

Title	An extraordinarily large specimen of the polychaete worm <i>Eunice aphroditois</i> (Pallas) (Order Eunicia) from Shirahama, Wakayama, central Japan
Author(s)	UCHIDA, Hiro'omi; TANASE, Hidetomo; KUBOTA, Shin
Citation	Kuroshio Biosphere (2009), 5: 9-15
Issue Date	2009-03
URL	http://hdl.handle.net/2433/179218
Right	© 2009 黒潮生物研究財団
Type	Journal Article
Textversion	publisher

**AN EXTRAORDINARILY LARGE SPECIMEN OF THE POLYCHAETE
WORM *EUNICE APHRODITOIS* (PALLAS) (ORDER EUNICEA)
FROM SHIRAHAMA, WAKAYAMA, CENTRAL JAPAN**

By

Hiro'omi UCHIDA ¹, Hidetomo TANASE ², and Shin KUBOTA ³

Abstract

A large specimen of *Eunice aphroditois* (Pallas) (Annelida, Polychaeta, Eunicea, Eunicidae) was collected from a mooring raft for fish culture at Seto Fishing Harbor, Shirahama, Japan, on January 16, 2009. The raft had been in use for 13 years and the worm was hidden in one of its floats. This worm, measuring 299 cm long with 673 segments, and weighing 433 g, is one of the largest specimens of this species ever recorded from the temperate and tropical seas of the world.

Introduction

Eunice aphroditois (Pallas, 1788) (Annelida, Polychaeta, Eunicea, Eunicidae) is distributed all over the warmer marine areas of the world, including coastal areas southwards from central Honshu, the main island of Japan. The present species is well-known for its great size and body length among the many species of polychaetes in the world, and finds have often been reported together with the body size (Cuvier 1817: West Indies, 4 feet; Fauvel 1917: Australia, 3 m; Imahara 1998: Japan, 2 m; etc.). In Japanese waters, the present species is often found along the Pacific southern coasts, where its length has usually been reported as about 1 m; as far as the authors know, the longest specimens from Japan reach about 2 m in length (Imahara 1998; Uchida unpublished). Recently, we found an extraordinary giant specimen inhabiting one of numerous floats of a mooring raft for fish culture in the Seto Fishing Harbor, Shirahama, Wakayama, Japan. This wooden raft, 40×20 m in size and surrounding a fish corral, had 120 floats, one float being 180 cm long and 60 cm in diameter

-
1. Kushimoto Marine Park Center, Arita, Kushimoto, Higashimuro, Wakayama, 649-3514, Japan.
 2. 676 Shirahama, Nishimuro, Wakayama, 649-2211, Japan.
 3. Seto Marine Biological Laboratory, Field Science Education and Research Center, Kyoto University, 459 Shirahama, Nishimuro, Wakayama, 649-2211, Japan

(Pl. 1A). It had been in use since March, 1995, and was demolished in mid-January, 2009.

Description

Eunice aphroditois (Pallas, 1788)

(Japanese name: Oni-Isome)

Collection date and site

- January 16, 2009.
- from a demolished mooring raft and fish corral, Seto Fishing Harbor, Shirahama town, Nishimuro county, Wakayama Prefecture, Japan.

Body length

- in life: 299 cm in more or less relaxed condition on shore (Pl. 1B).
- after fixation: 120 cm in 10% formalin seawater solution, without any pre-fixation treatment to relax the specimen.

Segments

673 setigers.

Width

- Maximum body width: 25 mm (excluding parapodia) in living condition.
- Width of peristomium: 8 mm in fixed condition.

Remarks

Eunice aphroditois was described on the basis of the long anterior portion of a specimen from Sri Lanka (= Ceylon), but the type specimen is lost (Fauchald 1992). This well-known species has been recognized from olden times owing to its long body-size, and it has many synonyms. The larger eunicids are distributed in warmer marine waters around the world (Atlantic, Pacific, and Indian Oceans, and Mediterranean Sea), and their synonymy and identification have been confused for a long time.

Atlantic populations (first record: *Eunice gigantea* sensu Cuvier 1830 and *Eunice macrobranchia* Schmarda 1861, originally from the Cape of Good Hope), and Mediterranean populations (first record: *Eunice roussaei* sensu Pruvot & Racovitza 1895), together with the other species besides *E. aphroditois* described from the Pacific, have recently tended to be

regarded as separate species (Fauchald 1992; Zanol & Bettoso 2006). However, the taxonomic confusion is not truly resolved, and all the records of large eunicid species, including those described under other names in the Pacific such as *Leodice gigantea* Savigny in Lamarck 1818, are regarded here as *Eunice aphroditois*.

The body of *Eunice aphroditois* (and its related species if they are not in fact all conspecific) may be the longest among the polychaete worms. This fact was recognized from the beginning of the 19th century. Cuvier (1817) mentioned that a species of large *Eunice* from the Indian Ocean was 4 feet long. Soon after, he again mentioned a species 4 feet long from the West Indies (Atlantic), described under the name of *Eunice gigantea*, as the largest of the known annelids: "La mer des Antilles en a une de plus de quatre pièdes de long (*E. gigantea*, Cuv.), qui est la plus grande Annélide connue." (Cuvier 1830; 199-200). Baird (1870: 343) similarly remarked on *Eunice aphroditois* as follows, "This is one of the longest of known annelids." But many published records based on fragments with or without prostomia do not include indications of body length. Concerning specimens from Japan, Izuka (1912) and Treadwell (1926) gave no information on body size; however, Izuka (1927) described one as 100 cm in body length and 20 mm in body width, with 430 segments. Fauvel (1936) recorded two specimens of this species from Seto, Shirahama, the same locality as the present specimen. One (reported as *E. aphroditois*) was an anterior fragment 95 mm long, and the other (reported as *E. tentaculata*) was 220 mm long.

There are many records of these larger eunicids with information on their size from all over the world. The size information is almost always of three sorts: body length, body width, and number of segments. Measurements of body length in almost all cases were based on fixed specimens, but some seem to have been based on living worms. Although the body length of polychaetes is quite variable depending on the conditions of fixation, the number of segments seems to be a rather precise indicator of body size, as is shown by the present specimen.

About 300 nominal species have been assigned to the genus *Eunice* Cuvier 1817, with body lengths ranging from 5 mm to 600 cm in mature individuals (Fauchald 1992), but we are not aware of any description citing a body length of 600 cm in the scientific literature. Table 1 presented here lists the world-wide records of the bigger specimens. The longest was reported from the Mediterranean Sea of France, with a body length of 332 cm and 879 segments (Pruvot & Racovitza 1895), so it may be that fully grown and relaxed *E. aphroditois* naturally reach ca. 3 m in length.

Many species of the genus *Eunice* have a white (or paler colored) dorsum of the anterior segments. Gigantic *Eunice* also frequently have paler bands, including the present specimen, but, some reports show individuals without such bands, for example *Eunice gigantea* of Milne-Edwards (1836; Pl. 10, Pl. 1A). This volume is famous for its fine figures, and the cited illustration surely shown the worm in its living state, without anterior paler segments. The text merely repeats the statement of Cuvier (1830), cited above, and the locality of collection of the figured individual is not stated. The presence of paler bands is not a sign of maturation. Fauchald (1999) reported that *Eunice aphroditois* matures much earlier, with some rather small yet mature individuals being under 10 cm in body length.

Concerning the origin and age of our specimen, it is uncertain when the individual first entered the mooring raft and fish corral during the 13 years the structure sat in the harbor. It is also uncertain whether the worm arrived by larval settlement or at a semi-adult stage of development. Nonetheless, the individual surely had been living in its comfortable floating home for a quite a long time.

Table 1. Records of bigger specimens of eunicids.

Authors	Body length (cm)	No. of segments	Localities	Referred species
Lamarck 1818		448	Indian Ocean	<i>Leodice gigantea</i>
Cuvier 1830	120		Antillen	<i>Eunice gigantea</i>
Baird 1870	105		(British Museum)	<i>E. aphroditois</i>
Grube 1878	113	618	Philippines	<i>E. aphroditois</i>
Marenzeller 1887		480	South Africa	<i>Eriphyle capensis</i>
Pruvot & Racovitza 1895	332	879	Mediterranean	<i>E. roussaei</i>
Saint-Joseph 1906	123		Atlantic France	<i>E. kinbergi</i>
Fauvel 1917	300	458	Australia	<i>E. roussaei</i>
Fauvel 1923	300		France	<i>E. roussaei</i>
Izuka 1927	100	430	Japan	<i>E. aphroditois</i>
Rioja 1958	120 - 150		Pacific Mexico	<i>E. aphroditois</i>
Campoly 1982	300		Iberian Peninsula	<i>E. aphroditois</i>
Davey 2000 & 2008	300		Australia	<i>E. aphroditois</i>
This report	120 ^c - 299 ^e	675	Japan	<i>E. aphroditois</i>

c: contracted; e: well-extended

Acknowledgements

We thank Mr Kazuo Yamaguchi for his skillfully taken photo of the specimen, Mr Takafumi Fukuda for his kindness in informing us of the manner of use of the mooring raft in the harbor, Dr Tetsuya Kato, for kindly providing biological information on the present

species, and Dr Mark J. Grygier for his critical revision of the manuscript.

References

- Baird, W. B. 1870. Remarks on several genera of annelides, belonging to the group Eunicea, with a notice of such species as are contained in the collection of the British Museum, and a description of some others hitherto undescribed. J. Linn. Soc. Lond., 10: 341-361.
- Campoy, A. 1982. Fauna de Anelidos Poliquetos de la Peninsula Iberica. Fauna de España. Publ. Biol. Univ. Navarra, ser. Zool., 7 (2): 464-781.
- Cuvier, B. G. 1817. Le Règne Animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Tome 2, 532 pp. Deterville, Paris.
- Cuvier, B. G. 1830. Le Règne Animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Nouvelle édition. Tome 3, xvi + 328 pp. Deterville, Paris.
- Davey, K. 2000 & 2008. Life on Australian seashores. <<http://www.mesa.edu.au/friends/seashores/page1.html>>
- Fauchald, K. 1992. A review of the genus *Eunice* (Polychaeta: Eunicidae) based upon type material. Smiths. Cont. Zool., 523: x + 422 pp.
- Fauchald, K. 1999. Bobbit Worm. <<http://www.bio.net/bionet/mm/annelida/1999-July/001251.html>>
- Fauvel, P. 1917. Annélides Polychètes de l'Australie méridionale. Arch. Zool. exp. Gén., 56: 159-277, Pls. 4-7.
- Fauvel, P. 1923. Polychètes Errantes. Faune de France. 5, 488 pp., Paul Lechevalier, Paris.
- Fauvel, P. 1936. Annélides Polychètes du Japon. Mem. Call. Sci., Kyoto Imp. Univ., Ser. B, 12: 41-92.
- Grube, E. 1878. Annulata Semperiana. Beiträge zur Kenntnis der Annelidenfauna der Philippinen nach den von Herrn Prof. Semper mitgebrachten Sammlungen. Mém. Acad. Imp. Sci. St.-Pétersberg, Sér. 7, 25, (8), ix + 300 pp., 15 pls.
- Imahara, Y. 1998. A big individual of *Eunice aphroditois* growing up in the coral tank of the aquarium of Wakayama Prefectural Museum of Natural History. (in Japanese) Shizen-Hakubutsukan Dayori (Newsletter from the Museum of Natural History).

16 (3): 6, 8.

- Izuka, A. 1912. The Errantiate Polychaeta of Japan. Jour. Coll. Sci., Imp. Univ. Tokyo, 30, (2), 262 pp., 24 pls.
- Izuka, A. 1927. Annelida Polychaeta. (in Japanese) Illustrated Encyclopedia of the Fauna of Japan. pp. 1535-1575. Hokuryukan, Tokyo.
- Lamarck, J. B. de 1818. Les Annelides. (Annelides). Histoire Naturelle des Animaux sans Vertèbres. Tom. 5, pp. 274-374.
- Marenzeller, E. von, 1887. Polychäten der Angra Pequena-Bucht. Zool. Jahrb., Abt. Syst., 3: 1-24, Pl. 1.
- Milne-Edwards, H. 1836. Les Annelides, avec un Atlas. in G. Cuvier, "Le Règne Animal distribué d'après son organisation, pour servir de base a l'histoire naturelle des animaux, et d'introduction a l'anatomie comparée. 3^e ed. Vol. 15, 54 pp., Vol. 16, 29 pls.
- Pallas, P. S. 1788. Marina varia nova et rariora. Nova Acta Acad. Sci. Imp. Petropolitanae, 2: 229-249, Pl. 5.
- Pruvot, G. & E.-G. Racovitza, 1895. Matériaux pour la faune des Annélides de Banyuls. Arch. Zool. exp. Gén., sér. 3, 3: 339-492, Pls. 15-20.
- Rioja, E. 1958. Estudios Anelidologicos. XXII. Datos para el conocimiento de la fauna de Anelidos Poliquetos de las costas orientales de Mexico. Anal. Inst. Biol. Mexico, 29: 219-301.
- Saint-Joseph, B. A. de 1906. Les Annélides Polychètes des côtes de France (océan et côtes de Provence). Ann. Sci. Nat. Zool., Sér. 9, 3: 145-260, Pls. 1-5.
- Schmarda, L. K. 1861. Neue wirbellose Thiere beobachtet und gesammelt auf einer Reise um die Erde 1853 bis 1857. Vol. 1. Turbellarien, Rotatorien und Anneliden. Pt. 2. 1-164, Pls. 16-37.
- Treadwell, A. L. 1926. Polychaetous Annelids from Fiji, Samoa, China, and Japan. Proc. U.S. Nat. Mus., 69 (15), (2641), 20 pp., 2 pls.
- Zanol, J. & N. Bettoso. 2006. Identity of *Eunice roussaei* (Eunicidae: Polychaeta: Annelida) from the Adriatic and Mediterranean Seas. J. Mar. Biol. Ass. U. K., 86: 1017-1024.

Explanation of Plate 1

Figure A. A wooden mooring raft used for fish culture in Seto fishing harbor, Shirahama, Wakayama, Japan. Being 40×20 m in size and surrounding a fish corral, it has 120 floats, each of which is 180 cm long and 60 cm in diameter. This raft was demolished in mid-January, 2009, having been in use since March, 1995.

Figure B. The large *Eunice aphroditois* (Pallas 1788) collected from a 13-year-old mooring pier for mariculture in the Seto Fishing Harbor, Shirahama town, Wakayama Prefecture. The polychaete worm contracted somewhat while being measured. The medial white line on a campus road is 217 cm long and 19 cm wide. Photo by K. Yamaguchi on Jan. 16, 2009.

