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Four new records of Eunicidae (Annelida: Polychaeta) from the Western Philippines

Islands

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Abstract

During December 2010, an expedition was conducted to the Philippines Islands aiming to collect coastal polychaetes in the area. Among the abundant material, 593 individuals belonging to the family Eunicidae (Annelida; Polychaeta) were found and studied, and their identification yielded seven species. Four of them were new records to Philippines, enlarging the list of eunicid polychaetes of the country from 32 to 36 species; moreover, two of the species new for these islands were also new records to South China Sea. Additionally, the taxonomic status of one of them is modified, by transferring it from genus *Eunice* Cuvier, 1817 to *Leodice* Lamarck, 1818. Eunicids are especially abundant and diverse in benthic environments of tropical seas, where they act mainly as predators and scavengers or as herbivores. Some species are important in coral reefs because their boring abilities make them key organisms in the bioerosion processes. In this respect, knowledge on the composition of their communities is of capital for the understanding of ecological structure of the system.

Key Words: Polychaeta, Eunicidae, new records, Philippines, South China Sea.

Declarations

Funding

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Conflicts of interest

The authors declare that they have no competing interests

Ethics approval

Since neither live animals were used for experimentation nor biological material (be it genetically modified or not) were used for the current study, approval from the “Cómite de Ética en la Investigación” (Ethics Committee for Research) of the Universidad Autónoma de Madrid was not required, as established in the University, regional and national normatives.

Consent to participate

In no case human participants whose consent to participate was needed were involved.

Consent for publication

In this study, human participants whose consent for publication was needed were not involved.

Availability of data and material

All the specimens herein studied were deposited at the Museo Nacional de Ciencias Naturales de Madrid and accession numbers for material are provided

Author’s contributions

AD conducted the examination and identification of specimens, compiled the data, and led writing of the paper.

EL performed the illustrations, reviewed the identifications, and co-wrote the paper. Both authors read and approved the final manuscript

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Introduction

Eunicidae (Eunicida: Polychaeta) is one of the largest families of polychaeta, with more than 250 valid species belonging to eight genera, of which *Eunice* Cuvier, 1817 is by far the most diverse (Carrera-Parra 2009). It is probably the one with the widest range of length, with species being no more than 15 mm long as adults, such as *Eunice marovoi* Gibbs, 1971, while some others can attain up to 4 m, as *Eunice aphroditois* (Pallas, 1788) (Fauchald, 1992a). Eunicidae occur worldwide, but exhibit higher species diversity in warm waters (Fauchald 1992a). They inhabit from the intertidal to abyssal depths (Rouse and Pleijel 2001) both in soft and hard bottoms, but a greater number of species can be found in the latter where they dwell in cracks and crevices of rock and biogenic structures (Fauchald 1992a) mainly as free living animals and only exceptionally in permanent tubes (Carrera-Parra 2009). Reports of feeding include predation on various invertebrates, scavenging and herbivorous behavior (Rouse and Pleijel 2001), but more specialized feeding behaviors are known. Some species have been reported as symbiotic with other sessile invertebrates, mainly sponges and soft corals (Hartmann-Schröder and Zibrowius 1998), whereas others are specialized in boring seagrass leaves (Gambi et al. 2003). Eunicids are known to drill the calcareous skeleton of hard corals using their complex and extremely hard jaw apparatus; when they occur in great numbers they act as ecologically relevant destructors of coral blocks and take an important role in the bioerosion processes (Hutchings 1986).

During December 2010 a research team from Universidad Autónoma de Madrid went on a biological expedition to the Philippines Islands aiming to study the polychaete fauna of shallow waters. On the basis of a rich representation of local benthic ecosystems (rocky shores, coral reefs, beaches ranging from fine sand to coarse gravel), two localities were chosen for the study, Batangas (SW Luzon Island) and El Nido (N Palawan Island). The two localities lie in the west coast of the archipelago facing the South China Sea. Since the main goal of the project was the study of Syllidae, the collecting effort was biased to little sample sizes and consequently to tiny specimens. However, every polychaete extracted was also properly preserved, labeled and studied, and this gave a very high number of specimens belonging to other families. In this paper the most relevant results concerning family Eunicidae are presented.

For 90 years following the classical work of Grube (1878), in which 16 new species were described for the Philippines Islands, only other 16 species belonging to family Eunicidae were newly recorded in the country (Pillai 1965; Gallardo 1968; Natividad and Palpal-latoc 1986; Palpal-latoc 1996, 1997, 2001; Glasby et al. 2019), so previous to our study 32 eunicid species were known to occur in these islands; the present paper give a

further contribution increasing the number of species. In this investigation the sampling effort was limited to two localities and to shallow waters, so prospection in other places and environments as well as examination of material collected in other expeditions such as project PANGLAO 2004 (Bouchet et al. 2009) will provide a much more complete picture of the polychaete fauna of Philippines Islands.

Material and Methods

The samples were taken by snorkeling or SCUBA diving from depths ranging from 2 to 20 m. The polychaetes were sampled in a qualitative fashion mainly from algae, coral blocks and rubble, and sponges. Algae were scraped from hard surfaces and stored in zip-safe plastic bag for the length of diving, whereas sponges and coral blocks and rubble were taken directly from the bottom and stored in a similar way. Immediately after diving, the worms were removed alive by close examination of the substrate using a Nikon SMZ1 stereomicroscope, sorted by families and preserved individually in 100% ethanol, except some specimens that were fixed in 10% seawater formalin, including those belonging to Euniciformia. Eunicids were studied at the Universidad Autónoma de Madrid under a Nikon SMZ 800 stereomicroscope and a Nikon Eclipse 80i biological microscope using the former for body structure measurements; drawings and chaetae measurements were made using a Nikon Optiphot microscope with a differential interference contrast system (Nomarsky) and a camera lucida drawing tube. After examination the specimens herein described were preserved in 70% ethanol and deposited at the Museo Nacional de Ciencias Naturales de Madrid; accession numbers for material are provided.

Morphological terminology referring go to genera *Eunice*, *Leodice* and *Palola* follows Fauchald (1992a) for general terms, but Paxton (2000) for prostomium and prostomial appendages. Based on anatomical studies of the nervous system, the last author pointed out that the most lateral appendages are actually very long palps instead of real antennae,. The maxillary and pectinate chaetae of these genera as well as of genus *Lysidice*, were described using the terms proposed by Molina-Acevedo and Carrera-Parra (2015) and actualized by Glasby et al. (2019).

Taxonomic account

The eunicids examined numbered 593 specimens belonging to seven species. Three of them had been previously recorded from the Philippines Islands: *Leodice antennata* Lamarck, 1818 (147 specimens), *Lysidice collaris*

Audouin and Milne-Edwards, 1833 (38 specimens), and *Lysidice unicornis* (Grube 1840) (275 specimens) (Palpal-latoc 2001). The rest of species were new records for the fauna of Philippines and two of them were also new records for the whole South China Sea.

Order EUNICIDA

Family EUNICIDAE Berthold, 1827

Genus *Eunice* Cuvier, 1817

Three antennae and a pair of articulate palps; antennae and palpal styles smooth or irregularly articulated. Peristomial cirri present in posterior peristomial ring. Notopodial aciculae present at least in anterior end of the body. Limbate neurochaetae present. True compound falciger neurochaetae present; bi- or tridentate. Acicula light or dark. Subacicular hooks present; light or dark; bi- or tridentate.

***Eunice coccinioides* Augener, 1922**

(Figs. 2, 6a-d)

***Eunice coccinioides* Augener.** Fauchald 1992a: 107, fig. 32 a-g.

Material examined: MNCN-16.01/16513; Batangas (13°41'51"N, 120°49'45"E), 17 m, dead coral rubble, 6th December 2010; one specimen. MNCN-16.01/16514; Batangas (13°41'51"N, 120°49'45"E), 2-3 m, within unidentified sponges, 6th December 2010; one specimen. MNCN-16.01/16515; Batangas (13°40'48"N-120°51'20"E), 20 m, dead coral rubble, 8th December 2010; one specimen. MNCN-16.01/16516; El Nido (11°11'50"N-119°17'06"E), 18 m, dead coral rubble, 15th December 2010; 62 specimens. MNCN-16.01/16517; Batangas (13°40'48"N-120°51'20"E), 17 m, dead coral rubble, 18th December 2010; five specimens.

Diagnosis

Largest specimen complete (material from MNCN-16.01/16513) with regenerating posterior end, fragmented in two; anterior fragment with prostomium, peristomium and 137 chaetigers, 78 mm long; posterior fragment with 120 chaetigers, 63 mm long; length through chaetiger 10, 8.0 mm; width at chaetiger 10, 8.5 mm. Body cylindrical on its anterior half, then dorsally convex and ventrally flat, tapering towards posterior end; green or red, with a conspicuous white dorsal band across chaetiger 3 and numerous white spots scattered on dorsum;

color pattern fading out towards posterior end; antennae and peristomial cirri white. Prostomium (Fig. 2a) shorter than peristomium, bearing palps and three antennae; prostomial lobes frontally rounded, dorsally flattened; median sulcus very conspicuous, extending dorsally to posterior end of prostomium; eyes small, red, posterior to and between palp and lateral antenna insertions. Prostomial appendages (Fig. 2a) arranged in a semicircle; palp and lateral antenna of each side close to each other, central antenna separated by a clear gap from lateral ones; palpophores and ceratophores cup-shaped; styles similar in thickness, slender and digitiform, irregularly wrinkled; palps extending to second peristomial ring, lateral antennae to chaetiger 3, and central antenna to chaetiger 5. Peristomium (Fig. 2a) cylindrical, with two distinct rings; anterior ring twice as long as posterior one and similar in length to prostomium; posterior ring similar in length to the following chaetiger. Peristomial (Fig. 2a) cirri reaching posterior end of prostomium, fusiform, without articles. Maxillary formula: 1 + 1, 7 + 6, 8 + 0, 5 + 13, 1 + 1. Prechaetal lobes inconspicuous in all parapodia; postchaetal lobes triangular in chaetigers 1 to 36 (Fig. 2b), then progressively shorter, becoming inconspicuous in posterior two thirds of body (Fig. 2c). Branchiae from chaetiger 5 to 68 in largest specimen (less than 65% of body length), pectinate; in the middle of the branchiate region of body much longer than dorsal cirrus and with up to 12 branches (Figs. 2a, b, 6a); digitiform and similar in length to dorsal cirrus in the posterior third of the branchiate region (Figs. 2c, 6b); all digitiform, similar in length to dorsal cirrus and extending much further in juvenile specimens. Dorsal cirri (Figs. 2a, b, c, 6a, b) without articulation, all tapering. First ventral cirri digitiform; triangular and somewhat inflated basally from chaetiger 3 onwards; very short and ovate from the end of the branchiate region. Superior group (Fig. 2b, c) of chaetae composed of up to 12 limbate and up to 18 pectinate chaetae; inferior group (Fig. 2b, c) of chaetae composed of up to 21 compound heterogomph falciger chaetae; pseudocompound falciger and spiniger chaetae absent. Limbate chaetae somewhat more slender than falciger shafts, slightly geniculated, with very fine marginal serration. Pectinate chaetae (Figs. 2d, 6d) heterodont narrow, with 10-14 short and slender teeth, shafts smooth. Compound falciger chaetae (Figs. 2e, f, 6c) bidentate, blade triangular, about 55 μ m long; proximal tooth triangular, short, directed laterally; distal tooth longer than proximal one, slightly bent, directed obliquely; both teeth widely separated; guard marginally serrated, usually shorter than blade, when longer distally pointed without mucro; shaft not too inflated, with fine marginal serration. Aciculae (Fig. 2g) black, usually solitary, tapering, distally blunt and clearly projecting from parapodial lobe. Subacicular hooks (Fig. 2h) black, first present from chaetiger 28 in largest specimen, from chaetiger 18-24 in medium sized and juvenile ones, usually solitary; bidentate; main fang large, triangular, directed in right angle and with tip bent distally; distal fang

almost as large, directed obliquely; guard inconspicuous or absent. Pygidium with a pair of fusiform dorsal anal cirri, without articulation, extending through last 2-3 chaetigers; ventral anal cirri not observed.

Remarks

The studied specimens fit well the redescription based on type material given by Fauchald (1992a). The most similar species is *Eunice afra* Peters, 1817, originally described from Mozambique, but recorded from a number of localities all over the Indo-Pacific tropical region (Fauchald 1970, 1992a, Miura 1979) including Philippines (Palpal-latoc 2001). However, this species can be distinguished from *E. coccinoides* by the presence of articulated antennae and by the branchiae, which extend to the posterior end of the body.

Distribution

There are records of the *E. coccinoides* scattered all over the Indo-Pacific (Fauchald 1992a). The species is herein first recorded for the Philippines, but it has previously been cited at least once in the South China Sea (Tan and Chou 1993).

Genus *Leodice* Lamarck, 1818

Three antennae and a pair of articulate palps; antennae and palpal styles regularly articulated. Peristomial cirri present in posterior peristomial ring. Lateral black dot between posterior parapodia. Notopodial aciculae present at least in anterior end of the body. Limbate neurochaetae present. True compound falciger neurochaetae present; bi- or tridentate. Acicula light or dark. Subacicular hooks present; light or dark; bi- or tridentate.

Remarks

In its original description, genus *Leodice* was not clearly differentiated from *Eunice*, so both names were alternatively synonymized or used interchangeably until the first third of the 20th century (Zanol et al. 2014). However, molecular phylogenetic analysis of the family Eunicidae supported a monophyletic clade in which the type species of the genus (*Leodice antennata* Lamarck, 1818) grouped with a number of species traditionally included within *Eunice* (Zanol et al. 2010). This monophyletic clade was sustained in a subsequent analysis that combined molecular and morphological characters (Zanol et al. 2014). Based on this result, these authors resurrected the generic name and transferred to it 13 species formerly considered to belong to *Eunice*. Furthermore, they gave a new and more consistent diagnosis of the genus, which was characterized by two

morphological synapomorphies: the regular articulation of antennae and palps and the presence of a black dot between each pair of posterior parapodia, although the latter was secondarily lost in a number of species within the genus.

***Leodice uschakovi* (Wu, Sun and Liu, 2013) n. comb.**

(Figs. 3, 6e-i)

***Eunice uschakovi* Wu, Sun and Liu, 2013: 135, figs. 1-3.**

Material examined: MNCN-16.01/16520; El Nido (11°11'50"N-119°17'06"E), 18 m, dead coral rubble, 15th December 2010; one specimen.

Diagnosis

Specimen incomplete and fragmented in two, anterior fragment 18.5 mm long with 40 chaetigers, midbody fragment 2.7 mm long with five chaetigers; length through chaetiger 10, 4.9 mm; width at chaetiger 10, 1.3 mm: another specimen complete, 15.5 mm long with 56 chaetigers. Body cylindrical, tapering towards posterior end; whitish. Prostomium (Fig. 3a) clearly shorter than peristomium, bearing palps and three antennae; prostomial lobes frontally rounded, dorsally flattened; median sulcus discrete; eyes small, red, posterior to and between palp and lateral antenna insertions. Prostomial appendages (Fig. 3a) arranged in a semicircle, palp and lateral antenna of each side close to each other, central antenna separated by a gap from lateral ones; palpophores and ceratophores cup-shaped; styles similar in thickness, slender and tapering, articulated, articles of similar lengths; palps with six articles and extending to second peristomial ring, lateral antennae with seven articles and extending to chaetiger 1, style of central antenna lost in the two specimens examined. Peristomium (Fig. 3a) cylindrical, with two distinct rings; anterior ring twice and half as long as posterior one; posterior ring somewhat shorter than the following chaetiger. Peristomial (Fig. 3a) cirri almost reaching posterior end of prostomium, tapering, with three or four long, cylindrical articles of similar lengths. Maxillary formula not examined. Pre- and postchaetal lobes inconspicuous in all parapodia (Fig. 3b). Branchiae (Figs. 3a, b, 6e) from chaetiger 6 to end of body; slightly shorter than dorsal cirri; pectiniform with up to six branches in anterior half of body; number of branches progressively reducing towards posterior end; branchiae digitiform in the last 10 chaetigers. Dorsal cirri (Figs. 3a, b, 6e) long and tapering. Ventral cirri short and triangular at chaetigers 1-4; inflated basally from chaetiger 5 to 20; triangular in remaining parapodia. Superior group of chaetae (Fig. 3b) composed of 2-8 limbate and 1-2 pectinate chaetae; inferior group (Fig. 3b) of chaetae composed of 2-11 compound

heterogomph falciger chaetae; pseudocompound falciger and spiniger chaetae absent. Limbate chaetae slender, with finely serrated margin smooth. Pectinate chaetae (Fig. 3c) very heterodont narrow, with 8-9 short and thick teeth, shafts finely serrated. Compound falciger chaetae bidentate (Figs. 3d, e, 6f), blade 60-50 μm long; proximal tooth triangular, long, directed laterally; distal tooth half as long as proximal one, clearly bent, directed laterally, both teeth widely separated; guard distally pointed, marginally serrated, without mucro; shaft not too inflated, with fine marginal serration. From chaetiger 43 (chaetiger 44 in smallest specimen) some blades tridentate (Figs. 3f, g, 6g), with a second apical tooth minute and distally directed surmounting first one, otherwise identical to normal bidentate falciger blades; number of tridentate blades per group increasing towards posterior end. Aciculae (Figs. 3h, 6i) yellow, distally hammer-shaped; paired in most chaetigers, occasionally numbering three; ventral one clearly thinner. Subacicular hooks (Figs. 3i, 6h) yellow, first present from chaetiger 21 (from chaetiger 15 in smaller specimen), usually solitary; tridentate; main fang large, triangular; subdistal fang half as large as the latter smaller and more strongly curved; distal fang even smaller, straight and obliquely directed guard marginally rounded and without serration, tip blunt. Pygidium not observed.

Remarks

This species is accurately referred to genus *Leodice* Lamarck, 1818 due to the regular articulation of its antennae and palps. Within the genus, the presence of hammer-shaped tip in aciculae and of falciger chaetae that are bidentate in anterior half of body and tridentate in posterior one and its branchial distribution make clear the identification of our specimens. The most similar species is *L. miurai* (Carrera-Parra and Salazar-Vallejo, 1998), from Caribbean Sea, which was already transferred to *Leodice* by Zanol et al. (2014). Together with very similar antennae, aciculae and subacicular hooks, it bears bidentate and tridentate falciger chaetae in different body regions (Carrera-Parra and Salazar-Vallejo 1998), in a similar fashion to that of *L. uschakovi*. However the branchial pattern is very different in the two species, with branchiae extending over less than half of body in *L. miurai* and from anterior part to near posterior end in *L. uschakovi*.

Distribution

Due to its recent description, this species had never been recorded out of its type locality, Hainan Island, which is also placed in South China Sea (Wu et al. 2013; Glasby et al. 2016). New records can be expected in this area when further investigations are conducted.

Genus *Lysidice* Lamarck, 1818

One or three antennae without articulation. Palps absent. Peristomial cirri absent. Notopodial aciculae absent at least on anterior quarter of body. Limbate neurochaetae present. True compound falciger neurochaetae present; bidentate. Acicula light or dark. Subacicular hooks present; light or dark; bidentate.

Lysidice natalensis Kinberg, 1865

(Fig. 4)

Lysidice natalensis Kinberg. Day 1967: 402, fig. 17.7 k-r.

Material examined: MNCN-16.01/16529; El Nido (11°11'50"N-119°17'06"E), 18 m, dead coral rubble, 15th December 2010; three specimens. MNCN-16.01/16530; Batangas (13°44'26"N, 120°53'34"E), 2-4 m, dead coral rubble, 7th December 2010; three specimens.

Diagnosis

Largest specimen (material from MNCN-16.01/16530) complete but with recently regenerated posterior end (from chaetiger 77 onwards), with 115 chaetigers; total length, 21.5 mm; length through chaetiger 10, 2.8 mm; width at chaetiger 10, 1.7 mm. Body subcylindrical, dorsally convex, ventrally flat, tapering towards posterior end; usually yellowish, sometimes pink with a broad white dorsal band in chaetigers 2 and 3 (material from MNCN-16.01/16530). Prostomium (Fig. 4a) clearly bilobed, bearing three antennae, but no palps; nearly as long as anterior ring of peristomium; prostomial lobes frontally rounded, dorsally flattened; median sulcus deep; eyes dark, kidney shaped, anterior to and below lateral antenna insertion. Antennae (Fig. 4a) in a straight line, similar in thickness and length; ceratophores covered by anterior margin of first peristomial ring; ceratostyles lanceolate and sometimes wrinkled, but without real articulation; all antennae outreaching anterior end of prostomium when stretched forward. Peristomium (Fig. 4a) cylindrical, with two distinct rings; anterior ring one and a half as long as posterior one; posterior one as long as following chaetiger; peristomial cirri absent. Maxillary formula: 1 + 1, 3 + 3, 0 + 0, 6 + 6, 1 + 1 (material from MNCN-16.01/16530). Prechaetal lobes inconspicuous in all parapodia; postchaetal lobes rounded and well developed (Fig. 4b, e). Dorsal cirri without articulation; tapering in anterior chaetigers (Fig. 4b), then increasingly shorter, becoming papilliform after chaetiger 35 (Fig. 4e). First ventral cirri short, triangular in chaetigers 1-5; inflated basally and partially fused to parapodial lobe thereafter (Fig. 4b); increasingly shorter towards posterior end, becoming inconspicuous after chaetiger 50 (Fig. 4e). Superior group of chaetae including 2-8 limbate and 1-8 pectinate chaetae; inferior group chaetae including up to 20 compound

heterogomph falciger chaetae; pseudocompound falciger and spiniger chaetae absent. Limbate chaetae slightly geniculate, similar in thickness to the shafts of compound chaetae; bearing a fine marginal serration. Pectinate chaetae in anterior chaetigers numbering 1-2, heterodont narrow, with 8-9 long and slender teeth (Fig. 4d), shafts smooth; up to eight pectinate chaetae in posterior chaetigers, anodont wide, with about 20 short and slender teeth (Fig. 4f). Compound falciger chaetae (Fig. 4c) bidentate, blade 24 μm long; proximal tooth triangular, directed laterally; distal tooth only a little shorter and thinner than proximal one, directed laterally; guard distally pointed but without mucro, marginally serrated; shaft not too inflated, marginally serrated. Aciculae (Fig. 4g) black, always solitary, distally blunt and slightly curved. Subacicular hooks (Fig. 4h) black, first present from chaetiger 19, always solitary; bidentate; both fangs similar in shape, with distally directed blunt tips; guards absent. Pygidium with two pairs of anal cirri; ventral ones minute, shorter than pygidial lobes; dorsal ones tapering, as long as last four chaetigers (material from MNCN-16.01/16530).

Remarks

According to Carrera-Parra et al. (2011), only four species within the genus *Lysidice* (*L. bilobata* Verrill 1900, *L. natalensis* Kinberg 1865, *L. notata* Ehlers 1887, and *L. adrianae* Carrera-Parra, Fauchald and Gambi 2011) bear black aciculae and subacicular hooks. However, *L. bilobata*, *L. notata* and *L. adrianae*, from tropical western Atlantic Ocean, can be distinguished from our specimens by their clearly shorter antennae, which in no case outreach the anterior margin of prostomium. In addition the eyes of *L. notata* are rounded instead of kidney-shaped and subacicular hooks of *L. adrianae* show a unique change of color, being black in anterior chaetigers and becoming translucent in posterior ones. On the contrary, our specimens fit clearly with the available data for *L. natalensis* (Day 1967), not only with regards to aciculae and subacicular hooks, but in the shape of antennae (long, outreaching anterior margin of peristomial lobes), and in the maxillary formula, which typically includes M-II bearing three robust teeth at each side instead of four or five, as typical in the genus.

Distribution

Prior to this record, this species has been considered as endemic form the South-western African coast (Day 1967), so this species is herein first recorded not only for the Philippines but for central Indo-Pacific area. Yet taking into account the subtle differences among species of the genus, it is very likely that *L. natalensis* has a much broader geographical distribution and that many records of other cosmopolitan species of *Lysidice* (namely *L. collaris* and *L. ninetta*) should be referred to it.

Genus *Palola* Gray, in Stair, 1847

Three antennae and a pair of palps; antennae and palpal styles not articulated. Peristomial cirri present in posterior peristomial ring. Limbate neurochaetae absent. True compound falciger neurochaetae present; uni- or bidentate. Acicula light or dark. Subacicular hooks absent.

Palola viridis Gray, in Stair, 1847

(Figs. 5, 6j-m)

Palola viridis Gray, in Stair. Fauchald 1992b: 1207, fig. 12.

Material examined: MNCN-16.01/16537; Batangas (13°44'26"N-120°53'34"E), 2-4 m, dead coral rubble, 4th december 2010; two specimens. MNCN-16.01/16538; El Nido (11°11'50"N-119°17'06"E), 18 m, dead coral rubble, 15th December 2010; 50 specimens. MNCN-16.01/16539; Batangas (13°40'48"N-120°51'20"E), 17 m, dead coral rubble, 18th December 2010; four specimens.

Diagnosis

Longest specimen (material from MNCN-16.01/16537) incomplete, with 241 chaetigers; total length 87 mm; length through chaetiger 10, 5 mm; width at chaetiger 10, 1.9 mm. Largest specimen incomplete, with 145 chaetigers; total length 39 mm; length through chaetiger 10, 7 mm; width at chaetiger 10, 2.8 mm. Body subcylindrical, dorsally convex, ventrally flat; greenish with a broad white dorsal band on second peristomial ring or yellowish, often with subtle white dorsal spots at prostomium, first peristomial ring and anterior chaetigers. Prostomium (Fig. 5a) frontally rounded, dorsally slightly flattened, bearing palps and three antennae; excavated around bases of palps; twice as long as the anterior ring of peristomium; median sulcus deep; eyes dark, between palp and lateral antenna insertions. Prostomial appendages (Fig. 5a) arranged in an open semicircle, palps separated by a gap from antennae, lateral and central antennae inserted close to each other; palpophores and ceratophores cup-shaped, with two articulations; styles digitiform and without articulation, thickness evenly increasing from palps to central antenna; palps extending to chaetiger 1, lateral antennae to chaetiger 5, and central antenna to chaetiger 7. Peristomium (Fig. 5a) wider anteriorly, with two distinct rings; anterior ring one and half as long as posterior one; posterior one longer than the following chaetiger. Peristomial cirri (Fig. 5a) reaching posterior end of prostomium; strongly tapering; without articulations. Maxillary formula: 1 + 1, 3 + 2, 2 + 0, 0 + 0, 1 + 1; M-I strongly curved and with triangular processes near bases, M-II dark colored

as the other pieces but with white tooth tips (Fig. 5a); mandibles strongly calcified. Prechaetal lobes inconspicuous in all parapodia; postchaetal lobes rounded (Figs. 5b, c, 6j). Branchiae from chaetiger 83, digitiform, longer than dorsal cirri after 3-4 chaetigers (Fig. 6k). Dorsal cirri without articulation, all tapering, twice as long as parapodial lobe in first chaetiger, one and a half as long as parapodial lobe in second chaetiger, then increasingly shorter. Ventral cirri short, triangular at chaetigers 1-4; strongly inflated from chaetiger 5 to 105 (Fig. 5b, c); short and digitiform thereafter. Superior group of chaetae composed of 4-6 limbate chaetae; inferior group of chaetae composed of 10-26 compound heterogomph falciger chaetae; pseudocompound falciger, pseudocompound spiniger and pectinate chaetae absent. Limbate chaetae (Fig. 5d) very slender, slightly geniculated, marginally serrated. Compound falciger chaetae (Figs. 5e, 6l) bidentate, blade proportionately short, 24-32 μm long; proximal tooth triangular, upwards directed, short and with blunt tip; distal tooth slightly shorter than proximal one, similarly directed; guard distally pointed, bearing strong marginal serration, without mucro; shaft not too inflated, marginally serrated. Aciculae (Figs. 5f, 6m) black, usually solitary, distally blunt and clearly curved. Subacicular hooks absent. Pygidium not examined in adult specimens.

Remarks

Although identifying species belonging to genus *Palola* can be difficult (Fauchald 1992b), the observed specimens can be referred to this species. The length of prostomial appendages steadily increasing from palps through central antenna together with the presence of a dorsal excavation around the bases of the palps provide identification of our specimens, as they fit Fauchald's redescription regarding these respects. Some difference in the maxillary formula (namely, in specimens from Philippines M-IV could not be observed, whereas type series specimens bear these pieces armed with two teeth) was observed, but we do not consider it important enough as to erect a new specific name. It must be considered, too, that morphological variation within genus *Palola* is very subtle, and in many cases specimens appearing to be very similar to the redescription provided by Fauchald (1992b) are genetically well differentiated (Schulze 2006). Only the specimens collected near the type locality (Samoa and Vanuatu) can certainly be assigned to the species, whereas morphologically similar specimens collected in areas of the Indo-Pacific closer to Philippines, such as Guam, Yap o Palau Islands, could belong to a distinct species from a genetically based criterion (Schulze and Timm 2012).

Distribution

Palola viridis was assigned as the type species of the genus on the basis of material collected in Samoa (Fauchald 1992b). Since its formal description, it has been recorded a great number of times and it has been traditionally considered as a widespread species in the tropical Central Pacific (Burrows 1955). However, in the polychaete checklists compiled by Paxton and Chou (2000) and by Palpal-latoc (2001), the only *Palola* species recorded from the South China Sea and Philippines is *P. siciliensis* (Grube, 1840), rendering the present record as the first one of *P. viridis* for the entire area. *Palola siciliensis* was described from the Mediterranean Sea but it has been reported in all major oceans, roughly between latitudes 43 °N and 32 °S (Schulze 2006), so its presence in the Philippines cannot be discarded; however a careful examination of the specimens should be conducted.

Conclusion

The results herein presented add four new species to the polychaete fauna of the Philippine Archipelago and consequently the number of reported species of Eunicidae increases to 36. *Lysidice natalensis* Kinberg, 1865 and *Palola viridis* Gray, in Stair, 1847 are also new findings for the entire South China Sea. The fact that a modest number of samples collected from only three localities points out that the marine biodiversity of the region is still far from a good knowledge and that a hard research effort is needed in order to achieve this goal.

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Figure legends

Fig. 1 Geographical location of the sampling sites in the Philippines Archipelago.

Fig. 2 *Eunice coccinioides* MNCN-16.01/16513. **a** Anterior end in dorsolateral view. **b** Left parapodial lobe of chaetiger 36 in anterior view. **c** Left parapodial lobe of chaetiger 65 in anterior view. **d** Pectinate chaeta of chaetiger 36. **e** Dorsalmost compound falciger of chaetiger 36. **f** Ventralmost compound falciger of the same chaetiger. **g** Acicula of chaetiger 65. **h** Subacicular hook of chaetiger 65. Scale bar: **a** = 3.8 mm. **b**, **c** = 1 mm. **d-f** = 48 μ m. **g**, **h** = 97.5 μ m

Fig. 3 *Leodice uschakovi* MNCN-16.01/16520. **a** Anterior end in dorsal view. **b** Left parapodial lobe of chaetiger 15 in anterior view. **c** Pectinate chaeta of chaetiger 44. **d** Dorsalmost compound falciger of chaetiger 15. **e** Ventralmost compound falciger of the same chaetiger. **f** Dorsalmost compound falciger of chaetiger 44. **g** Ventralmost compound falciger of the same chaetiger. **h** Paired aciculae of the same chaetiger. **i** Subacicular hook of the same chaetiger. Scale bar: **a** = 2 mm. **b** = 0.3 mm. **c-g** = 26.7 μ m. **h**, **i** = 64 μ m

Fig. 4 *Lysidice natalensis* MNCN-16.01/16529. **a** Anterior end in dorsal view. **b** Left parapodial lobe of chaetiger 5 in anterior view. **c** Compound falciger of the same chaetiger. **d** Pectinate chaeta of the same chaetiger. **e** Right parapodial lobe of chaetiger 65 in anterior view. **f** Pectinate chaeta of the same chaetiger. **g** Acicula of the same chaetiger. **h** Subacicular hook of the same chaetiger. Scale bar: **a** = 1 mm. **b**, **e** = 0.16 mm. **c**, **d**, **f-h** = 28.6 μ m

Fig. 5 *Palola viridis* MNCN-16.01/16537. **a** Anterior end in dorsal view. **b** Left parapodial lobe of chaetiger 15 in anterior view. **c** Right parapodial lobe of chaetiger 50 in anterior view. **d** Limbate chaeta of chaetiger 15. **e** Compound falciger of the same chaetiger. **f** Acicula of chaetiger 50. Scale bar: **a** = 2 mm. **b**, **c** = 0.32 mm. **d-f** = 28.6 μ m

Fig. 6 *Eunice coccinioides* MNCN-16.01/16513. **a** Left parapodial lobe of chaetiger 35 in anterior view. **b** Left parapodial lobe of chaetiger 73 in anterior view. **c** Ventralmost compound falciger of the same chaetiger. **d** Pectinate chaeta of the same chaetiger 36. *Leodice uschakovi* MNCN-16.01/16520. **e** Left parapodial lobe of

chaetiger 15 in anterior view. **f** Dorsalmost compound falciger of chaetiger 45. **g** Ventralmost compound falciger of the same chaetiger. **h** Subacicular hook of the same chaetiger. **i** Paired aciculae of the same chaetiger. *Palola viridis* MNCN-16.01/16537. **j** Left parapodial lobe of chaetiger 15 in anterior view. **k** Left parapodial lobe of chaetiger 85 in anterior view. **l** Compound falciger of the same chaetiger. **m** Acicula of chaetiger 50

Figure 1











