NEW SPECIES OF THE GENUS *ZEUXO* (PERACARIDA, TANAIDACEA)

BY

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ABSTRACT

Two new species of *Zeuxo* Templeton, 1840 are described, one from Korea (*Z. koreaensis*), belonging to the *Z. normani* (Richardson, 1905) species complex, and one from Turkey (*Z. turkensis*). Two other *Zeuxo* species (*Z. exsargasso* Sieg, 1980 and *Z. holdichi* Bamber, 1990) are redescribed. The species *Z. paranormani* Sieg, 1980 is demoted to a junior synonym of *Z. normani*, while the ‘*Zeuxo normani*’ from Australia is raised to full species rank under the name *Z. edgari*.

Key words. — Species complex, Tanaidacea, Crustacea, *Zeuxo*

INTRODUCTION

The genus *Zeuxo* Templeton, 1840 is one of the most common and species-rich genera in the superfamily Tanaoidea Dana, 1849. Individuals belonging to this genus, however, are very difficult or impossible to identify without dissection of mouthparts (Sieg, 1980) which requires extensive taxonomic expertise. At the same time, what were initially thought to be defining characters for species, and even for higher level identifications, such as the number of uropodal articles and pleopodal setation have been shown to vary within both species (Kudinova-
Pasternak, 1989; Bamber, 1990) and individuals (Larsen et al., 2014). This has also been shown in other tanaidomorphans (Masunari, 1983; Larsen & Wilson, 1998; Larsen, 2006; Bird, 2008; Larsen et al., 2012; Larsen & Froufe, 2013).

The genus *Zeuxo* has a cosmopolitan distribution, being found in both the Atlantic and Pacific, but have not been recorded from the Polar Regions. The genus was originally described by Templeton (1840) and currently contains at least 31 species, including the additions/alterations made in this paper, but will definitely reveal more species in the future. In his monograph on the superfamily Tanaoidea, Sieg (1980) thoroughly revised the genus, but many new species have been recorded since then (Kudinova-Pasternak, 1989; Bamber, 1990, 2005, 2006, 2008, 2012a; Bamber & Bird, 1997; Edgar, 2008; Bamber & Chatterjee, 2010).

A recent paper (Larsen et al., 2014) revealed, using molecular techniques, that a *Z. normani* species complex exists and one new species of this complex is described in this paper. This complex consists of the following species: *Z. normani*, from California (Richardson, 1905; Sieg, 1980), *Z. cf. normani*, from Japan (Shiino, 1951), *Z. edgari* n. sp. from Australia (Edgar, 2008), *Z. koreaeensis* n. sp. from Korea and *Z. holdichi* from Brittany, Spain and France (Bamber, 1990; Larsen et al., 2014).

**MATERIAL AND METHODS**

Dissections were made in glycerine using chemically sharpened tungsten wire needles. The terminology in the descriptions is based on Larsen (2003). Adjectives such as ‘long’ and ‘short’ are used as relative qualifiers in respect of the appendage/structure being described. Type material of *Z. turkensis* is deposited at the Ege University, Faculty of Fisheries. Other material is lodge at the CIIMAR/LMCEE. Type material of *Z. koreaeensis* is deposited at the Museum Municipal do Funchal (História Natural), Madeira.

**TAXONOMY**

Order TANAIDACEA Dana, 1849
Suborder TANAIDOMORPHA Sieg, 1980
Superfamily TANAOIDEA Lang, 1949
Family TANAIDAE Dana, 1849
Genus *Zeuxo* Templeton, 1840

For synonymy see Sieg (1980).

Revised diagnosis (modified after Edgar, 2008).— Five pleonites present plus pleotelson. Antennule with four articles, first article over 2.5 times as long as second article, terminal article with two to eight aesthestascs. Antenna with seven
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articles, article 2 longer than wide. Labium outer lobe with small terminal process (palp rudiment). Maxilliped basis with one to two distal setae; palp article 1 with one or two outer setae; article 2 with one outer seta. Pereopod 1 coxa with anterior bulge. Pleopods basis with one or two plumose setae on inner margin and three to eight setae on outer margin, endopod inner margin with one to six plumose setae. Uropod with three to seven articles, terminal article not reduced.

Remarks.— *Zeuxo* was split into two subgenera, *Zeuxo* (*Zeuxo*) and *Zeuxo* (*Parazeuxo*) by Sieg (1980) based on a confusing (and incorrect) diagnosis of *Parazeuxo*: A smaller pereopod 1 coxa process (than in *Zeuxo*); pereopod 4-6 merus with only one ventral seta; pereopod 4-6 carpus with either one to three outer and two inner, or four outer and three inner spiniform setae; pleopod endopod with only one inner seta (Sieg, 1980: 217). *Zeuxo* (*Parazeuxo*) *maldevensis* has a pereopod 4-6 merus with one or two setae and *Z. exsargasso* Sieg, 1980 have more than one inner pleopodal endopod seta in the original description by Sieg (1980) (although not in the specimen redescribed in this study), and this number may also vary within a species (also seen in *Z. holdichi* Bamber, 1990). Due to these problems, the subgenus division was deemed invalid by Larsen et al. (2014).

Type species.— *Zeuxo westwoodiana* Templeton, 1840.


*Zeuxo koreansi* n. sp.

(figs. 1-3)

*Zeuxo* sp. A: Larsen et al. (2014): 82, figs. 2A, B and 4A.

Material examined.— Holotype ovigerous ♀ (MMF 43130), Geumjin-Harbor, 37°39′09.13″N 129°03'06.96″E, 06 August 2009, 1-2 m depth.

Paratypes: three non-ovigerous ♂♀ (MMF 43131), same locality as holotype. Three non-ovigerous ♂♀ (MMF 43132), Ayajin-Harbor, 38°16′21.92″N 128°33′22.66″E, 28 August 2009, 1-3 m depth. Six non-ovigerous ♂♀ (MMF 43133), Gisamun, 38°00′21.94″N 128°43′47.75″E, 05 October 2010, 1-3 m depth.
All specimens collected by Ho Sung Hwang, Kangnung National University, Gangwon-do, South Korea.

Diagnosis.— Pleotelson as long as pleonite 1. Antennule article 4 with three aesthestascs. Antenna article 2 with dorsal serration. Left mandible lacinia mobilis large with crenulated upper margin. Right mandible with lacinia mobilis reduced to a spine fused with incisor. Labium proximal part with outer spines. Maxilliped coxa 1 without outer serration; article 2 with one outer seta. Pereopod 1 coxa with produced anterior process with three setae. Pleopod basal article with five setae on outer margin, one seta on inner margin; endopod with two setae on inner margin. Uropod with basal article and endopod with five or six articles in mature individuals.

Description.— Female, body from holotype, 2.6 mm, appendages from dissected paratype.

Body (fig. 1A, B): cephalothorax rounded and narrowing anteriorly in dorsal view, longer than combined length of pereonite 1 and 2. Pereonites all with paired setae along anterodorsal and lateral margins; pereonite 1 half as long as pereonite 3; pereonite 2 marginally shorter than pereonite 3; pereonites 4 and 5 subequal, 1/3 longer than pereonite 3; pereonite 6 as long as pereonite 3. Pleon, slightly more than 20% of total body length; pleonites 1, 2 and 3 decreasing in length, with multiple epimeral plumose setae; pleonites 4 and 5 similar, together as long as pleonite 3, with few lateral setae. Pleotelson as long as pleonite 1; posterior margin with two pairs of short setae. Additional setae anterior to articulation with uropod.

Antennule (fig. 1C): longer than length 75% of cephalothorax. Article 1 more than twice as long as article 2, with individual proximal and medial setae and two setolated and four simple distal setae. Article 2 longer than article 3 and 4 combined, with two setolated and four simple distal setae. Article 3 longer than wide, with four short and one long distal setae. Article 4 greatly reduced, with three aesthestascs, three short, one medium and one very long distal setae.

Antenna (fig. 1D): article 1 fused to cephalothorax, naked. Article 2 longer than article 4, with dorsal serration, two medial and two distal setae. Article 3 less than half length of article 2, naked. Article 4 twice as long as article 6, with three distal setae. Article 5 marginally shorter than article 4, with four short simple and two setolated distal setae. Article 6 longer than wide, with two long simple distal setae. Article 7 reduced to small terminal cap with five long setae.

Mouthparts: labrum (fig. 2A): with distal setules and setae. Mandibles molar broad and with corrugated apex. Left mandible (fig. 2B): lacinia mobilis large and with outer crenulations, incisor smooth but not acute, spine row consist of two spiniform setae with inner distal setulation. Right mandible (fig. 2C): lacinia mobilis reduced to a spine fused with incisor, incisor with blunt apical denticles, spine row consist of two small spiniform setae with inner distal setulation. Labium
Fig. 1. *Zeuxo koreaensis* n. sp. A, female holotype, lateral view; B, same dorsal view; C, antennule; D, antenna. Scale bars: 0.5 mm.

(fig. 2D): proximal part with outer spines, inner and outer lobes with fine setules near distal margins, outer lobe with articulated pointed terminal process, with
Fig. 2. *Zeuxo koreaensis* n. sp., female paratype. A, labrum; B, left mandible; C, right mandible; D, labium; E, maxillule; F, maxilla; G, maxilliped; H, epignath. Scale bar: 0.5 mm.
setules and distal setae. Maxillule (fig. 2E): endite with seven large terminal spiniform setae of which one is setulose on the inner margin; with cluster of fine setae on outer margin near base of spines; endite outer medial margin with several weak spines; palp with four long apical setae. Maxilla (fig. 2F) ovoid and apparently featureless. Maxilliped (fig. 2G) basis with one short distal seta, with proximomedial outer spines. Endite distal margin setulose, with two proximally circumplumose distal setae and two small spiniform inner distal setae (possible remnants of coupling hooks). Palp article 1 with single seta on outer margin. Article 2 with single seta on outer margin and inner row of seven to eight simple setae from midway to distal margin. Article 3 shorter and narrower than article 2, with nine setulated setae on inner margin. Article 4 narrower than article 3, with seven long setulose long inner setae and one smaller simple outer seta. Epignath (fig. 2H): with terminal circumplumose seta and fringed by fine setules.

Cheliped (fig. 3A): basis shorter than carpus, with one distal seta near ventral margin and one seta adjacent to sclerite. Merus triangular with two ventral setae. Carpus as long as propodus (incl. fixed finger), with four setae ventromedial and three dorsodistal dorsal setae and one seta one-third distance along dorsal margin. Propodus with two setae at dactylus insertion. Fixed finger with four ventral setae, six on inner margin, and two subventral distal setae. Dactylus as long as fixed finger, with one medial seta and small inner spines.

Pereopod 1 (fig. 3B): coxa with anteriorly directed blunt process, with three setae. Ischio-basis with one dorsoproximal setulated- and one ventrodistal simple setae. Merus marginally shorter than carpus, with one distal seta on each margin. Carpus longer than half of propodus, with one distal seta on each margin. Propodus length similar to merus and carpus together, with three long and one short simple distal setae and one subdistal seta on dorsal margin. Dactylus and unguis combined shorter than propodus. Unguis two-thirds length of dactylus.

Pereopod 2 (fig. 3C): ischio-basis shorter and wider on than pereopod 1, with two dorsoproximal setulose and one ventrodistal setae. Merus ventral margin weakly serrated, with one spiniform and two ventrodistal setae and one dorsodistal seta. Carpus shorter than merus, ventral margin serrated, with two inner and three outer distal short spiniform setae. Propodus much shorter than on pereopod 1, with two ventrodistal and two dorsodistal setae. Dactylus and unguis combined shorter than propodus.

Pereopod 3 (fig. 3D): as pereopod 2 except carpus with additional three simple distal setae.

Pereopod 4 (fig. 3E): ischio-basis wider than in preceding pereopods, with two dorsoproximal and two ventro subdistal setulated setae and two ventrodistal simple setae. Merus ventral margin serrated, with two spiniform and two simple distal setae. Carpus ventral margin serrated, with two inner, three outer distal spiniform
and two dorsodistal simple distal setae. Propodus with one simple and one setulose subdistal dorsal setae, three distal simple setae and one subdistal ventral seta. Dactylus and unguis fused to a claw, with row of ventral spines and two lateral rows of seven flattened setae.

Pereopod 5 (fig. 3F): ischio-basis with two setulose dorsoproximal setae and two ventrodistal setae. Merus with serrated ventral margin, with four simple distal
setae and two spiniform ventral setae. Carpus with serrated ventral margin, with three simple distal setae as well as two inner and three outer spiniform distal setae. Propodus also with ventral serration/scales, with four subdistal setae and one setulose subdistal dorsal seta. Dactylus with one larger and several smaller ventral spines.

Pereopod 6 (fig. 3G): ischio-basis without setulose setae. Merus without ventral serration/scales. Carpus without ventral serration/scales, with three simple setae and two inner and three outer spiniform setae. Propodus with distal row of six flattened setae, one subdistal dorsal setulose seta, one subdistal ventral simple seta, and three simple distal setae. Dactylus with two lateral rows of eight setae and ventral spine.

Pleopods (fig. 3H): basal article tapering, with five plumose setae on outer margin and one plumose seta on inner margin. Exopod with about 25 plumose setae on outer margin; endopod with two plumose inner setae, thick but stout terminal circumplumose seta and 13 plumose setae along outer margin.

Uropod (see Larsen et al., 2014 for figure): basal article twice as long as wide, with three to five distal setae. Endopod with four or five articles. Article 1 naked, shorter than other articles. Article 2-5 all with simple or setulated distal setae, terminal article setae longer than other setae.

Remarks.— This species differs from *Z. normani* sensu Sieg (1980) in the following characters: Antennule with only three distal aesthestascs. Antenna article 2 with miniscule dorsal spines. Maxilliped basis with only one distal seta. Pereopod 2-5 with small ventral meral spines. Pereopod 4-6 dactylus with small ventral spine. Pleopod exopod with only two outer setae. From *Z. edgari* the Korean specimens differs in the size of the right mandible lacinia mobilis; the pleopod having five instead of six setae on outer margin of basal article; and three instead of four projecting setae on the coxa of pereopod 1.

The genetic comparison (Larsen et al., 2014) of this species with the sequence listed in Genbank for *Z. cf. normani* from Japan (Drumm, 2010) reveal that these specimens are not conspecific but no morphological comparisons could be made. A major problem is that the specimen sequenced was not illustrated or described and was collected in Japan (Drumm, 2010), while the type locality for *Z. normani* is California. The original description of *Z. cf. normani* from Japan (Shiino, 1951) does not allow for a reliable comparison but is unlikely that the species from Japan are conspecific with the original *Z. normani* from California. The characters separating *Z. koreaensis* from its congeners are given in table I.

Etymology.— The species is named after the nation of Korea (*koreaensis* = latinization of “from Korea” as an adjective) where the species was discovered.
TABLE I
Morphological differences between *Z. koreaensis* n. sp. and other *Zeuxo* species (pleopod setation and uropodal article number excluded)

<table>
<thead>
<tr>
<th>Species</th>
<th>Characters of <em>Z. koreaensis</em> n. sp. separating it from the following species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Z. amiti</em> Bamber, 2008</td>
<td>A much larger lacinia mobilis on the left mandible</td>
</tr>
<tr>
<td><em>Z. andaminimus</em> Bamber &amp; Chatterjee, 2010</td>
<td>Pereopod 1 coxa projection present</td>
</tr>
<tr>
<td><em>Z. angua</em> Bamber, 2005</td>
<td>The antennule with three rather than one distal aesthetascs</td>
</tr>
<tr>
<td><em>Z. belli</em> Edgar, 2008</td>
<td>Left mandibular lacinia mobilis much larger, right mandibular lacinia mobilis and spine row present</td>
</tr>
<tr>
<td><em>Z. beringi</em> Kudinova-Pasternak, 1989</td>
<td>Right mandibular lacinia mobilis smaller</td>
</tr>
<tr>
<td><em>Z. clocarattus</em> Bamber, 2006</td>
<td>Pereopod 1 coxa projection present</td>
</tr>
<tr>
<td><em>Z. coralensis</em> Sieg, 1980</td>
<td>Left mandibular lacinia mobilis much larger than right, pereopod 1 coxa process much larger and with three rather than two setae</td>
</tr>
<tr>
<td><em>Z. coturnix</em> Bamber, 2012a</td>
<td>Pereopod 1 coxa projection present</td>
</tr>
<tr>
<td><em>Z. edgari</em> n. sp.</td>
<td>Right mandibular lacinia mobilis much smaller, with three instead of four projecting setae on the coxa of pereopod 1</td>
</tr>
<tr>
<td><em>Z. exsargasso</em> Sieg, 1980</td>
<td>Left mandible lacinia mobilis large and triangular</td>
</tr>
<tr>
<td><em>Z. fresii</em> Sieg, 1980</td>
<td>Left mandible lacinia mobilis large and triangular, third pair of pleopods not reduced</td>
</tr>
<tr>
<td><em>Z. holdichi</em> Bamber, 1990</td>
<td>Right mandible lacinia mobilis much smaller</td>
</tr>
<tr>
<td><em>Z. kirkmani</em> Edgar, 2008</td>
<td>Pereopod 1 coxa with three instead of six setae</td>
</tr>
<tr>
<td><em>Z. kurilensis</em> (Kussakin &amp; Tzareva, 1974)</td>
<td>Pereopod 1 coxa projection present</td>
</tr>
<tr>
<td><em>Z. marmoratus</em> (Nordenstam, 1930)</td>
<td>Cheliped fixed finger with 5 rather than 3 ventral setae</td>
</tr>
<tr>
<td><em>Z. mooneyi</em> Edgar, 2008</td>
<td>Pereopod 1 coxa projection larger and with three rather than two setae</td>
</tr>
<tr>
<td><em>Z. nannioggae</em> Bamber, 2005</td>
<td>Pereopod 1 coxa projection smaller and with three rather than two setae</td>
</tr>
<tr>
<td><em>Z. normani</em> (Richardson, 1905) (California)</td>
<td>The antennule with only three distal aesthetascs, antenna article 2 with miniscule dorsal spines (see discussion), maxilliped basis with only one distal seta, pereopods 2-5 with small ventral meral spines and fewer carpal spiniform setae, pereopods 4-6 dactylus with small ventral spine, pleopod exopod with only two outer setae</td>
</tr>
<tr>
<td><em>Z. novaeezalandiae</em> (Thomson, 1879)</td>
<td>Pereopod 1 coxa without dentated spur</td>
</tr>
<tr>
<td><em>Z. odohertyae</em> Edgar, 2008</td>
<td>Pereopod 1 coxa with three instead of five setae</td>
</tr>
<tr>
<td><em>Z. phythalensis</em> Sieg, 1980</td>
<td>Left mandibular lacinia mobilis much larger than right</td>
</tr>
<tr>
<td><em>Z. russi</em> Edgar, 2008</td>
<td>Left mandibular lacinia mobilis much larger, right mandibular lacinia mobilis and spine row present</td>
</tr>
<tr>
<td><em>Z. seurati</em> (Nobili, 1906)</td>
<td>Pereopod 2 carpal spiniform setae not as long as half of propodus</td>
</tr>
</tbody>
</table>
Table I
(Continued)

<table>
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<tr>
<th>Species</th>
<th>Characters of <em>Z. koreaensis</em> n. sp. separating it from the following species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Z. sherpherdi</em> Edgar, 2008</td>
<td>Maxilliped palp article 1 with one rather than three outer setae</td>
</tr>
<tr>
<td><em>Z. simonsiensis</em> Sieg, 1980</td>
<td>Left mandibular lacinia mobilis much larger than right</td>
</tr>
<tr>
<td><em>Z. turkensis</em> n. sp.</td>
<td>Maxilliped palp article 1 without outer serration and three setae, absence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. vanhoeffeni</em> Sieg, 1980</td>
<td>Left mandibular lacinia mobilis much larger than right</td>
</tr>
<tr>
<td><em>Z. westwoodiana</em> Templeton, 1840</td>
<td>Pereopod 1 coxa with three instead of four setae</td>
</tr>
<tr>
<td><em>Z. zorro</em> Bamber &amp; Bird, 1997</td>
<td>Pereopod 1 coxa projection present</td>
</tr>
</tbody>
</table>

**Zeuxo edgari** n. sp.

Synonymy:


Material examined.— None. Holotype, non-ovigerous ♀ (NMV J56611), as described and figured by Edgar, 2008: 52, figs. 22-24, see under Remarks, below. Mrs Macquarie’s Chair, Sydney Harbour, NSW, fucoid algal washings, 1 April 1993.

Type series: two ♂♂, 2 ovigerous ♀♀, and 3 non-ovigerous ♀♀. Same locality. One ♂♂, 8 ♀♀, 1 juvenile, Kettering, Tas, pylon scrapings, collected by Aquenal Pty Ltd (Aqueenal, 2003), 9 July 2003, 2 m depth.

Diagnosis (modified from Edgar, 2008).— Pleotelson as long as pleonite 1. Antennule article 4 with three aesthestascs. Antenna article 2 without dorsal serration. Left mandible lacinia mobilis large with crenulated upper margin. Right mandible with lacinia mobilis with two denticles but otherwise without crenulations, not fused with incisor. Labium proximal part with outer spines. Maxillule palp with up to seven long terminal setae. Maxilliped basis with two setae; palp article 1 with outer serration; article 2 with one outer seta. Pereopod 1 coxa with produced anterior process with four setae. Pleopod basal article with five or six setae on outer margin, one seta on inner margin; endopod with two to four setae on inner margin. Uropod with basal article and endopod with six or seven articles in mature individuals.

Remarks.— As it was impossible to physically examine these specimens, I have chosen here to designate a “type series”, as per article 72.4.1 of the Code (ICZN, 1999) from Edgar’s (2008) publication. Furthermore, the illustrated (female) specimen in that publication is designated as the holotype as per article 73.1.4 of the Code. Note that specimens mentioned by Edgar (2008: 47) that were collected in Japan, are herein explicitly excluded from the type series. Edgar examined...
these Japanese specimens and considered them conspecific to his Australian specimens; possibly transported by shipping. This is entirely possibly as tanaids have previously been found both in ballast water (Jones, 1991) and as fouling organisms (Shoukr et al., 1991). However, such disjoint distribution is unlikely, given the recent rejection (based both on morphological and molecular data) of many of the previously ‘widely distributed’ tanaid species (Larsen, 2001; Bamber, 2010, 2012b; Larsen & Froufe, 2013; Larsen et al., 2014). Even more so since the Japanese species is genetically proven to be different from the geographically close Korean species (Larsen et al., 2014). Thus, until we have material available for genetic analysis of *Z. edgari*, we cannot determine if this species have a wide distribution and is also present in Japan.

No genetic information is available of *Z. edgari* or *Z. normani* from the type locality. However, the distances from the type locality of the original *Z. normani* suggest different species. This is confirmed by the detailed morphological description by Edgar (2008). It is here raised to the full species rank.

*Zeuxo edgari* differs from *Z. normani* (California) in possessing two rather than one setae at the base of the maxilliped, and up to seven, rather than four long terminal setae on the maxillule palp.

Etymology.— The species is named after Graham Edgar who described this species from Australia.

**Zeuxo holdichi** Bamber, 1990 (specimens from Spain) (figs. 4-7)

Synonymy:


*Zeuxo holdichi* Larsen et al. (2014): 82, figs. 3 and 4C.


Revised diagnosis, adult female (modified from Bamber, 1990).— Pleotelson longer than pleonite 1. Antenna article 2 with dorsal serration. Right mandible lacinia mobilis conspicuous, widening distally. Labium proximal part with outer spines. Maxilliped basis and palp article 1 with outer serration; palp article 1 and 2 with one outer seta. Pereopod 1 coxa with pronounced anterior process with three setae. Pereopods 3-6 with ventral serration/scales on merus and carpus and five distal carpal spiniform setae. Pereopods 4-6 dactylus with ventral spine. Pleopod basal article with six setae on outer margin and one seta on inner margin, endopod with two setae on inner margin. Pleopod 1-2 endopod with three outer setae, while
Description.— Female, 1.8 mm.

Body (fig. 4B, C): cephalothorax rounded and narrowing anteriorly in dorsal view, longer than combined length of pereonite 1-3. Pereonites all with paired setae along anterodorsal and lateral margins; pereonite 1 only slightly longer than half of pereonite 2; pereonite 2 shorter than pereonite 3; pereonite 3 to 5 subequal, one-third longer than pereonite 2; pereonite 6 longer than pereonite 2. Pleon, as long as 20% of total body length; pleonites 1, 2 and 3 decreasing in length, with multiple lateral setae; pleonites 4 and 5 similar, reduced, together as long as pleonite 3, with few lateral setae. Pleotelson longer than pleonite 1. Posterior margin with two pairs of short setae. Additional setae anterior to articulation with uropod.

Antennule (fig. 5A): length shorter than 65% of cephalothorax. Article 1 almost three times as long as article 2, with proximal scales, individual proximal seta and three simple distal setae. Article 2 longer than article 3 and 4 combined, with at least eight simple distal setae. Article 3 longer than wide, with three short and two long distal setae. Article 4 greatly reduced, with three aesthetasc, and three dissimilar length distal setae.

Antenna (fig. 5B): article 1 fused to cephalothorax, naked. Article 2 longer than article 3, with small dorsal spines, one medial and two distal setae and ventral setules. Article 3 longer than article 6, with dorsal setules. Article 4 twice as long as article 3, with seven distal setae. Article 5 marginally shorter than article 4, with four short simple and two setulated distal setae. Article 6 longer than wide, with four long simple distal setae. Article 7 reduced to small terminal cap with at least seven long setae.

Mouthparts: labrum (fig. 6A): with distal setules and setae. Mandibles molar broad and corrugated. Left mandible (fig. 6B): incisor with outer crenulations, not acute; lacinia mobilis large, subrectangular, and with distal crenulations; spine row consist of one large spiniform seta with inner distal pectination. Right mandible (fig. 6C): incisor with blunt apex, lacinia mobilis conspicuous and widening distally, tip excavate; spine row consist of two small spiniform setae with inner distal setulation. Labium (fig. 6D): proximal part with outer spines, inner and outer lobes with fine setules near distal margins, outer lobe with articulated pointed terminal process, with setules and distal setae. Maxillule (fig. 6E): endite with eight large terminal spiniform setae and cluster of fine setae on outer margin near base of spines; palp (fig. 6F): with five long apical setae. Maxilla (fig. 6G): ovoid and apparently featureless. Maxilliped (fig. 6H): basis with one short distal seta, with proxim medial outer spines. Endites (fig. 6I): distal and outer margin setulose, with two long, proximally circumplumose distal setae and two small spiniform setae. Palp article 1 with outer serration and one outer seta. Article 2 with single seta on
Fig. 4. *Zeuxo holdichi* Bamber, 1990. A, male, lateral view; B, female, lateral view; C, same, dorsal view. Scale bar: 0.5 mm.
Fig. 5. *Zeuxo holdichi* Bamber, 1990. A-E, female. A, antennule; B, antenna; C, uropod; D, male cheliped. Scale bars: 0.5 mm.

outer margin and inner row of nine simple setae from midway to distal margin. Article 3 shorter and narrower than article 2, with 15 inner setae of which about half are setulated. Article 4 narrower than article 3, with 11 long setulose long
Fig. 6. *Zeuxo holdichi* Bamber, 1990, female. A, labrum; B, left mandible; C, right mandible; D, labium; E, maxillule, endite; F, terminal palp setae; G, maxilla; H, maxilliped; I, same endite; J, epignath. Scale bars: 0.5 mm.
inner setae and one smaller simple outer seta. Epignath (fig. 6J): with terminal circumplumose seta and fringed by fine setules.

Cheliped (fig. 7A): sclerite triangular, with two setae. Basis shorter than carpus, with one distal seta near ventral margin and one seta adjacent to sclerite. Merus triangular with three ventral setae and one proximomedial seta. Carpus as long as propodus (incl. fixed finger), with three ventromedial, three dorsodistal dorsal setae and one seta one-third distance along dorsal margin. Propodus with two setae at dactylus insertion. Fixed finger with five ventral, and seven inner setae. Dactylus as long as fixed finger, with one medial seta and small inner spines.

Pereopod 1 (fig. 7B): coxa with anteriorly directed process, with three setae. Ischio-basis with one dorsoproximal and one ventrodistal simple setae. Merus shorter than carpus, with one small distal seta on each margin. Carpus longer than half of propodus, with one distal seta. Propodus longer than merus and carpus combined, with four ventrodistal, one long dorsodistal and one dorsomedial simple setae. Dactylus and unguis combined shorter than propodus. Unguis less than two-thirds as long as dactylus.

Pereopod 2 (fig. 7C): ischio-basis shorter and wider than pereopod 1, with two setulose and one simple dorsoproximal setae and one ventrodistal setae. Merus with one spiniform and two ventrodistal setae and one dorsodistal seta. Carpus shorter than merus, with two inner and two outer distal short spiniform setae as well as one simple setae on each distal margin. Propodus much shorter than on pereopod 1, about the length of merus, with one dorsomedial setulated seta, two dorsodistal setae, two simple ventro-subdistal setae, and one ventrodistal spiniform seta. Dactylus and unguis combined shorter than propodus. Dactylus with proximal seta.

Pereopod 3 (fig. 7D): as pereopod 2 except ischio-basis with additional ventromedial setulose seta and two ventrodistal setae. Merus and carpus ventral margins serrated. Carpus with two inner and three outer distal short spiniform setae, and dorsodistal simple seta.

Pereopod 4 (fig. 7E): ischio-basis wider than in preceding pereopods, with one dorsomedial and two ventro subdistal setulated setae and two ventrodistal simple setae. Merus ventral margin serrated, with two spiniform ventrodistal setae and one simple distal setae on each margin. Carpus ventral margin serrated, with two inner, three outer distal spiniform and two dorsodistal simple distal setae. Propodus with two simple distal and one setulose subdistal dorsal setae, one distal and one subdistal simple ventral setae. Dactylus and unguis fused to a claw, with ventral spine and two lateral rows of five flattened setae.

Pereopod 5 (fig. 7F): as pereopod 4 except ischio-basis with two setulated ventro-subdistal and three simple distal setae. Carpus with additional simple dorsodistal setae. Propodus also with ventral serration/scales, with one subdistal,
Fig. 7. Zeuxo holdichi Bamber, 1990, female. A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pereopod 6. Scale bar: 0.5 mm.
three distal, and one setulose subdistal dorsal setae. Dactylus with two lateral rows of eight flattened setae.

Pereopod 6 (fig. 7G): as pereopod 4 except ischio-basis without ventral setulose setae. Merus with two simple dorsodistal setae. Propodus with distal row of 11 flattened setae, one subdistal dorsal setulose seta, and three simple distal setae. Dactylus with two lateral rows of seven setae and ventral spine.

Pleopods (see Larsen et al., 2014 for figure): pleopod 1 & 2 basal article tapering, with six plumose setae on outer margin and one plumose seta on inner margin. Exopod with about 29 plumose setae on outer margin; endopod with three plumose inner setae, one stout terminal circumplumose seta and additional 15 plumose setae along outer margin. Pleopod 3 as pleopod 1 and 2 except endopod with two plumose inner setae, one stout terminal circumplumose seta and additional 12 plumose setae along outer margin. Exopod with about 28 plumose setae on outer margin.

Uropod (fig. 5C): basal article twice as long as wide, with four distal setae. Endopod with five articles, all with simple or setulated distal setae, terminal article setae longer than other setae.

Male where differing from female, 2.6 mm.

Body (fig. 4A): cephalothorax more triangular than in female.

Cheliped (fig. 5D): much enlarged in size compared to female. Basis with distal seta near sclerite. Merus with medial depression, four ventral and two medial setae. Carpus with three dorsodistal and four ventral setae (dorsoproximal seta apparently absent but this is believed to be an artefact). Propodus much enlarged with three setae near dactylus insertion. Fixed finger with nine simple inner, six ventral simple, and one subventral-subdistal setae near unguis insertion. Dactylus as long as fixed finger, apparently without medial seta but with inner spines.

Remarks.—*Zeuxo holdichi* is redescribed here because we find it important for future research that the genetic sequence of a species recorded in Genbank can be attributed to a specific description in order to avoid the problems listed above for *Z. cf. normani* from Japan.

The following differences between our specimens and those described by Bamber (1990) are: antenna article 2 with small dorsal spines; left mandible with only one spiniform seta under the lacinia mobilis; labial basis with spines; cheliped dactylus with small inner spines; carpus of pereopod 2 with four spiniform setae while pereopods 3-6 have five; pereopod 3 dactylus with small proximal seta. We also found that the pleopods are not identical. The endopod of pleopod 1 and 2 have three plumose inner setae, while pleopod 3 only has two. Bamber (1990) himself also described variation of the uropod article number of this species.
Zeuxo exsargasso Sieg, 1980 (specimens from Cape Verde)  
(figs. 8-10)

Synonymy:
Zeuxo exsargasso: Larsen et al. (2012): 42.
Zeuxo exsargasso: Larsen et al. (2014): 82, figs. 2C and 5.

Material examined.— Holotype: ZMB (56740). Paratypes: ZMB (58632). Additional material: eight ovigerous ♀♀, 12 non-ovigerous ♂♂, 12 ♀♂, 20+ mancae. Arinaga beach, 27°52′14.43″N 15°23′00.31″W and 27°54′17.1″N 15°23′20.1″W, Gran Canaria, 0.5 to 1.5 m depth, collected by F. Tuya by snorkeling. Ten non-ovigerous ♀♀, 18 ovigerous ♂♂, 9 ♀♂, 30+ mancae, St. Vicente island, Mindelo, Cape Verde, Marina and Mindelo beach, 0.5 to 1.5 m depth, collected by K. Larsen by snorkeling.

Revised diagnosis (modified from Sieg, 1980).— Pleotelson longer than pleonite 1. Antenna article 2 with dorsal serration. Left mandible lacinia mobilis articulated from mandibular body, of simple spine-shape. Right mandible lacinia mobilis not articulated from mandibular body, of simple spine-shape; setal row missing. Labium proximal part with outer spines, Maxilliped basis and palp article 1 with outer serration; palp article 1 and 2 with one outer seta. Pereopod 1 coxa with small anterior process with two setae. Pereopods 3-6 without ventral serration/scales on merus and carpus; carpus with six distal carpal spiniform setae. Pereopods 4-6 dactylus without ventral spine. Pleopod basal article with five setae on outer margin and one seta on inner margin; endopod with one outer seta. Uropod with basal article and endopod with four or five articles in mature individuals.

Description.— Female, 2.1 mm.

Body (fig. 8A): cephalothorax rounded and narrowing anteriorly in dorsal view, much longer than combined length of pereonite 1-2. Pereonites all with paired setae along anterodorsal margin; pereonite 1 only slightly longer than half of pereonite 2; pereonite 2 only marginally shorter than pereonite 3; pereonite 3 longer than pereonite 6; pereonite 4 longer than other pereonites; pereonite 5 longer than pereonite 3. Pereonite 6 as long as pereonite 2. Pleon, longer than 20% of total body length; pleonites 1, 2 and 3 decreasing in length, with few dorsal and multiple lateral plumose setae; pleonites 4 and 5 similar, reduced, together shorter than pleonite 3, with few lateral setae. Pleotelson (fig. 10B) longer than pleonite 1. Posterior margin with two pairs of short setae.

Antennule (fig. 8B): longer than length 65% of cephalothorax. Article 1 more than three times as long as article 2, three setulatated medial setae, four simple dorsodistal and four small ventrodistal setulated setae. Article 2 longer than article 3 and 4 combined, four simple and four setulated distal setae. Article 3 longer than wide, with two distal setae. Article 4 greatly reduced, with three aesthestascs, six long simple, and three short setulated distal setae.
Fig. 8. *Zeuxo exsargasso* Sieg, 1980 (Gran Canaria), female. A, lateral view; B, antennule; C, antenna; D, pleopod. Scale bars: 0.5 mm.
Antenna (fig. 8C): article 1 fused to cephalothorax, naked. Article 2 longer than article 3, with small dorsal spines and denticles, one dorso medial and one ventrodistal setae. Article 3 longer than article 6, naked. Article 4 twice as long as article 3, with four simple and one setulated distal setae. Article as long as article 4, with three simple and three setulated distal setae. Article 6 longer than wide, with five long simple distal setae. Article 7 reduced to small terminal cap with three long setae.

Mouthparts: labrum (fig. 9A): with distal setules and setae. Mandibles molar broad and with corrugated apex. Left mandible (fig. 9B): incisor without crenulations, not acute; lacinia mobilis articulated from mandibular body, with one denticle; spine row absent. Right mandible (fig. 9C): incisor with blunt apex; lacinia mobilis not articulated from mandibular body, of simple spine-shape; setal row missing. Labium (fig. 9D): proximal part with outer spines, inner and outer lobes with fine setules near distal margins, outer lobe with articulated pointed terminal process, with setules and distal setae. Maxillule (fig. 9E): endite with eight terminal spiniform setae of which at least two are serrated, cluster of fine setae on outer margin near base of spines, outer margin with scattered small spines; palp with three terminal setae. Maxilla (fig. 9F): ovoid with two distal setae. Maxilliped (fig. 9G): basis with one short distal seta, with proximal setulated outer spines. Endite distal margin heavily setulose, with two long, proximally circumplumose, distal setae and two small inner distal setae. Palp article 1 with outer serration and one outer seta. Article 2 with single outer seta and inner row of five simple and two thick serrated setae from midway to distal margin. Article 3 shorter and narrower than article 2, with 10 setulose inner setae. Article 4 narrower than article 3, with two small proximal inner setae, eight setulose long inner distal setae and one smaller simple outer seta. Epignath (fig. 9H): with terminal circumplumose seta, body fringed proximally and distally by fine setules.

Cheliped (fig. 10A): basis shorter than carpus, with one ventrodistal and one seta adjacent to sclerite. Merus triangular with two ventral setae. Carpus longer than propodus (incl. fixed finger), with four setae ventromedial and three dorsodistal dorsal setae and one seta one-third distance along dorsal margin. Propodus with three setae at dactylus insertion. Fixed finger with four ventral setae, two subdistal setae near unguis insertion, and six on inner margin. Dactylus as long as fixed finger, with row of small inner spines, with medial seta.

Pereopod 1 (fig. 10B): coxa without appreciable anteriorly directed process, with two setae. Ischio-basis less than twice the length of propodus, with one simple and one setulose dorsoproximal and one simple ventrodistal setae. Merus shorter than carpus, with one small ventrodistal seta. Carpus longer than half of propodus, with one distal seta on each margin. Propodus as long as merus and carpus combined, with four ventrodistal, one long simple dorsodistal and one
Fig. 9. Zeuxo exsargasso Sieg, 1980 (Gran Canaria), female. A, labrum; B, left mandible; C, right mandible; D, labium; E, maxillule; F, maxilla; G, maxilliped; H, epignath. Scale bars: 0.5 mm.
Fig. 10. *Zeuxo exsargasso* Sieg, 1980 (Gran Canaria), female. A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pereopod 6. Scale bar: 0.5 mm.

dorsomedial setulated setae. Dactylus and unguis combined shorter than propodus. Dactylus with small proximal seta. Unguis less than twice the length of dactylus.

Pereopod 2 (fig. 10C): coxa with one seta. Ischio-basis shorter and wider than pereopod 1, with two setulose and one simple dorsoproximal setae and two ventrodistal setae. Merus with one spiniform and two ventrodistal setae, and one
dorsodistal seta as well as weak ventral spines. Carpus shorter than merus, with weak ventrodistal serration/scales, four ventrodistal spiniform setae, as well as one simple seta on each distal margin. Propodus much shorter than on pereopod 1, about the length of merus, with one dorsomedial setulated seta, one dorsodistal seta, and one simple ventro-subdistal seta. Dactylus and unguis combined shorter than propodus.

Pereopod 3 (fig. 10D): as pereopod 2 except ischio-basis wider, with one dorsomedial setulated and one simple seta and two ventrodistal setae. Carpus with three inner, three outer distal spiniform setae as well as one simple dorsodistal. Propodus without ventro-subdistal setae.

Pereopod 4 (fig. 10E): ischio-basis wider than in preceding pereopods, with two ventromedial setulated setae and two ventrodistal simple setae. Merus ventral margin weakly serrated, with two spiniform ventrodistal setae, two ventrodistal simple setae and one simple dorsodistal seta. Carpus ventral margin serrated, with two inner, three outer distal spiniform setae and two dorsodistal simple distal setae. Propodus with three simple distal, one setulose subdistal dorsal seta and one simple ventromedial seta. Dactylus and unguis fused to a claw, with ventral spine and two lateral rows of seven flattened setae.

Pereopod 5 (fig. 10F): as pereopod 4 except ischio-basis with one setulated ventromedial, two setulated dorsomedial, and two simple ventrodistal setae. Merus with two spiniform ventrodistal, one ventrodistal simple and one simple dorsodistal setae. Propodus with one subdistal, three distal setae and one setulose subdistal dorsal seta. Dactylus with two lateral rows of six flattened setae.

Pereopod 6 (fig. 10G): as pereopod 4 except ischio-basis only with two dorsomedial setulated setae. Carpus with three outer and three inner spiniform setae and two dorsodistal simple setae. Propodus with distal row of ten flattened setae, two simple distal setae, one dorso-subdistal simple seta, and one subdistal dorsal setulose seta. Dactylus with two lateral rows of six setae.

Pleon (fig. 8D): basal article tapering, with five plumose setae on outer margin and one plumose seta on inner margin. Exopod with about 24 plumose setae on outer margin; endopod with one plumose inner seta, one thick but stout terminal circumplumose seta and additional 12 plumose setae along outer margin.

Uropod (see Larsen et al., 2014 for figure): basal article twice as long as wide, widening distally with two simple and two very long (longer than length of two proximal endopod articles together) distal setae. Endopod with four or five articles (may even vary in the same individual), all with simple or setulated distal setae, those on terminal article broken.

Remarks.— Again we are redescribing Z. exsargasso not because of significant differences with the description of Sieg (1980) but for the purpose of having a
description to accompany the gene sequences lodged in GenBank by Larsen et al. (2014).

The following differences observed in our specimens relative to those described by Sieg (1980) are: Antenna article 2 with dorsal serration. Labium with outer spines. Maxilliped palp article 1 with outer serration; endites with two small inner distal setae. Cheliped dactylus with inner spines and medial seta. Zeuxo exsargasso was also described by Sieg (1980) as having two inner setae on the pleopodal endopod, but this is in conflict with the diagnosis of the subgenus Parazeuxo, also by Sieg (1980). In this study the pleopod endopod was found with only one inner seta. Uropodal article number varies between five and six (even within individuals). The armament of the pereopod carpus also seems to vary, having four spiniform setae in pereopod 2, while pereopods 4 and 5 have five, and pereopods 3 and 6 have six in our specimens. The specimen described by Sieg (1980) has five on pereopods 2 and 3, seven on pereopods 4 to 6.

Zeuxo exsargasso was recorded by Sieg (1980) from floating Sargassum natans (L.) Gaillon, 1828 off Bermuda but was later reported from benthic intertidal algae in the Canary Islands and from benthic intertidal algae off the Cape Verde archipelago (Bamber, 2012a; Larsen et al., 2014). It has been suggested that this species has distributed this widely via rafting (for review on tanaid dispersal mechanisms see Larsen, 2005). Recently Bamber (2012a) described Z. coturnix from Cape Verde and separates this from Z. exsargasso mainly on the basis of differences in pigmentation pattern and uropod article number. While we accept Z. coturnix as a valid species on the basis of different proportions of the antennule, cheliped, and pereopod 1 as well as the seta number on the cheliped fixed finger, we would like to point out that both the pigmentation and uropod characters are subject to variation within Z. exsargasso (as well as within Z. holdichi) the latter character even within the individual specimen (Larsen et al., 2014). The ‘distinct’ pigmentation pattern described for Z. coturnix (Bamber, 2012a: 13) were also found in specimens which were genetically identical to Z. exsargasso.

Zeuxo turkensis n. sp.  
(figs. 11-18)

Synonymy:
Zeuxo sp. B: Larsen et al. (2014): 82, fig. 4B.


Diagnosis.— Pleotelson longer than pleonite 1. Antenna article 2 without dorsal serration. Left mandible lacinia mobilis wide, articulated from mandibular
body, with distal crenulations. Right mandible lacinia mobilis articulated from mandibular body, only 25% the size of same on left mandible; setal row consisting of two simple setae. Labium proximal part with outer spines. Maxilliped basis and palp article 1 with outer serration; palp article 1 with several (at least three) outer setae and article 2 with one outer seta. Cheliped carpus with ventral process. Pereopod 1 coxa without appreciable processes, with two setae. Pereopods 3-6 with ventral serration/scales on merus and carpus; carpus with four-six distal carpal spiniform setae. Pereopods 4-6 dactylus with ventral spines. Pleopods 1 and 2 basal article with six setae on outer margin and one seta on inner margin. Pleopod 3 basal article with three setae on outer margin and none on inner margin. All pleopod endopod with one outer seta. Uropod with basal article and endopod with minimum three articles in adult specimens.

Description.— Body from male holotype, 2.6 mm, appendages from dissected paratype.

Body (fig. 11A): cephalothorax rounded and narrowing anteriorly in dorsal view, longer than combined length of pereonite 1-3. Pereonites all with paired setae along anterodorsal margin; pereonite 1 longer than half of pereonite 2; pereonite 2 only marginally shorter than pereonite 3; pereonite 3 as long as pereonite 6; pereonite 4 longer than pereonite 3; pereonite 5 longer than other pereonites. Pleon, about 25% of total body length; pleonites 1, 2 and 3 decreasing in length, with few dorsal and multiple lateral plumose setae; pleonites 4 and 5 similar, reduced, together shorter than pleonite 3, without lateral setae. Pleotelson longer than pleonite 1. Posterior margin with four pairs of simple and one pair of setulated setae.

Antennule (fig. 11C): almost as long as cephalothorax. Article 1 more than three times as long as article 2, with one setulated medial seta, four simple and four small setulated distal setae. Article 2 longer than article 3 and 4 combined, with ring of simple and one setulated distal setae. Article 3 longer than wide, with three simple distal setae. Article 4 greatly reduced, with at least five aesthestascrs and three long distal setae.

Antenna (fig. 11D): article 1 fused to cephalothorax, naked. Article 2 longer than article 3, without dorsal spines, with two ventromedial and one ventrodistal setae. Article 3 less than half length of article 2, with one dorsodistal seta. Article 4 more than twice as long as article 3, with four simple and one setulated distal setae. Article 5 shorter than article 4, with ring of simple distal setae. Article 6 longer than wide, with three long simple distal setae. Article 7 reduced to small terminal cap with three long setae.

Mouthparts: labrum (fig. 12A): with distal setules and setae, with proximal spines. Mandibles molar broad and with corrugated apex. Left mandible (fig. 12B): incisor without crenulations, not acute, lacinia mobilis wide, articulated from
Fig. 11. *Zeuxo turkensis* n. sp., male. A, holotype, lateral view; B, pleotelson and uropods; C, antennule; D, antenna. Scale bars: 0.5 mm.
Fig. 12. Zeuxo turkensis n. sp., male. A, labrum; B, left mandible; C, right mandible; D, labium; E, maxillule; F, maxilla; G, maxilliped; H, epignath. Scale bar: 0.5 mm.

mandibular body, with distal crenulations, setal row consisting of two setae. Right mandible (fig. 12C): incisor with blunt apex, lacinia mobilis articulated from mandibular body, only 25% the size of same on left mandible, setal row consisting
of two setae. Labium (fig. 12D): proximal part with small outer spines, inner and outer lobes with fine setules near distal margins, outer lobe with articulated pointed terminal process, with setules and distal setae. Maxillule (fig. 12E): endite with nine, terminal spiniform setae of which at least two are serrated, cluster of fine setae on outer margin near base of spines, outer margin naked; palp appears biarticulated, with five long distal setae. Maxilla (fig. 12F): ovoid with row of distal setules. Maxilliped (fig. 12G): basis with one short and one long distal setae, with distal outer spines. Endite distal margin heavily setulose, with two long, proximally circumplumose, distal setae and two small inner spiniform distal setae. Palp article 1 with outer serration and three outer setae. Article 2 with single outer seta and inner row of six long simple and two bipinnate setae. Article 3 shorter and narrower than article 2, with three simple and five bipinnate inner setae. Article 4 narrower than article 3, with eight bipinnate long inner distal setae. Epignath (fig. 12H): with terminal circumplumose seta not articulated, body fringed proximally and distally by fine setules.

Cheliped (fig. 13A): basis about as long as carpus, with one ventrodorsal and one seta adjacent to sclerite. Merus triangular with two ventral setae and distal depression. Carpus shorter than propodus (incl. fixed finger), with proximal process, with three setae ventromedial and three dorsodistal dorsal setae and one seta one-third distance along dorsal margin. Propodus with three setae at dactylus insertion. Fixed finger with inner medial process, with four ventral setae, one subdistal seta near unguis insertion, and seven on inner margin. Dactylus as long as fixed finger, with row of small inner spines.

Pereopod 1 (fig. 13B): coxa without appreciable anteriorly directed process but with two setae. Ischio-basis less than twice the length of propodus, with one simple and one setulose dorsoproximal setae. Merus shorter than carpus, with one small ventrodorsal seta. Carpus longer than half of propodus, with one ventrodorsal and one dorso-subdistal setae. Propodus as long as merus and carpus combined, with five subdistal and one dorsomedial serrated setae. Dactylus and unguis combined shorter than propodus. Dactylus with small proximal seta. Unguis less than twice the length of dactylus.

Pereopod 2 (fig. 13C): ischio-basis shorter and wider than pereopod 1, with two setulose and one simple dorsoproximal setae and two ventrodorsal setae. Merus with one spiniform and two ventrodorsal setae and one dorsodistal seta as well as weak ventral serration/scales. Carpus shorter than merus, with weak ventrodorsal serration/scales, four ventrodorsal spiniform setae as well as three simple distal setae. Propodus much shorter than on pereopod 1, about the length of merus, with two ventromedial setae, two dorsodistal setae, and one simple ventrodorsal seta, with ventral row of small spines. Dactylus and unguis combined much shorter than propodus, naked.
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Fig. 13. Zeuxo turkensis n. sp., male. A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pereopod 6. Scale bars: 0.5 mm.
Pereopod 3 (fig. 13D): as pereopod 2 except ischio-basis with additional ventro-subdistal setulated seta. Propodus with additional dorso-subdistal setulated seta and only one ventromedial seta.

Pereopod 4 (fig. 13E): ischio-basis wider than in preceding pereopods, with two ventro-subdistal setulated setae and two ventrodistal simple setae. Merus ventral margin serrated, with two spiniform ventrodistal setae, two ventrodistal simple and one dorsodistal simple setae. Carpus ventral margin serrated, with two inner, three outer distal spiniform and one dorsodistal simple distal setae. Propodus with one setulose dorso-subdistal seta, two ventromedial setae, and five simple subdistal setae. Dactylus and unguis fused to a claw, with ventral spine and two lateral rows of seven flattened setae.

Pereopod 5 (fig. 13F): as pereopod 4 except ischio-basis with additional two dorsoproximal setulated setae. Merus with additional simple dorsal seta. Carpus with two additional simple dorsal setae. Propodus with only three subdistal simple setae and dorso-subdistal setulated seta.

Pereopod 6 (fig. 13G): as pereopod 4 except ischio-basis without setulated setae. Merus with two additional dorsodistal setae. Carpus with three outer and three inner spiniform setae and four distal simple setae. Propodus with distal row of seven flattened setae, one serrated seta, two simple dorsodistal setae, and one subdistal dorsal setulose seta. Dactylus with two lateral rows of eight setae.

Pleopods 1-2 (fig. 14A): basal article tapering, with six plumose setae on outer margin and one plumose seta on inner margin. Exopod with about 26 plumose setae.

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Fig. 14. *Zeuxo turkensis* n. sp., male. A, pleopod 2; B, pleopod 3. Scale bar: 0.5 mm.
Fig. 15. *Zeuxo turkensis* n. sp., female. A, lateral view; B, pleotelson and uropods; C, antennule; D, antenna; E, labrum; F, labium. Scale bar: 0.5 mm.
setae on outer margin, without gaps. Endopod with one plumose inner seta, one thick but stout terminal circumplumose seta and additional ten plumose setae along outer margin without gaps.

Pleopod 3 (fig. 14B): basal article tapering, with only three plumose setae on outer margin and none on inner margin. Exopod with about 19 plumose setae on outer margin without gaps. Endopod with one plumose inner seta, one thick but stout terminal circumplumose seta and additional nine plumose setae along outer margin, without gaps.
Fig. 17. *Zeuxo turkensis* n. sp., female. A, cheliped; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pereopod 6. Scale bar: 0.5 mm.

Uropod (fig. 11B): basal article twice as long as wide, with six or seven simple distal setae of which some are long (longer than endopod). Endopod with three articles, all with simple or setulated distal setae.

Female (figs. 15-18), where differing from male.

Body (fig. 15A): more elongated than male.
Fig. 18. Zeuxo turkensis n. sp., female. A, pleopod 1; B, pleopod 3. Scale bar: 0.5 mm.

Maxilla (fig. 16D): with fewer setules.

Cheliped (fig. 17A): much smaller than in male, particularly the chela. Propodus with only one seta at dactylus insertion. Fixed finger with much smaller inner medial processes, with only three ventral setae, two subdistal setae near dactylus insertion, and five inner setae.

Pleopod 1-2 (fig. 18A): basal article with four plumose setae on outer margin and none on inner margin. Exo- and endopod with fewer setae than in male.

Pleopod 3 (fig. 18B): basal article basal with two plumose setae on outer margin and none on inner margin. Exo- and endopod with fewer setae than in male.

Remarks.— The key to the genus given by Sieg (1980) relies heavily on the pleopodal setae and uropodal article numbers; characters known to be of dubious value. Therefore the characters of *Z. turkensis* separating it from the other species in the genus are given in table II.

Etymology.— The species is named after the nation of Turkey (turkensis = latinization of “from Turkey” as an adjective) where the species was discovered.
### Table II

Morphological differences between *Z. turkensis* n. sp. and other *Zeuxo* species (pleopod setation and uropodal article number excluded)

<table>
<thead>
<tr>
<th>Species</th>
<th>Characters of <em>Z. turkensis</em> n. sp. separating it from the following species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Z. amiti</em> Bamber, 2008</td>
<td>A much larger lacinia mobilis on the left mandible, by the maxilliped palp article 1 having three outer setae, the presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. andaminimus</em> Bamber &amp; Chatterjee, 2010</td>
<td>A much larger lacinia mobilis on the left mandible, by the maxilliped palp article 1 having three outer setae, the presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. angua</em> Bamber, 2005</td>
<td>Presence of a spine row on the left mandible, maxilliped palp article 1 having three outer setae</td>
</tr>
<tr>
<td><em>Z. bellii</em> Edgar, 2008</td>
<td>Presence of a cheliped carpus ventral process, additional difference in the male gender is the fixed finger process</td>
</tr>
<tr>
<td><em>Z. beringi</em> Kudinova-Pasternak, 1989</td>
<td>A smaller lacinia mobilis and spine row on the right mandible, maxilliped article 1 having three outer setae</td>
</tr>
<tr>
<td><em>Z. cloacarattus</em> Bamber, 2006</td>
<td>A maxilliped palp article 1 having three outer setae</td>
</tr>
<tr>
<td><em>Z. coralensis</em> Sieg, 1980</td>
<td>Presence of a cheliped carpus ventral process, additional difference in the male gender is the fixed finger process</td>
</tr>
<tr>
<td><em>Z. coturnix</em> Bamber, 2012a</td>
<td>Presence of only three ventral setae on the cheliped fixed finger</td>
</tr>
<tr>
<td><em>Z. edgari</em> n. sp.</td>
<td>Pleotelson longer than pleonite 1. Maxilliped palp article 1 with at least three outer setae</td>
</tr>
<tr>
<td><em>Z. exsargasso</em> Sieg, 1980</td>
<td>Antenna article 2 without dorsal serration, a much larger and crenulated left mandible lacinia mobilis, presence of a spine row on the right mandible</td>
</tr>
<tr>
<td><em>Z. fresii</em> Sieg, 1980</td>
<td>Lack of a prominent pereopod 1 coxa</td>
</tr>
<tr>
<td><em>Z. holdichi</em> Bamber, 1990</td>
<td>Maxilliped palp article 1 having three outer setae, lack of a prominent pereopod 1 coxa</td>
</tr>
<tr>
<td><em>Z. kirkmani</em> Edgar, 2008</td>
<td>Much larger lacinia mobilis on the left mandible, maxilliped palp article 1 having three outer setae</td>
</tr>
<tr>
<td><em>Z. koreaensis</em> n. sp.</td>
<td>Maxilliped palp article 1 with outer serration and three setae and by the presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. kurilensis</em> (Kussakin &amp; Tzareva, 1974)</td>
<td>Much bigger lacinia mobilis on the left- and equally smaller on the right mandible</td>
</tr>
<tr>
<td><em>Z. marmoratus</em> (Nordenstam, 1930)</td>
<td>Maxilliped palp article 1 having three outer setae</td>
</tr>
</tbody>
</table>
**TABLE II**
(Continued)

<table>
<thead>
<tr>
<th>Species</th>
<th>Characters of <em>Z. turkensis</em> n. sp. separating it from the following species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Z. mooneyi</em> Edgar, 2008</td>
<td>Maxilliped palp article 1 having three outer setae, presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. nannioggae</em> Bamber, 2005</td>
<td>Presence of a lacinia mobilis and spine row on the right mandible, maxilliped palp article 1 having three outer setae, presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. normani</em> (Richardson, 1905) (California)</td>
<td>Maxilliped palp article 1 with outer serration and three setae, presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. novaezealandiae</em> (Thomson, 1879)</td>
<td>Pereopod 1 coxa without dentated spur</td>
</tr>
<tr>
<td><em>Z. odohertyae</em> Edgar, 2008</td>
<td>Much larger lacinia mobilis on the left mandible and by the maxilliped palp article 1 having three outer setae</td>
</tr>
<tr>
<td><em>Z. phytalensis</em> Sieg, 1980</td>
<td>Maxilliped palp article 1 having three outer setae, additional difference in the male gender is the fixed finger process</td>
</tr>
<tr>
<td><em>Z. russi</em> Edgar, 2008</td>
<td>Much larger lacinia mobilis on the left mandible, by the maxilliped palp article 1 having three outer setae, presence of a cheliped carpus ventral process</td>
</tr>
<tr>
<td><em>Z. seurati</em> (Nobili, 1906)</td>
<td>Lack of a prominent pereopod 1 coxa</td>
</tr>
<tr>
<td><em>Z. sherpherdii</em> Edgar, 2008</td>
<td>Much larger lacinia mobilis on the left mandible, fewer small spiniform setae on the maxilliped endite</td>
</tr>
<tr>
<td><em>Z. simonsiensis</em> Sieg, 1980</td>
<td>Much larger lacinia mobilis on the left, presence of same on the right mandible</td>
</tr>
<tr>
<td><em>Z. vanhoeffeni</em> Sieg, 1980</td>
<td>Much larger lacinia mobilis, presence of spine row on the left mandible</td>
</tr>
<tr>
<td><em>Z. westwoodiana</em> Templeton, 1840</td>
<td>Lack of a prominent pereopod 1 coxa</td>
</tr>
<tr>
<td><em>Z. zorro</em> Bamber &amp; Bird, 1997</td>
<td>Maxilliped palp article 1 having 3 outer setae and by the presence of a cheliped carpus ventral process</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Sieg (1980) erected the species *Zeuxo paranormani* on the basis of very few characters, all of which have now shown to be variable within a species. Sieg defines the difference between *Z. normani* and *Z. paranormani* by the latter having: (1) one article less in the uropodal endopod; (2) a tiny difference in expression of the pereopod 1 coxa process, which in Sieg’s own drawings are close to identical (Sieg, 1980: 188, fig. Z3 and Z4); (3) one less spiniform seta on the pereopod 2
carpus. Since both the uropod and the spiniform setae characters have been shown to vary in many species (see introduction), and since the expression of the pereopod 1 coxa process is both tiny and subjective, we here consider Z. paranormani as a junior synonym of Z. normani. This decision is also supported by the fact that the type-material of both species was also originally part of the same type-series of Z. normani and from the same type locality.

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REFERENCES


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