First record of Paraprionospio coora Wilson, 1990 (Polychaeta: Spionidae) from the Mediterranean Sea

YOKOYAMA H.
National Research Institute of Aquaculture, Fisheries Research Agency, Minami-ise, Mie 516-0193

DAGLI E.
Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100, Bornova, Izmir

CINAR M.E.
Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100 Bornova, Izmir

http://dx.doi.org/10.12681/mms.96

Copyright © 2010

To cite this article:

doi:http://dx.doi.org/10.12681/mms.96
First record of Paraprionospio coora Wilson, 1990 (Polychaeta: Spionidae) from the Mediterranean Sea

H. YOKOYAMA1, E. DAĞLI2 and M. E. ÇINAR2

1 National Research Institute of Aquaculture, Fisheries Research Agency, Minami-ise, Mie 516-0193, Japan
2 Ege University, Faculty of Fisheries, Department of Hydrobiology, 35100 Bornova, Izmir, Turkey

Corresponding author: hyoko@fra.affrc.go.jp

Received: 28 October 2009; Accepted: 16 March 2010 Published on line: 21 April 2010

Abstract

The spionid polychaete Paraprionospio pinnata (Ehlers, 1901) has been widely reported from the Mediterranean Sea. We examined some specimens belonging to the genus Paraprionospio that had been collected from the Aegean Sea, the Sea of Marmara and the Spanish Mediterranean coast, and identified them as Paraprionospio coora Wilson, 1990, which is new to the Mediterranean fauna. This finding indicates that P. coora has a widespread geographical distribution in Australia, the Far East and the Mediterranean, and suggests that the previous records of P. pinnata from the Mediterranean are questionable.

Keywords: Paraprionospio coora; Taxonomy; Aegean Sea; Sea of Marmara; Turkey; Spain.

Introduction

The spionid polychaete Paraprionospio pinnata (Ehlers, 1901) has been reported not only from the Mediterranean (BELLAN, 1964; DIAPOLIS & BOGDANOS, 1983; ERGEN, 1992; REDONDO & SAN MARTÍN, 1997; SIMBOURA & NICOLAIDOU, 2001; ERGEN et al., 2002, 2006; ÇINAR, 2005; DOĞAN et al., 2005) but also from various temperate and tropical waters in the world (e.g., FAUVEL, 1932; WESENBERG-LUND, 1949; HARTMAN, 1964; HARTMAN-SCHRÖDER, 1965), resulting in it gaining recognition as a cosmopolitan species (LIGHT, 1978; MACIOLEK, 1985). FOSTER (1971) demonstrated that P. pinnata is a monotypic species which belongs to the genus Paraprionospio Caullery, 1914. YOKOYAMA & TAMAI (1981), however, found that the Japanese specimens of Paraprionospio pinnata comprised four distinct forms of morphological variations based on a series of 11 characters including papillae on posterior margins of the peristomial wings, pigment patches on the peris-
tomium, accessory processes on the first pair of branchiae, shapes of branchial lamellae, filaments on the third chaetiger, a ventral ridge on the eighth chaetiger, transverse dorsal crests, a semi-transparent dorsal cuticle, interneuropodial pouches, lateral anal cirri and the first appearance of nonlimbate capillaries in neuropodia. They suggested that the observed variations might be sufficient to allow the forms to be distinguished at the specific level, but they did not determine species names. Later, YOKOYAMA (2007) published a revision of the genus Paraprionospio, in which 9 valid species including 4 Japanese species that are P. coora Wilson, 1990, and 3 undescribed species (P. cordifolia Yokoyama, 2007, P. oceanensis Yokoyama, 2007 and P. patiens Yokoyama, 2007) were validated. ZHOU et al. (2008) also examined the Chinese specimens, which were previously identified as P. pinnata, and found that they belonged to the three species, P. coora, P. inaequilbranchia (Caullery, 1914) and an undescribed species (P. cristata Zhou, Yokoyama & Li, 2008). The above-mentioned studies suggested a possibility of misidentification of the specimens, which were previously reported as P. pinnata. Hence, we examined some specimens of Paraprionospio collected from the Aegean Sea, the Sea of Marmara and the Spanish Mediterranean coast to identify species.

Material and Methods

Specimens of Paraprionospio were collected at 21 stations in the Aegean Sea and the Sea of Marmara between the years 1999 and 2008 (Fig. 1). Samples were taken by an anchor dredge and a Van Veen Grab at depths ranging from 17 to 135 m. All benthic samples were sieved through a 0.5 mm mesh and then the retained material was fixed with a 4% formaldehyde-sea water solution. In the laboratory, the samples were sorted according to taxonomic groups under a stereomicroscope and preserved in 70% ethanol. Afterwards, specimens were identified and counted under stereo- and compound microscopes. The body length and width of the 5th chaetiger (excluding parapodia) of the worms were measured using an ocular micrometer. The specimens examined were deposited at ESFM [Ege Universitesi Su Ürünleri Müzesi (Museum of Faculty of Fisheries, Ege University)].

A specimen which was collected from the Spanish Mediterranean coast and described as Paraprionospio pinnata in REDONDO & SAN MARTIN (1997) was also examined. The specimen was deposited at MNCN (Museo Nacional de Ciencias Naturales).

Taxonomic Account

Paraprionospio coora Wilson, 1990

Paraprionospio sp. Form CI Yokoyama & Tamai, 1981: 311, Fig. 5.

Paraprionospio coora Wilson, 1990: 266-268, Figs 75-83; Yokoyama, 2007: 264, Fig. 8; Zhou et al., 2008: 309-311, Fig. 1.

Material examined: The Aegean Sea: ESFM-POL/08-22, 1 specimen, 21 May 2008, Gerence Bay, Station 1, 38°26’32”N, 26°29’07”E, 45 m, mud with shell fragments, coll. E. Dağlı; ESFM-POL/07-37, 9 specimens, 17 October 2007, Izmir Bay, Station 3, 38°28’50”N, 26°46’27”E, 40 m, mud, coll. E. Dağlı; ESFM-POL/07-37, 9 specimens, 17 October 2007, Izmir Bay, Station 3, 38°28’50”N, 26°46’27”E, 40 m, mud, coll. E. Dağlı; ESFM-POL/08-23, 8 specimens, 4 May 2008, Gerence Bay, Station 4, 38°27’17”N, 26°27’14”E, 52 m, sandy mud, coll. E. Dağlı; ESFM-POL/08-23, 8 specimens, 4 May 2008, Gerence Bay, Station 4, 38°27’17”N, 26°27’14”E, 52 m, sandy mud, coll. E. Dağlı; ESFM-POL/00-192, 1 specimen, 29 July 2000, Izmir Bay, Station 5, 39°44’22”N, 26°01’59”E, 60 m, sandy mud, coll. E. Dağlı; ESFM-POL/99-19, 1 specimen, 27 May 1999, Izmir Bay, Station 6, 36°35’25”N, 26°47’03”E, 22 m, mud, coll.
Fig. 1: Map showing sampling stations of Paraprionospio coora.

M. E. Çınar; ESFM-POL/00-201, 2 specimens, 14 July 2000, Izmir Bay, Station 7, 38°35'10"N, 26°45'35"E, 33 m, mud, coll. E. Dağlı; ESFM-POL/00-189, 1 specimen, 3 August 2000, Saroz Bay, Station 8, 40°27'40"N, 26°29'57"E, 135 m, mud, coll. E. Dağlı; ESFM-POL/00-191, 2 specimens, 13 August 2000, Gökçeada Island, Station 9, 40°10'40"N, 25°40'50"E, 104 m, mud, coll. E. Dağlı; ESFM-POL/00-193, 1 specimen, 28 July 2000, Aegean Sea, Station 10, 39°15'00"N, 26°32'05"E, 53 m, sandy mud, coll. E. Dağlı; ESFM-POL/00-208, 4 specimens, 14 September 2000, Kusadasi Bay, Station 11, 37°55'18"N, 27°07'41"E, 78 m, mud, coll. E. Dağlı; ESFM-POL/00-196, 4 specimens, 14 July 2000, Izmir Bay, Station 12, 38°40'36"N, 26°41'50"E, 62 m, mud, coll. E. Dağlı; ESFM-POL/00-213, 1 specimen, 19 September 2000, Gökova Bay, Station 13, 36°54'40"N, 28°09'57"E, 19 m, sandy mud, coll. E. Dağlı; ESFM-POL/00-
187, 1 specimen, 4 August 2000, Saroz Bay, Station 14, 40°36'08"N, 26°33'53"E, 66 m, mud, coll. E. Dağlı; ESFM-POL/00-210, 3 specimens, 29 September 2000, southwestern of Dilek Peninsula, Station 15, 37°38'50"N, 27°01'17"E, 35 m, mud, coll. E. Dağlı; ESFM-POL/00-211, 4 specimens, 15 September 2000, east of Agathonisi Island, Station 16, 37°23'55"N, 27°06'52"E, 71 m, mud, coll. E. Dağlı; ESFM-POL/00-209, 1 specimen, 29 September 2000, Kusadasi Bay, Station 17, 37°48'00"N, 27°16'00"E, 31 m, mud, coll. E. Dağlı; ESFM-POL/00-194, 2 specimens, 14 July 2000, Izmir Bay, Station 18, 38°40'36"N, 26°37'05"E, 73 m, mud, coll. E. Dağlı; ESFM-POL/00-207, 3 specimens, 30 September 2000, Kusadasi Bay, Station 19, 37°59'00"N, 27°11'15"E, 32 m, mud, coll. E. Dağlı; ESFM-POL/00-200, 1 specimen, 14 July 2000, Izmir Bay, Station 20, 38°35'10"N, 26°43'05"E, 61 m, mud, coll. E. Dağlı; ESFM-POL/00-622, 1 specimen, 19 January 2000, Izmir Bay, Station 22, 38°39'19"N, 26°37'04"E, 69 m, mud, coll. E. Dağlı; Sea of Marmara: ESFM-POL/08-24, 1 specimen, 9 August 2008, Erdak Bay, Station 2, 40°18'42"N, 27°46'18"E, 17 m, sandy mud, coll. E. Dağlı; Spanish Mediterranean coast: MNCN 16.01/2646, 1 specimen, Station between Cape San Antonio and Valencia Harbour, coll. CIS (Centro de Investigaciones Submarinas).

Description: Largest complete specimen, 42 mm long, 1.3 mm wide with 95 chaetigers. Prostomium fusiform with round or bluntly pointed anterior end (Fig. 2a), extending posteriorly as a faintly raised ridge to first chaetiger. Two pairs of black, small eyes in trapezoidal arrangement. Brown pigment patch usually present on lateral side of peristomium (Fig. 2a). Faint groove just posterior to pigmented area on peristomium. Small papilla on posterior margin of peristomium (Fig. 2a). Notopodial postchaetal lamellae on chaetigers 1–3 long, foliaceous, distally pointed (Fig. 2b-d); posterior to chaetiger 4, becoming rounded and reducing in size (Fig. 1e-h); posterior to chaetiger 10, elevated increasingly, showing triangular to lanceolate (Fig. 2i-j). Neuropodial postchaetal lamellae of chaetiger 1–3 lanceolate (Fig. 2b-d); posterior to chaetiger 4, lamellae becoming rounded and reducing to low postchaetal ridges by about chaetiger 9 (Fig. 2e-h). Three pairs of branchiae on chaetigers 1–3. First branchiae longest extending posteriorly to about chaetiger 10 (Fig. 2a), second branchiae extending posteriorly to about chaetiger 9, third pair shortest extending to about chaetiger 6. In basal region of first branchial shaft, 2–5 conic processes placed along anterior face. All branchiae bearing lamellar plates; in proximal region of branchial shaft, lamella consisting of single triangular plate; succeeding lamellae consisting of two plates; in middle and distal regions, two plates united completely, showing flabellate-shape. A small protuberance usually present on dorsum near base of third branchiae (Fig. 2d), instead of the slender filament in some of the other Paraprionospio species. Anterior chaetae all limbate capillaries bearing granules (Fig. 3a). Posterior to about chaetiger 16, notopodial limbate capillaries replaced by slender, nonlimbate capillaries. Neuropodial hooded hooks with 2–3 pairs of apical teeth above main fang and striate secondary internal hood from chaetiger 9 (Fig. 3b,c), accompanied by alternating nonlimbate slender capillaries (Fig. 3d) and one to two granulated sabre chaetae (Fig. 3e). Notopodial hooded hooks with 3 pairs of apical teeth above main fang and striate secondary internal hood appearing from about chaetiger 33 (Fig. 3f). No ventral bilobed flap on chaetiger 8. No interneuropodial pouches.
Fig. 2: Paraprionospio coora collected from the Aegean Sea (a, ESFM-POL-99-19; b-k, ESFM-POL/08-23). a, Anterior end in dorso-lateral view; b, 1st parapodium, in anterior view; c, 2nd parapodium, in anterior view; d, 3rd parapodium, 3rd branchia and a protuberance near the base of the 3rd branchia, in anterior view; e, 4th parapodium, in anterior view; f, 5th parapodium, in anterior view; g, 8th parapodium, in anterior view; h, 9th parapodium, in anterior view; i, 15th parapodium, in anterior view; j, 48th parapodium, in anterior view; k, posterior end, in ventral view.
from all specimens. Dorsum of chaetigers 4–11 faintly biannulated. Dorsum of chaetigers 12–17 transverse series of lighter colored slightly raised ridges, 3 ridges per chaetiger. Membranous dorsal crests and semi-transparent dorsal cuticle absent. Pygidium with a long median anal cirrus and two short, lateral cirri (Fig. 2k). Muscular gizzard present between chaetigers 6–8.

**Distribution:** Western Japan, more southern than 37°N; Yellow Sea, East China Sea, New South Wales to Tasmania in Australia, Mediterranean.

**Remarks:** The Mediterranean specimens of Paraprionospio coora closely agree with the original description of the species from Australia by WILSON (1990), but have 2–3 pairs of apical teeth in neuropodial hooded hooks rather than only 2 pairs of apical teeth. A variable number of apical teeth was noted within the Mediterranean specimens, suggesting that this is not a stable characteristic to be used in distinguishing species. Interneuropodial pouches were found in most specimens collected from Australia (WILSON, 1990) and in some specimens from Japan (YOKOYAMA, 2007) and China (ZHOU et al., 2008), whereas all Mediterranean specimens examined in this study lack this characteristic. However, it seems this is not a stable characteristic which can be dependably used in distinguishing species,
because the number of interneuropodial pouches varies from zero to about 30 even in a local population in Australia, China and Japan. The Mediterranean specimens have a small protuberance on the dorsum near the base of third branchiae (Fig. 2d) instead of the slender filament in some of the other Paraprionospio species (see Figs 1,10,11,13,14 in YOKOYAMA, 2007). WILSON (1990), YOKOYAMA (2007) and ZHOU et al. (2008) did not mention this characteristic however, we found the same structure in the Japanese specimens of P. coora. Hence, we identified the Mediterranean specimens as P. coora. It is the first time this species has been recorded from the Mediterranean Sea; the present study has revealed the widespread geographical occurrence of P. coora from Australia, the Far East and the Mediterranean.

The closely similar species Paraprionospio pinnata was first recorded from the western Mediterranean by BELLAN (1964) and from the eastern Mediterranean by ERGEN (1992). Later, this species was reported especially from the eastern Mediterranean (DIAPOULIS & BOGDANOS, 1983; SIMBOURA & NICOLAIDOU, 2001; ERGEN et al., 2002, 2006; DOĞAN et al., 2005; ÇINAR, 2005) and the Red Sea (FAUVEL, 1933). The examination of the older benthic material, which was collected in the Aegean Sea and identified as P. pinnata, in fact belongs to P. coora. This finding suggests that the occurrence of P. pinnata in the Mediterranean should be reexamined.

Paraprionospio coora is closely related to P. pinnata in morphological and chaetal appearances. However, P. coora easily distinguishes from P. pinnata in the following characteristics 1) P. coora has a small papilla on posterior margin of the peristomium (no papilla in P. pinnata); 2) The first branchiae of P. coora are usually the longest or the first and second branchiae are approximately equal in length, the third pair is the shortest (branchiae are almost equal in size in P. pinnata); 3) P. coora has conic processes in the basal region of the first branchial shaft (no processes in P. pinnata); 4) P. coora has a small protuberance on the dorsum near the base of the third branchiae (no protuberance in P. pinnata); 5) P. coora lacks a semi-transparent dorsal cuticle (P. pinnata has a semi-transparent dorsal cuticle); and 6) Interparapodial pouches are present in some specimens of P. coora (absent in P. pinnata).

Paraprionospio coora has been reported from distant regions (i.e. Australia, Japan and China) before (WILSON, 1990; YOKOYAMA, 2007; ZHOU et al., 2008). The occurrence of P. coora in the Mediterranean Sea indicates that this species has a wider distributional pattern than we know now. Spionid polychaetes are known to invade different zoogeographic regions as a result of their introduction via the ballast waters of ships (BASTROP et al., 1997; ÇINAR et al., 2005, 2006, 2008; DAGLI & ÇINAR, 2009) or the introduction of molluscs into coastal waters for further commercial cultivation (MORENO et al., 2006; RADASHEVSKY et al., 2006). P. coora may be included in alien species however, at present their alien status cannot be demonstrated based on scientific data except for their extensive geographical distribution. The discovery of this species in other parts of the world and genetic studies on its distant populations would shed more light on its alien status.

Acknowledgements

We thank Guillermo San Martin for informing us that his material was deposited in MNCN and to Javier Sánchez Almazán for arranging the loan of the material.
References


DAĞLI, E. & ÇİNAR, M.E., 2009. Species of the subgenera Aquilaspio and Pri-
onospio (Polychaeta: Spionidae: Pri-
onospio) from the southern coast of Turkey (Levantine Sea, eastern Mediterranean), with description of a new species and two new reports for the Mediterranean fauna. Zootaxa, 2275: 1-20.


DIAPOULIS, A. & BOGDANOS, C., 1983. Preliminary study of soft substrate macro-
zoobenthos and marine flora in the Bay of Geras (Lesvos Island, Greece). Thalassographica, 6: 127-139.

DOĞAN, A., ÇİNAR, M.E., ÖNEN, M., ERGEN, Z. & KATAĞAN, T., 2005. Seasonal dynamics of soft-bottom zoobenthic communities in polluted and un-
polluted areas of Izmir Bay (Aegean Sea). Senckenbergiana Maritima, 35: 133-145.


FAUVEL, P., 1933. Mission Robert Ph. Dol-
fus en Egypte. Annélides polychètes. 
Mémoires de l’ Institut d’ Egypte, 12: 
31-83.
FOSTER, N. M., 1971. Spionidae (Poly-
chaeta) of the Gulf of Mexico and the 
Caribbean Sea. Studies on the Fauna of 
Curaçao and other Caribbean Islands, 
36: 1-183.
HARTMAN, O., 1960. Systematic account 
of some marine invertebrate animals 
from the deep basins off southern Cal-
ifornia. Allon Hancock Pacific Expedi-
Kenntnis des Sublitorals der chilenis-
chen Küste unter besonderer Berück-
sichtigung der Polychaeten und Ostra-
coden. Tl. II. Die Polychaeten des Subli-
torlas. Mitteilungen des Hamburgischen 
Zoologischen Museum und Institut, 62 
(Suppl.): 59-305.
The polychaetous annelids of Japan, 
Part II. Allon Hancock Foundation Publi-
cations, Occasional Paper, 26: 239-452.
Francisco Bay Estuary System, Family 
Spionidae (Annelida, Polychaeta). The 
Boxwood Press, Pacific Grove, Cali-
fornia, 211 pp.
MACIOLEK, N.J., 1985. A revision of 
the genus Prionospio Malmgren, with 
special emphasis on species from the 
Atlantic Ocean, and new records of 
species belonging to the genera Apopri-
onospio Foster and Paraprionospio 
Caullery (Polychaeta, Annelida, Spi-
onidae). Zoological Journal of the Lin-
near Society 84: 325-383.
MORENO, R.A., NEILL, P.E. & 
ROZBACZYLO, N., 2006. Native and 
non-indigenous boring polychaetes in 
Chile: a threat to native and commer-
cial mollusc species. Revista Chilena de 
Historia Natural, 79 (2): 263-278.
RADASHEVSKY, V.I., LANA, P.C. & 
NALESSO, R.C., 2006. Morphology and 
biology of Polydora species (Polychaeta: 
Spionidae) boring into oyster shells in 
south America, with the description of 
REONDO, M.S. & SAN MARTÍN, G., 
1997. Anélidos poliquetos de la costa 
comprendida entre el cabo de San An-
tonio y el puerto de Valencia (Medit-
ráneo occidental). Publicaciones Espe-
ciales. Instituto Espanol de Oceanografía, 
SIMBOURA, N. & NICOLAIDOU, A., 
2001. The Polychaetes (Annelida, Poly-
chaeta) of Greece: Checklist, distribu-
tion and ecological characteristics. 
Monographs on Marine Sciences, Series 
no 4., NCMR, 115 pp.
WESENBERG-LUND, E., 1949. Polychaetes 
of the Iranian Gulf. Danish Scientific In-
vestigations in Iran, 4 (4): 247-400.
WILSON, R.S., 1990. Prionospio and Para-
pronospio (Polychaeta: Spionidae) from 
southern Australia. Memoirs of the Mu-
seum of Victoria, 50: 243-274.
YOKOYAMA, H., 2007. A revision of the 
genus Paraprionospio (Polychaeta: Spi-
onidae). Zoological Journal of the Lin-
near Society, 151 (2): 253-284.
Four forms of the genus Paraprionospio 
(Polychaeta: Spionidae) from Ja-
pan. Publications of the Seto Marine Bi-
ological Laboratory, 26: 303-317.
ZHOU, J., YOKOYAMA, H. & LI, X., 
2008. New records of Paraprionospio 
(Annelida: Spionidae) from Chinese 
waters, with the description of a new 
species. Proceedings of the Biological So-
ciety of Washington, 121 (3): 308-320.