-339.

Tilbrook, K.J.; Hayward, P.J. and Gordon, D.P. (2001). Cheilostomatous Bryozoa from Vanuatu. Zoological Journal of the Linnean Society, 131: 35-109.

Van Beneden, P. J. (1850). Récherches sur les polypes bryozoaires de la Mer du Nord, et projet d'une classification des animaux de ce groupe. *Bulletin de l'Academie Royale de Belgique. Classes des Sciences* 16: 644-658. (1849 in Weisbord)

Vieira, L.M. Spencer Jones, M.E. and Winston, J.E. (2013a). *Cradoscrupocellaria*, a new bryozoan genus for *Scrupocellaria bertholletii* (Audouin) and related species (Cheilostomata, Candidae): taxonomy, biodiversity and distribution. *Zootaxa*, 3707 (1): 1-63.

Vieira, L.M.; Spencer Jones, M.E. and Winston, J.E. (2013b). Resurrection of the genus *Licornia* for *Scrupocellaria jolloisii* (Bryozoa) and related species, with documentation of *L. jolloisii* as a non-indigenous species in the western Atlantic. Journal of the Marine Biological Association of the United Kingdom, 93(7): 1911-1921.

Vieira, L.M.; Spencer Jones, M.E.; Winston, J.E.; Migotto, A.E. and Marques, A.C. (2014). Evidence for Polyphyly of the Genus Scrupocellaria (Bryozoa: Candidae) Based on a Phylogenetic Analysis of Morphological Characters. PLoS ONE 9(4): e95296. doi:10.1371/journal.pone.0095296

Waters, A.W. (1909). Reports on the marine biology of the Sudanese Red Sea - XII. The Bryozoa. Part 1.Cheilostomata. Journal of the Linnean Society of London, Zoology, 31: 123-181.

Waters, A.W. (1910). Reports on the marine biology of the Sudanese Red Sea - XII. The Bryozoa. Part 2.Cyclostomata, Ctenostomata and Endoprocta. *The Journal of the Linnean Society, Zoology*, 31: 231-256.

Winston, J.E. (1982). Marine bryozoans (Ectoprocta) of the Indian River area (Florida). *Bulletin of the American Museum of Natural History*, 173: 99-176.

Winston, J.E. and Woollacott, R.M. (2008). Redescription and revision of some red-pigmented *Bugula* species. *Bulletin of Museum of Comparative Zoology*, 159(3): 179-212.

Zabala, M. and Maluquer, P. (1988). Illustrated keys for the classification of Mediterranean Bryozoa. *Treballsdel Museu de Zoologia*, Barcelona, 4: 1-294.