



Polychaetes associated to calcareous sediments, Venezuela: Eunicidae

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Abstract. In this study we examined a total of 78 polychaetes collected from calcareous sediments at The National Park Archipiélago Los Roques, Venezuela. The samples were taken from seven reef stations, twice a year, between 2009 and 2012. We identified six species, belonging to four families of the clade Eunicida: 1 species of Oeonidae and Eunicidae; and two species of Dorvilleidae and Onuphidae. The species *Arabella (Cenothrix) maculosa*, *Schistomeringos pectinata*, *Kinbergonuphis simoni*, and *Kinbergonuphis rubrescens* are new records for Venezuela. These results increase the knowledge about marine biodiversity from the continental shelf in Venezuela and the south Caribbean.

Keywords: Aciculata, biodiversity, benthos, annelids, Polychaeta

Resumen. Poliquetos asociados a sedimentos calcáreos, Venezuela: Eunicidae. En este estudio se examinaron un total de 78 poliquetos obtenidos en sedimentos calcáreos en el Parque Nacional Archipiélago Los Roques, Venezuela. Las muestras fueron tomadas en siete estaciones, dos veces al año, entre el 2009 y 2012. Se identificaron seis especies, pertenecientes a cuatro familias del clado Eunicidae: 1 especie de Oeonidae y Eunicidae y dos especies de Dorvilleidae y Onuphidae. Las especies *Arabella (Cenothrix) maculosa*, *Schistomeringos pectinata*, *Kinbergonuphis simoni* y *Kinbergonuphis rubrescens* son nuevos registros para Venezuela. Estos resultados incrementan el conocimiento sobre la biodiversidad marina en la plataforma continental venezolana, y en el Caribe sur.

Palabras clave: Aciculata, biodiversidad, bentos, anélidos, Polychaeta.

Introduction

The Order Eunicida is one of the most diverse polychaete groups, with around 3.000 species that belong to nine families, of which Eunicidae is the most numerous (Fauchald 1977). The members of this Order are characterized by having a partially eversible pharynx and a mandibular complex with at least one pair of mandibles, well developed neuropodia and reduced notopodia. These are common polychaetes and are found in all marine ecosystems. In the Caribbean, 200 species of eunicimorphs have been described (Carrera-Parra 2009), whereas the number of species identified in Venezuela is considerably low, only 32 species (Hartman 1944, Bone *et al.* 1983, Liñero-Arana

1993, 1996; Díaz-Díaz & Liñero-Arana 2002). Most of them are associated to soft-bottoms, mainly recorded in the northeastern region. Moreover, in the insular region, Hartman (1944) recorded 12 species collected in La Tortuga, Coche and Cubagua islands. However, the presence of four of these species is questionable for the region. Therefore, a revision of the eunicimorphs of the Venezuelan continental shelf is required. In this study, the polychaete fauna associated to calcareous shallow sandy bottoms of the National Park Archipiélago Los Roques (NPALR) is taxonomically analyzed, to expand the knowledge of the biodiversity of this important zoological group.

Material and Methods

The National Park Archipelago Los Roques (NPALR) (Fig.1) is located in the Caribbean Sea (11° 58' 36" - 11° 44' 26" N and 66° 57' 26" - 66° 36' 25" O). The archipelago is part of the Federal Dependencies of Venezuela and is located 130 km off-shore from the Venezuelan coast. The NPALR consists of a large coral atoll that spans 36 km from west to east and 24.6 km from north to south, and covers an approximate area of 800 km². It comprises 50 isles and 292 cays and sand banks that form an irregular oval which encloses a lagoon in its central portion with a mean depth of 5 m (Diaz-Diaz *et al.* 2015). The surveys were performed between 2009 and 2012, twice a year at seven stations: Gran Roque, Madrisquí, Boca del Medio, Rabusquí, Boca de Sebastopol, Cayo de Agua, and Dos Mosquises (Fig. 1).

The examined material was collected with a PVC corer (0.015 m²). The processing of the samples (separation, transport, anesthesia, fixation, preservation, analysis and characterization) was done following the methodology described by Liñero-Arana & Díaz-Díaz (2011). The schemes and drawings were performed using the Coleman (2006)

methodology, and those presented in this study only correspond to new records for Venezuela. The specimens are placed at the reference collection of Laboratorio de Bentos Marinos (LBM), Universidad Simón Bolívar. In each case, the number of examined specimens is indicated between parentheses, after the station reference, which is represented by the acronym of each station followed by the period and year of collection (DMS-2-2009 = Dos Mosquises, 2nd period, year). The acronyms used for each station are described as: GR= Gran Roque, MQ=Madrisquí, BM=Boca del Medio, RQ=Rabusquí, SB=Boca de Sebastopol, CA= Cayo de Agua, and DMS=Dos Mosquises.

Results and Discussion

A total of 78 specimens were examined. These belong to six species, of which four are new records for Venezuela (*Arabella (Cenothrix) maculosa* Verrill, 1900, *Schistomeringos pectinata* Perkins, 1979, *Kinbergonuphis simoni* (Santos, Day & Rice, 1981), *Kinbergonuphis rubescens* (Augener, 1906)). These results expand our knowledge of the marine biodiversity in the Venezuelan continental shelf.

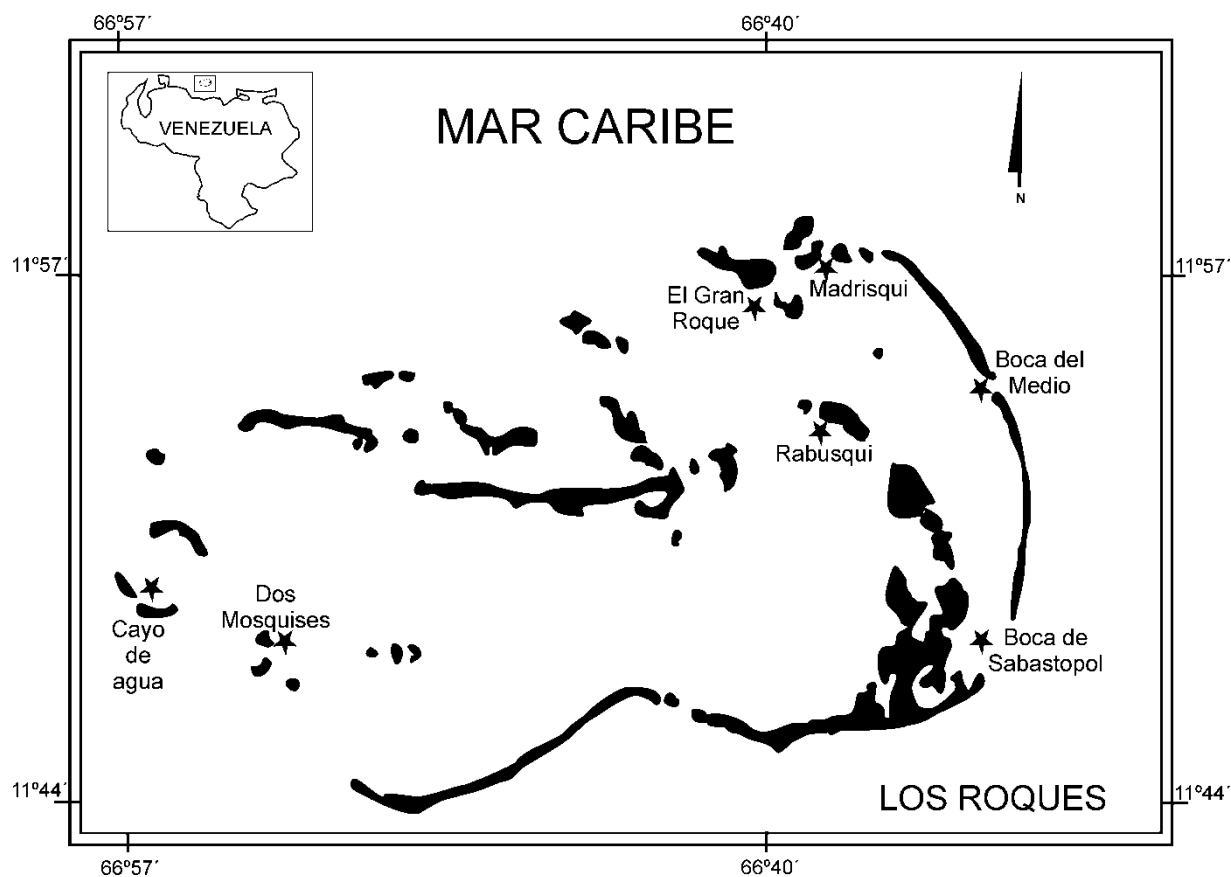


Figure 1. Sampling stations (*) in the National Park Archipelago Los Roques.

Family Oeonidae Kinberg, 1865

Genus *Arabella* Grube, 1850

Arabella (*Cenothrix*) *maculosa* Verrill, 1900.

(Figure 2a-g)

Arabella maculosa Verrill 1900: 651.

Arabella (*Cenothrix*) *maculosa* Carrera-Parra 2009: 360.

Material examined. Two specimens. BM-2-2009 (1); MQ-2-2009 (1).

Description. Complete specimen with 98 chaetigers, 25 mm long and 1 mm wide. Iridescent body, brown color. Conical prostomium and distally rounded, slightly longer than wider, with two pairs of subdermal eyes, localized near the posterior edge (Fig. 2a). Peristomium with two rings, well-developed parapodia with a short prechaetal lobe and moderately long postchaetal lobe, digitiform (Fig. 2b). The chaetae include limbate chaetae of two kinds: smooth and marginally serrated (Fig. 2c), and a lower acicular hooded chaetae, one per parapodium (Fig. 2d). Pigidium with short anal cirri. Thin mandibles, medially attached (Fig. 2e). Long maxillary carriers (Fig. 2f). M-I: 2+1 M-II 7: 11; M-III: 7+6; M-IV: 5+5; M-V: 1+1 (Fig.2g).

Comments. Carrera-Parra (2009) recognized the presence of two species of *Arabella* (*A.* (*Cenothrix*) *multidentata* (Ehlers, 1887), and *A.* (*C.*) *maculosa* (Verrill, 1900)) in the Great Caribbean. Both species have hooded acicular chaetae in the medial-posterior parapodia, but differ because the MII is symmetrical in the former and assymetrical in the latter. Díaz-Díaz & Liñero-Arana (2002) recorded *A. mutans* (Chamberlain, 1919) for the Venezuelan coasts; however, Colbath (1989) reviewed the material type for this species, and considered that the only valid records for this taxon correspond to the Eastern and Marshall islands. Therefore, *A. mutans* is not present in the Caribbean.

Distribution. Great Caribbean.

Family Eunicidae Berthold, 1827

Genus *Nematonereis* Schmarda, 1861

Nematonereis hebes Verrill, 1900

Nematonereis hebes: Verrill 1900:647; Treadwell 1921:82, Figs. 288-297; Gathof 1984: 6(40)/4-6, Fig. 40/2 a-g; Díaz-Díaz & Liñero-Arana 2003a:299; Díaz-Díaz & Liñero-Arana 2003b: 63; Liñero-Arana & Díaz-Díaz 2006: 768; Vanegas-Espinosa 2008: 132-133, Fig. 70 a-c.

Nematonereis unicornis Day 1967: 403, Fig. 17.8 j-n; Fauvel 1927: 412, Fig. 162 h-n; Fauchald 1977: 106; De León-González & Díaz-Castañeda 2006: 98;

Carrera-Parra 2009: 170.

Material examined. Twenty-five specimens. BM-1-2009 (1); BM-2-2009 (1); CA-2-2009 (4); DMS-2-2009 (4); GR-2-2009 (1); RQ-1-2009 (1); GR-2-2010 (1); MQ-1-2010 (1);MQ-2-2010 (2); CA-2-2011 (1);DMS-2-2011 (1); GR-2-2011 (1); MQ-1-2011 (4); SB-2-2011 (1); RQ-1-2011 (1).

Comments. It is a species considered controversial. Hartman (1944) described *N. hebes* as a synonym of *N. unicornis*. Nevertheless, Imajima & Hartman (1964) pointed out that in the former, the bidentate subacicular hooded hooks begin in the chaetigers 8-10, while in the latter, such hooks are tridentate and begin in the chaetiger 20. Moreover, Rullier (1974) separated both species due to their geographic locations. However, Salazar-Vallejo & Carrera-Parra (1997) indicate that since no significant differences were found between the specimens of *N. unicornis* from England and those from the Mexican Caribbean, the synonymy proposed by Hartman (1944) is correct.

Distribution. Pacific Ocean (Baja California), Indic Ocean (South Africa), Atlantic Ocean (Mediterranean Sea, Gulf of Mexico, Bermudas, Venezuela).

Family Dorvilleidae Chamberlain, 1919

Genus *Dorvillea* Parfitt, 1866

Dorvillea sociabilis (Webster, 1879)

Staurocephalus sociabilis Webster 1879:243, Lám. 7, Figs. 89-91; Hartman 1951: 66, Lám. 8, Figs 3-5; Gardiner 1975:215, Figs. 29 1-n; Perkins 1979:451, Figs. 15a-r; Wolf 1984: 44.24, Figs.44-18a-h; Vanegas-Espinosa 2008: 155-156, Figs. 84 a-c.

Examined material. One specimen: MQ-2-2009 (1)
Comments. The characteristics of this organism coincide with the descriptions of Perkins (1979) and Wolf (1984) for this species. This species was recorded by Vanegas-Espinosa (2008) for Falcon State, associated to coralline rubble, which concurs with the literature regarding the habitat of this species (Intertidal at 160 m, in coarse sand, sand with fragments of shells, coarse calcareous sand (Wolf 1984)).

Distribution. Virginia to Hutchinson Island and Florida, USA; North of the Gulf of Mexico, Cuba, Bermudas and Venezuela.

Genus *Schistomeringos* Jumars 1974.

Schistomeringos pectinata Perkins, 1979.

Figure 2h-m

Schistomeringos pectinata Perkins 1979:456, Figs. 18-20; Wolf 1984:44-20 Figs. 44-13, 14a-t; Carrera-Parra 2009:162, Fig. 2f.

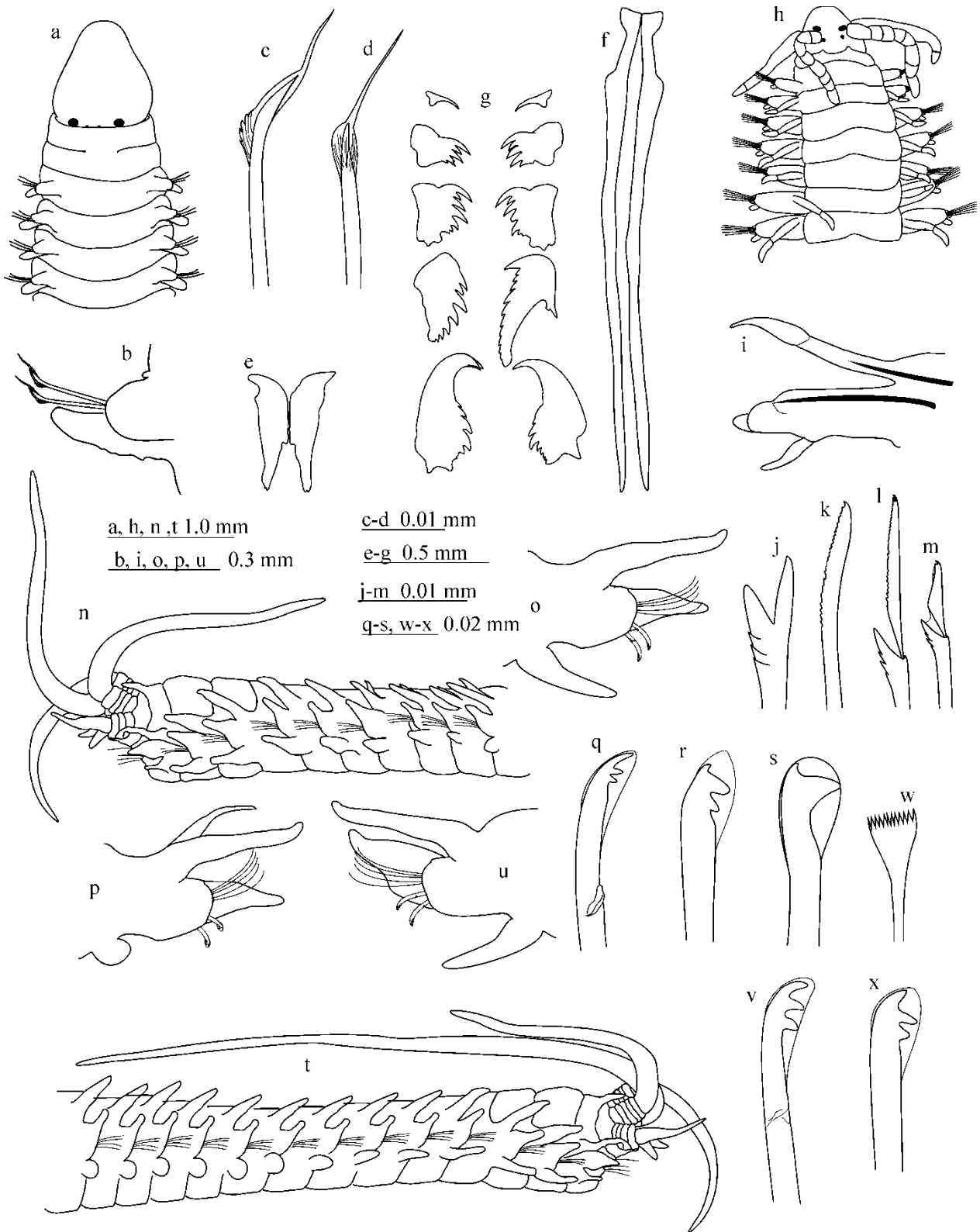


Figure 2.- a-g) *Arabella* (*Cenothrix*) *maculosa*: a) anterior end, dorsal view (VD), b) posterior parapodium, c) limbate chaeta, d) subacicular hooded hook, e) mandibles, f) maxillary apparatus, g) maxillary carriers; h-m) *Schistomeringos pectinata*: h) anterior end (VD), i) 10th parapodium, j) furcate chaeta, k) cultriform chaeta, l-m) falcigerous chaetae; n-s) *Kinbergonuphis simoni*: n) anterior end, lateral view (VL), o) anterior parapodium, p) medioposterior parapodium, q) tridentate pseudocompound hooded falciger, r) large median tridentate hooded hooks, s) subacicular hooded hook; t-x) *K. rubescens* t) anterior end (VL), u) anterior parapodium, v) tridentate pseudocompound hooded falciger, w) large median tridentate hooded hooks, x) pectinate chaeta.

Examined material. Six specimens. DMS-1-2009 (2); RQ-1-2009 (1); GR-1-2010 (1); MQ-1-2009 (1); RQ-2-2012 (1).

Description. Cylindrical body, with 52 chaetigers, 14 mm long and 1 mm wide, including the parapodia. Flattened prostomium, conical, anterior edge slightly truncated; antennae in dorsolateral and medial position in the prostomium, with a length equal of the palps, with 7-9 articulations. Biarticulate palps, long, thick, conical with a smooth palpostyle (Fig. 2h). One pair of reniform eyes. Prostomium with no appendages, slightly longer and narrower than the subsequent segments. Maxillary apparatus and mandibles with 3-6 fused teeth. Superior basal plate of the maxilla with 7 principal teeth, 17-20 secondary, 20-25 free denticles. The parapodia of the first chaetiger are uniramous, without dorsal cirri, with ventral cirri; the rest are sub-biramous, dorsal cirri with a thin notoaciculum, these cirri are generally longer than the chaetal lobes in anterior segments. Ventral cirri subdistal to the parapodial lobe. Chaetal lobes slightly elongated, thin (Fig. 2i). Supra-acicular chaetal lobe rounded with up to six capillary chaetae with the internal margin slightly serrated and up to two furcate chaetae with asymmetrical branches (Fig. 2j); the latter are replaced in the posterior segments with cultriform chaetae (Fig. 2k). Sub-acicular chaetal lobe with compound falciger chaetae with large blade (Fig. 2l) or short (Fig. 2m), bidentate with a short subterminal hook. Six to ten sub-acicular compound falcigers. Bifurcate chaetae with slightly unequal tips, base with 3-4 denticulate longitudinal margins that can extend up to the edge. Capillary chaetae with a serrated margin. Compound falcigers with long and short blades having a short subterminal guard. Rounded pygidium, obliquely truncated, with two pairs of anal cirri; the dorsal cirri are longer and slightly thicker than the ventral ones.

Comments. *Schistomeringos pectinata* is very similar to *S. rudolphi*, being the latter widely distributed in Venezuela (Díaz-Díaz & Liñero-Arana 2002; Vanegas-Espinosa 2008). Among the morphological characteristics that separate both species, the shape of the maxillary apparatus stands out; in *S. pectinata* the anterior free denticles of the inferior rows are wide and pectinate, while in *S. rudolphi* are thinner and not pectinate.

Distribution. Gulf of Mexico, Florida, and Venezuela.

Family Onuphidae Kinberg, 1865

Genus *Kinbergonuphis* Fauchald, 1982

Kinbergonuphis simoni (Santos, Day & Rice, 1981).

Figure 2n-s

Onuphis eremita oculata. Santos & Simon 1974.

Onuphis sp. Santos & Simon 1980; Dauer & Conner 1980.

Kinbergonuphis simoni Santos, Day & Rice 1981: 663-667, Fig. 1a-e; Fauchald 1982: 32-34, Fig. 10e.

Examined material. Forty-two specimens. CA-2-2009 (3); DMS-2-2009 (3); CA-1-2010 (4); CA-2-2010 (1); DMS-1-2010 (3); RQ-2-2010 (1); CA-2-2011 (8); DMS-2-2011 (12); GR-2-2011 (3); MQ-2-2011 (1); SB-2-2011 (1); RQ-2-2012 (1); MQ-1-2012 (1)

Description. The largest specimen was 32 mm long and 1.5 mm wide, including the parapodial lobes, with 72 chaetigers. Rounded prostomium with a pair of frontal palps and subrounded (Fig. 2n). Five occipital appendages (three central antennae and two lateral palps). Ceratostyles, of the medial antenna reaching up to chaetiger 6; those of the lateral internal occipital antennae up to chaetiger 7 and the ceratostyle of the lateral palps reaches chaetiger 2. Short ceratophores with 4 rings. One pair of small eyes located between the bases of the occipital antennae. Short peristomial segment, almost half the size of the prostomium, with a pair of subulate peristomial cirri placed distally that surpasses it in longitude. Parapodia with oval pre-setal lobe and digitiform post-setal lobe (Fig. 2o), which shortens starting from chaetigers 13-18. Digitiform dorsal cirri, larger than the parapodial lobes, up to chaetigers 14-15, where it is as long as the lobe. Cirriform ventral lobe in the first six chaetigers, with the same longitude or even slightly longer than the parapodial lobes; it reduces from chaetiger 4 until it is papilliform (Fig. 2p). Filiform branchiae, present from chaetigers 6-8; the first 5-8 pairs with only one filament, up to a maximum of four filaments, in the medial and medioposterior parapodia. First five chaetigers with tridentate pseudocompound hooded falciger (Fig. 2q). Large median tridentate hooded hooks between chaetigers 4 and 16 (Fig. 2r). Sub-acicular bidentate hooks present from chaetiger 17 (Fig. 2s); pectinate chaeta with 9-11, generally 10 tooth; accompanied by bilimbate chaetae. Pigidium with four anal cirri.

Comments. *Kinbergonuphis simoni* is very close to *K. pulchra* (Fauchald, 1980) but it differs from the latter because it has tridentate pseudocompound hooded falciger in the 1-5 chaetigers instead 1-6, and that it has ventral cirrus digitiform up to chaetiger 8 instead chaetiger 9. Also Fauchald (1982) and Santos *et al.* (1981), emphasized the high variability of some characteristics, such as, patterns of

pigmentation (transversal lines with a brown color over the back of the peristomium and first two chaetigers) and number of teeth of the pectinate chaetae. Regarding the former, the transversal lines are imperceptible in specimens that have been preserved for a long time, usually those of larger size, and absent on the smaller ones. On the other hand, they have pointed out that the number of teeth of the pectinate chaetae varies between 6 and 11, but a pattern between them and the position of the chaetae with respect to the parapodia could not be proved, and the number of these is not consistent, probably due to the fragility of this type of chaetae. It is important to clarify that the identification of this species was done and must be done using other diagnostic characteristics and not the two previously indicated, such as the number of rings of the ceratophores, the longitude of the antennae, the number of anterior chaetigers with pseudocompound hooks, the maximum number of branchial filaments, the start of modified and sub-acicular hooks.

Distribution. Florida and Venezuela.

Kinbergonuphis rubescens (Augener, 1906)
(Figure 2t-x)

Onuphis rubescens Augener, 1906:139-141, pi. 4: figs. 76-83.

Kinbergonuphis rubescens Fauchald, 1982: 3, Fig. 6e.

Nothria rubescens Salazar-Vallejo, 1996: 25

Kinbergonuphis rubescens Carrera-Parra, 2009: 173
Examined material. Eight specimens. CA-1-2009 (1); CA-2-2009 (1); DMS-1-2009 (2); DMS-2-2009 (1); SB-1-2009 (2); SA-1-2010 (1).

Description. Larger complete specimen with 61 chaetigers, 28 mm long and 1.7 mm wide, including the parapodial lobes. Oval prostomium with a pair of short frontal and subrounded palps (Fig. 2t). Five occipital appendages with long ceratostyles, reaching the one of the medial antennae, chaetiger 13; those of the lateral palps reach chaetiger 5; and those of the lateral internal antennae, chaetiger 5. Short ceratophores with 4-5 rings. One pair of small eyes located between the bases of the occipital antennae. Short peristomial segment, almost half the size of the prostomium with a pair of subulate peristomial cirri distally located that exceed it in longitude. Parapodia with rounded pre-setal lobe and foliose post-setal lobe (Fig. 2u), which shortens from the ninth chaetiger. Cirriform dorsal cirri, longer than the parapodial lobes. Cirriform ventral cirrus in the first four chaetigers, it reduces from chaetiger five until it is papiliform (Fig. 2t). First five chaetigers with tridentate pseudocompound hooded

falciger (Fig. 2v) and a very thin capillary chaeta, large median tridentate hooded hooks and falcigerous chaetae are absent. Bilimbate chaetae between chaetigers 6 and 13, 1-2 simple chaetae widened in the base, distally acuminate and one pectinate chaeta with approximately 12 teeth (Fig. 2w); two tridentate sub-acicular hooks emerge from the parapodium from chaetiger 14 (Fig. 2x), accompanied by the bilimbate chaetae and the pectinate chaeta. Simple branchiae from chaetiger 13-19, as a cirriform filament. Pygidium with four anal cirri.

Comments. To date only six species of *Kinbergonuphis* are characterized by presenting simple branchiae (Fauchald 1982) and only *K. rubescens* is recorded for this region. Among the characteristics of the examined specimens, only two partially differ from the original description, and refer to the emergence interval of the first pair of branchiae (13-19 for the specimens of this study) and the number of anterior segments with cirriform ventral cirri (4), being 14 and 5, respectively. Nonetheless, such differences might be considered as variations between the species.

Distribution. Great Caribbean

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