Turkish Journal of Zoology

Volume 42 | Number 1 Article 4

1-1-2018

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Turkish Journal of Zoology

http://journals.tubitak.gov.tr/zoology/

Research Article

Turk J Zool
(2018) 42: 29-45
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doi:10.3906/zoo-1708-4

Variations in *Afrolaophonte pori* Masry, 1970 (Copepoda: Harpacticoida: Laophontidae): a contribution towards the revision of the genus

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Received: 02.08.2017 • **Accepted/Published Online:** 23.10.2017 • **Final Version:** 10.01.2018

Abstract: *Afrolaophonte pori* was originally described from the interstitial habitats of Israel and subsequently reported from Italy and the Aegean coasts of Turkey. It is the only representative of the genus in the Mediterranean Sea. The aim of this study is to present a detailed redescription of *A. pori* based on extensive material from different parts of the species' range to provide geographic distributional data and to reveal variations within and between the populations. We have examined numerous specimens collected from the Aegean and Mediterranean Turkish coasts and have presented a detailed redescription of both sexes. Despite the fact that the original description of *A. pori* does not meet modern standards, the present redescription of *A. pori* matches well with the original description in terms of setal and segmental pattern, except for the setation of the P1 exopods. Many populations collected from along the Aegean shores also had 2-segmented exopods, but the discovery along the Mediterranean coast of some specimens having 2-segmented exopods and 1-segmented endopods, as well as observation of asymmetric P3 rami on some specimens, directed us to conclude that all populations of *Afrolaophonte* in the Mediterranean Basin belong to the same morphospecies sharing the same gene pool.

Key words: Zoogeography, asymmetry, Mediterranean Sea, Aegean Sea, biodiversity

1. Introduction

Genus *Afrolaophonte* Chappuis, 1960 is one of the vermiform genera of the family Laophontidae Scott T., 1904 that occur exclusively in the interstitial realm of the intertidal zone of sandy beaches. They show typical modifications for an interstitial lifestyle, with their small, cylindrical bodies and highly reduced appendages (Fiers, 1990; Huys, 1990). The genus shares these characters with other interstitially living laophontid genera like *Laophontina* Norman & Scott T., 1905; *Klieonychocamptoides* Noodt, 1958; *Galapalaophonte* Mielke, 1981; *Amerolaophontina* Fiers, 1991; and *Wellsiphontina* Fiers, 1991, but it can easily be recognized by the morphology of the fourth swimming leg (P4) in both sexes (Fiers, 1990; Lang, 1965). Although the genus *Afrolaophonte* was clearly defined by the fusion of the P4 endopod to the basis, in several representatives of the genus, very basic taxonomical issues have so far remained unresolved, and the geographic distribution of most species is poorly known.

Genus *Afrolaophonte* was established by Chappuis (1960) to accommodate *A. monodi*, which was described from the littoral waters of Senegal. Lang (1965) then transferred *Laophontina brevipes* and *L. renaudi* to *Afrolaophonte*. With the 10 species described after Lang (1965), the genus has 13 valid species showing a pantropical distribution (Fiers, 1990). In his work in which he described *A. stocki* Fiers, 1990 and discussed the zoogeography of the genus, Fiers (1990) divided the genus into 3 groups based on the armature and segmentation of the third (P3) and fourth (P4) swimming legs: 1) the *chilensis*-group, which has 3-segmented P3 and P4 exopods armed with 4 setae/spines at the last segment; 2) the *brevipes*-group, which has 2-segmented P3 and P4 exopods armed with 3 (P3) or 4 (P4) setae/spines at the last segment; and 3) the *monodi*-group, which has a 3-segmented P4 exopod that bears 3 spines on the last segment.

Afrolaophonte pori Masry, 1970, which belongs to the *monodi*-group, is the only representative of the genus in the Mediterranean Sea and was described by Masry (1970) based on materials collected from the sandy beaches of the Nahariyya, Nitzanim, and Akhziv beaches of Israel, without the designation of a type species. Cottarelli et al. (1992) reported and redescribed the species from the Cetara shore (Ischia, Naples, Italy). Recently, Alper et al. (2010, 2015) reported the species from Datça and Dilek

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Peninsula, Turkey. These two are the only records of the species outside its type locality.

The aim of this study is to present a detailed redescription of *A. pori* based on extensive material from different parts of the species' range (Mediterranean), to provide geographic distributional data, and to reveal variations within and between populations. We present a detailed redescription using light and scanning electron microscopy, enabling a morphological characterization constant enough to define *A. pori*. Previously overlooked characters that can help to differentiate *A. pori* from other representatives of the genus are introduced. Updated morphological information may serve as a basis for future comparison of other *A. pori*-like specimens from other localities and may significantly contribute to the phylogenetic reconstruction of the evolutionary history of the genus.

2. Materials and methods

Extensive materials collected from the Aegean coasts of Turkey via previous studies (Table; Figure 1) and deposited in the collection of Mersin University and Balıkesir University were examined. Olympus BX-50 and BX-53 binocular microscopes were used to examine and draw the specimens. Selected specimens were dissected in lactic acid under an Olympus SZX-12 stereomicroscope and parts were mounted on slides in lactophenol mounting medium. Glass fibers were added to prevent the animals and appendages from being compressed by the coverslips and to assist rotation and manipulation, allowing observation from all angles. Specimens were also examined with a Zeiss SUPRA 55VP (FESEM) scanning electron microscope at the Mersin University Advanced Technology Education, Research, and Application Center (MEITAM). Kaymak and Karaytuğ (2014) were followed to

Table. Localities and coordinates of the sampling stations.

St	Locality	Latitude (N)	Longitude (E)
Ast03	Gemiler Bay, Fethiye	36.55867	29.0605
Ast07	Büyükboncuklu Bay, Fethiye	36.6275	29.07722
Ast11	Günlüklü Beach, Fethiye	36.71561	29.0205
Ast12	İnlice Bay, Fethiye	36.73044	28.96614
Ast19	Turunç, Marmaris	36.77497	28.243
Ast22	Adaköy, Marmaris	36.83808	28.29492
Ast25	Karaca, Marmaris	36.95469	28.20594
Ast26	Çamlık pier, Marmaris	36.98942	28.25069
Ast27	East of İncekum Beach, Marmaris	36.9835	28.20575
Ast28	Akyaka, Gökova	37.05128	28.32378
Ast36	Küçükbük, Bodrum	37.14078	27.35778
Ast38	Yalıkavak, Bodrum	37.109	27.29308
Ast39	Günbatımı Beach, Turgutreis	37.00675	27.25569
Ast45	Yalıçiftlik, Bodrum	36.99458	27.51567
Ast56	Venus Beach, Güzelçamlı	37.72606	27.23572
Ast57	İçmeler Beach, Dilek Peninsula	37.70817	27.20511
Ast58	Aydınlık Beach, Dilek Peninsula	37.70022	27.17578
Ast59	Karasu Beach, Dilek Peninsula	37.68975	27.12875
Ast60	Mersinderesi, Dilek Peninsula	37.68125	27.08908
Ast61	Dipburun, Dilek Peninsula	37.66342	27.00906
Ast63	Pygeia Beach	37.90122	27.27256
Ast64	Pamucak Beach	37.94578	27.27289
Ast66	Ahmetbeyli	37.99058	27.18714
Ast68	Doğanbey	38.06319	26.90286
Ast76	South of Mordoğan	38.47231	26.61303
Ast77	Mordoğan Beach	38.51642	26.62597
Ast80	Bademlibük	38.62133	26.35778
Ast81	Küçükbahçe	38.55744	26.3705
Ast82	Karareis	38.47792	26.42989
Ast83	Ildırı	38.34722	26.4505
Ast87	Ferah Camp, Foça	38.69181	26.73178

Table. (Continued).

St	Locality	Latitude (N)	Longitude (E)
Ast88	Acar Camp, Foça	38.73153	26.74244
Ast90	Yenişakran	38.88483	27.0625
Ast93	Deniz Camp, Bademli	39.03883	26.82536
Ast94	Dikili	39.08744	26.88292
AstY01	Küçükboncuklu Bay, Fethiye	36.62108	29.07953
AstY06	Gümüşlük	37.05211	27.23678
AstY08	Manastır Beach, Altınkum	37.34206	27.23625
AstY09	Altınkum, 3rd bay	37.34328	27.26258
AstY12	Ortamahalle, Özdere	38.04453	27.05392
AstY16	Tınaztepe	38.40131	26.48828
DATst06	Hayıtbükü	36.68408	27.5723
DATst07	Mendelle Beach, Kargı	36.73195	27.677
DATst08	Taşlık Beach, Datça	36.72042	27.68705
DATst15	Kurucabük Camp Beach, Aktur	36.75595	27.88502
Mst08	Kurtpınarı, Hatay	36.89015	35.94625
Mst17	Viranşehir, Mersin	36.73928	34.5413
Mst23	Arkum, Mersin	36.35865	34.07937
Mst25	Akçakıl Beach, Arkum, Mersin	36.29715	33.84772
Mst28	Boğsak, Mersin	36.27107	33.81403
Mst31	West of Yeşilovacık, Mersin	36.18828	33.62872
Mst33	Ahi Beach, Mersin	36.14983	33.49935
Mst34	Ağaçlı Beach, Mersin	36.15637	33.48195
Mst35	Eskur-2, Mersin	36.15525	33.44247
Mst38	Tekeli, Mersin	36.13802	33.16213
Mst40	Bozyazı, Mersin	36.10038	32.97002
Mst41	Mamure, Mersin	36.08612	32.9059
Mst44	Melleç, Mersin	36.04303	32.68382
Mst45	Kaledran, Mersin	36.09887	32.56777
Mst46	Gazipaşa Marina, Antalya	36.26895	32.27972
Mst48	Drita Hotel Beach, Antalya	36.46368	32.11888
Mst50	Payallar, Antalya	36.59248	31.83913
Mst51	İncekum Beach, Antalya	36.6375	31.74657
Mst52	East of İncekum, Antalya	36.67867	31.61938
Mst57	Lara Beach, Antalya	36.85052	30.84943
Mst60	Göynük, Antalya	36.66112	30.56117
Mst65	Karaöz, Antalya	36.27445	30.40905
Mst67	Sahilkent, Finike, Antalya	36.31522	30.19858
Mst69	Çağıllı, Finike, Antalya	36.27905	30.13987
MstY03	Kale village, Arsuz, Hatay	36.28673	35.78875
MstY07	Zeytinbeli, Adana	36.76662	35.73605
MstY11	Tisan, Mersin	36.1569	33.68403
MstY14	Papaz Bay, Mavikent, Antalya	36.27903	30.39295
SRZst04	Kocadere village, Eceabat, Çanakkale	40.24949	26.28117
SRZst06	Ece Harbour, Çanakkale	40.36253	26.32375
SRZst08	Köümürlimanı, Çanakkale	40.54619	26.51112
SRZst2	Tuzla Beach, Enez, Edirne	40.59773	26.2432
SRZst21	Sultaniçe, Enez, Edirne	40.59211	26.14025
SRZst22	Altınkum, Enez, Edirne	40.65168	26.06587

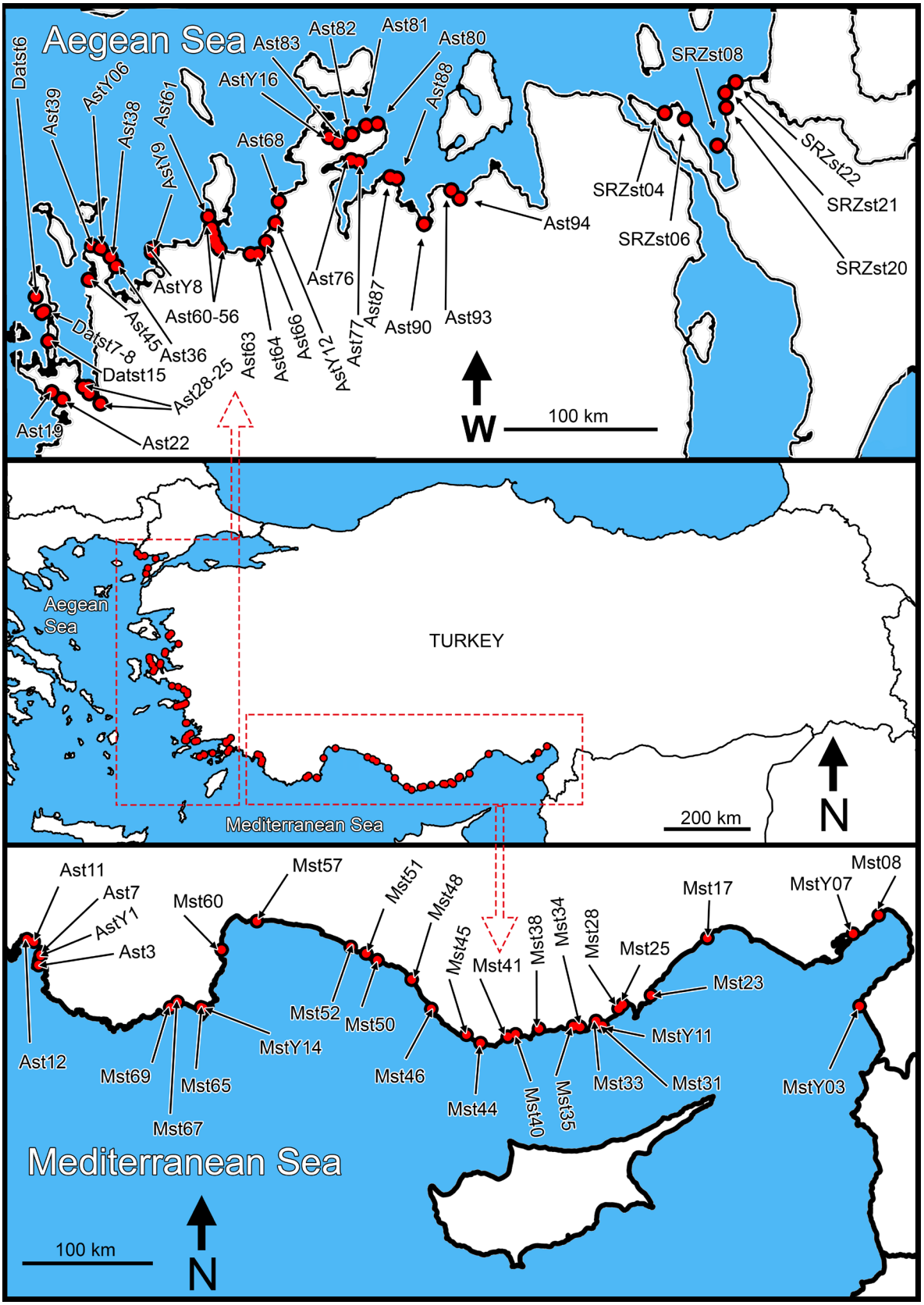

Figure 1. Zoogeographic distribution of *Afrolaophonte pori* along the Turkish coasts.

prepare the specimens for SEM observation. All specimens that were prepared for light microscopy were sealed with Entellan (Merck) after examination; additional materials were preserved in 70% ethanol in 5-mL plastic tubes and deposited in the collection of Balıkesir University's and Mersin University's harpacticoid collections. Huys et al. (1996) were followed for the terminology used in the text. Abbreviations used in the text are: P1–P6, first to sixth swimming legs; ae, aesthetasc.

3. Results

Family Laophontidae Scott T., 1904
Genus *Afrolaophonte* Chappuis, 1960
Afrolaophonte pori Masry, 1970 (Figures 2–10)

3.1. Material examined

Mst08; 13.09.2008 (2♀♀), Mst17; 26.07.2007 (6♀♀,1♂), Mst23; 10.04.2007 (2♀♀), 27.07.2007 (4♀♀, 3♂♂), 27.11.2007 (6♀♀), Mst25; 27.11.2007 (6♀♀), Mst26; 14.09.2008 (8♀♀, 29♂♂), 27.07.2007 (7♀♀, 4♂♂), Mst28; 27.11.2007 (16♀♀,15♂♂), Mst31; 11.07.04.2007 (5♀♀), 28.07.2007 (2♀♀), 28.11.2007 (5♀♀,4♂♂), Mst33; 11.04.2007 (1♀), Mst34; 28.07.2007 (8♀♀), Mst35; 28.07.2007 (2♀♀, 5♂♂), 28.11.2007 (10♀♀,10♂♂), Mst36; 28.11.2007 (1♀), Mst38; 15.09.2008 (30♀♀, 15♂♂), 28.07.2007 (12♀♀), 28.11.2007 (1♀), Mst40; 28.11.2007 (1♀), Mst41; 11.04.2007 (4♀♀), Mst44; 12.04.2007 (3♀♀), 29.07.2007 (8♀♀, 6♂♂), Mst45; 29.07.2007 (4♀♀), Mst46; 29.07.2007 (1♀), 29.11.2007 (1♀), Mst48; 12.04.2007 (1♀), 15.09.2008 (1♂), 29.07.2007 (7♀♀), 29.11.2007 (4♀♀, 6♂♂), Mst50; 12.04.2007 (2♀♀), 29.07.2007 (2♀♀, 4♂♂), Mst51; 12.04.2007 (2♀♀), Mst52; 12.04.2007 (6♀♀, 2♂♂), 29.07.2007 (11♀♀), Mst57; 30.07.2007 (5♀♀), 30.11.2007 (10♀♀, 4♂♂), Mst60; 01.12.2007 (1♂♂), Mst65; 31.07.2007 (2♀♀, 3♂♂),Mst67; 01.12.2007 (1♂), Mst69; 14.04.2007 (4♀♀); MstY03; 25.07.2007 (1♀), MstY07; 24.07.2007 (12♀♀), 25.11.2007 (2♀♀, 1♂), MstY11; 27.07.2007 (8♀♀,4♂♂); MstY14; 01.12.2007 (1♀, 2♂♂); 31.07.2007 (2♀♀), Datst6; 15.04.2007 (3♀♀, 3♂♂), 21.08.2007 (1♀, 1♂), Datst7; 16.04.2007 (3♀♀, 3♂♂), 20.08.2007 (2♀♀, 2♂♂), Datst8; 04.12.2007 (5♀♀, 6♂♂), 26.02.2008 (10♀♀, 5♂♂), Datst15; 16.04.2007 (5♀♀, 2♂♂), 21.08.2007 (4♀♀, 1♂), 04.12.2007 (4♀♀, 1♂), 25.02.2008 (2♂♂), Ast03; 20.10.2012 (1♀, 2♂♂), Ast07; 17.05.2012 (1♀), 20.10.2012 (10♀♀, 5♂♂), Ast11; 07.06.2013 (8♀♀, 11♂♂), Ast12; 21.10.2012 (2♀♀, 2♂♂), 28.06.2014 (1♀), Ast19; 10.06.2013 (6♀♀), 19.05.2012 (2♀♀), Ast22; 09.06.2013 (11♀♀, 5♂♂), Ast25; 10.06.2013 (8♀♀, 9♂♂), 22.10.2012 (39♀♀, 46♂♂), Ast26; 22.10.2012 (3♂♂), Ast27; 09.06.2013 (6♀♀, 2♂♂), Ast28; 10.06.2013 (8♀♀), Ast29; 20.05.2012 (1♂), Ast36; 20.05.2012 (1♂), Ast38; 11.06.2013 (16♀♀, 8♂♂), 20.05.2012 (5♀♀, 3♂♂), 23.10.2012 (58♀♀, 55♂♂), Ast39; 20.05.2012 (14♀♀, 26♂♂), Ast45; 21.05.2012 (25♀♀, 12♂♂), 23.10.2012 (4♀♀, 8♂♂), Ast56; 25.10.2012 (11♀♀, 3♂♂), Ast57; 14.06.2013 (11♀♀, 4♂♂), Ast58; 14.06.2013 (15♀♀, 2♂♂), Ast59; 02.07.2014 (7♀♀, 6♂♂), 14.06.2013 (3♀♀, 2♂♂), 25.10.2012 (11♀♀, 3♂♂), Ast60; 14.06.2013 (9♀♀, 3♂♂), 22.05.2012 (50♀♀, 30♂♂), 25.10.2012 (9♀♀, 9♂♂), Ast61; 25.10.2012 (1♂), Ast63; 03.07.2014 (17♀♀,16♂♂), 14.06.2013 (6♀♀, 5♂♂), 23.05.2012 (22♀♀, 11♂♂), 25.10.2012 (34♀♀, 25♂♂), Ast64; 14.06.2013 (10♀♀, 3♂♂), Ast66; 02.07.2014 (1♀), Ast68; 02.07.2014 (1♀), 25.10.2012 (37♀♀, 6♂♂), Ast76; 04.07.2014 (2♀♀), 16.06.2013 (12♀♀), Ast77; 16.06.2013 (9♀♀, 6♂♂), Ast80; 24.05.2012 (9♀♀, 6♂♂), Ast81; 16.06.2013 (3♀♀, 5♂♂), Ast82; 16.06.2013 (7♀♀, 2♂♂), Ast83; 24.05.2012 (1♀, 1♂), Ast87; 28.10.2012 (5♀♀, 9♂♂), Ast88; 28.10.2012 (1♀), Ast90; 25.05.2012 (2♀♀), Ast93; 25.05.2012 (29♀♀, 16♂♂), Ast94; 25.05.2012 (22♀♀, 16♂♂), AstY01; 08.06.2013 (6♀♀, 4♂♂), 20.10.2012 (35♀♀, 48♂♂), AstY06; 20.05.2012 (14♀♀, 3♂♂), AstY08; 13.06.2013 (1♀), AstY09; 24.10.2012 (2♀♀, 6♂♂), AstY12; 26.10.2012 (2♀♀, 1♂), AstY16; 27.10.2012 (3♀♀, 14♂♂), SRZst4; 29.09.2013 (18♀♀, 9♂♂), 23.02.2014 (4♀♀,8♂♂), SRZst6; 23.02.2014 (3♀♀), SRZst8; 23.02.2014 (1♀), SRZst20; 27.09.2013 (6♀♀, 3♂♂), SRZst21; 27.09.2013 (1♀), 21.02.2014 (1♀, 2♂), SRZst22; 27.09.2013 (2♂♂).

3.1. Description

Female. Body length from tip of rostrum to posterior margin of caudal rami 447 µm; body cylindrical, without clear demarcation between urosome and prosome (Figures 2A, 2B, 3A). Integuments of the somites are covered with tiny hairs on the dorsal and ventral surfaces (not shown in Figure 2), lateral margins of abdominal segments and the surface of caudal rami with long setules as shown in Figures 2A and 2B. Posterior margin of body somites with hyaline frills. Rostrum defined at base, about as long as first antennular segment, bears 2 sensilla at tip and tiny setules at dorsal surface (Figure 2A). Genital double somite about 1.2 times longer than wide, original segmentation clear in dorsal and lateral views; genital opening located midventrally at anterior half of the genital double somite. Anal somite bears a convex anal operculum dorsally (Figures 2A and 2B).

Caudal rami (Figures 2A, 2B, 3C, 9A–9C) about 2 times longer than wide, dorsal and ventral surfaces furnished with long setules as figured, bears a well-defined tube pore at outer distal corner and 7 setae. Setae I–III located at the proximal half of the dorsolateral surface, naked, seta I very small, setae II and III about 3 times longer than seta I; setae IV and V located terminally, with a fractured plane near base, seta IV about 2.2 times longer than caudal rami, plumose at the posterior half; seta V about 2.3 times longer than seta IV, naked; seta VI located at inner distal corner, naked; seta VII located at the middorsal surface, naked and biarticulated at base.

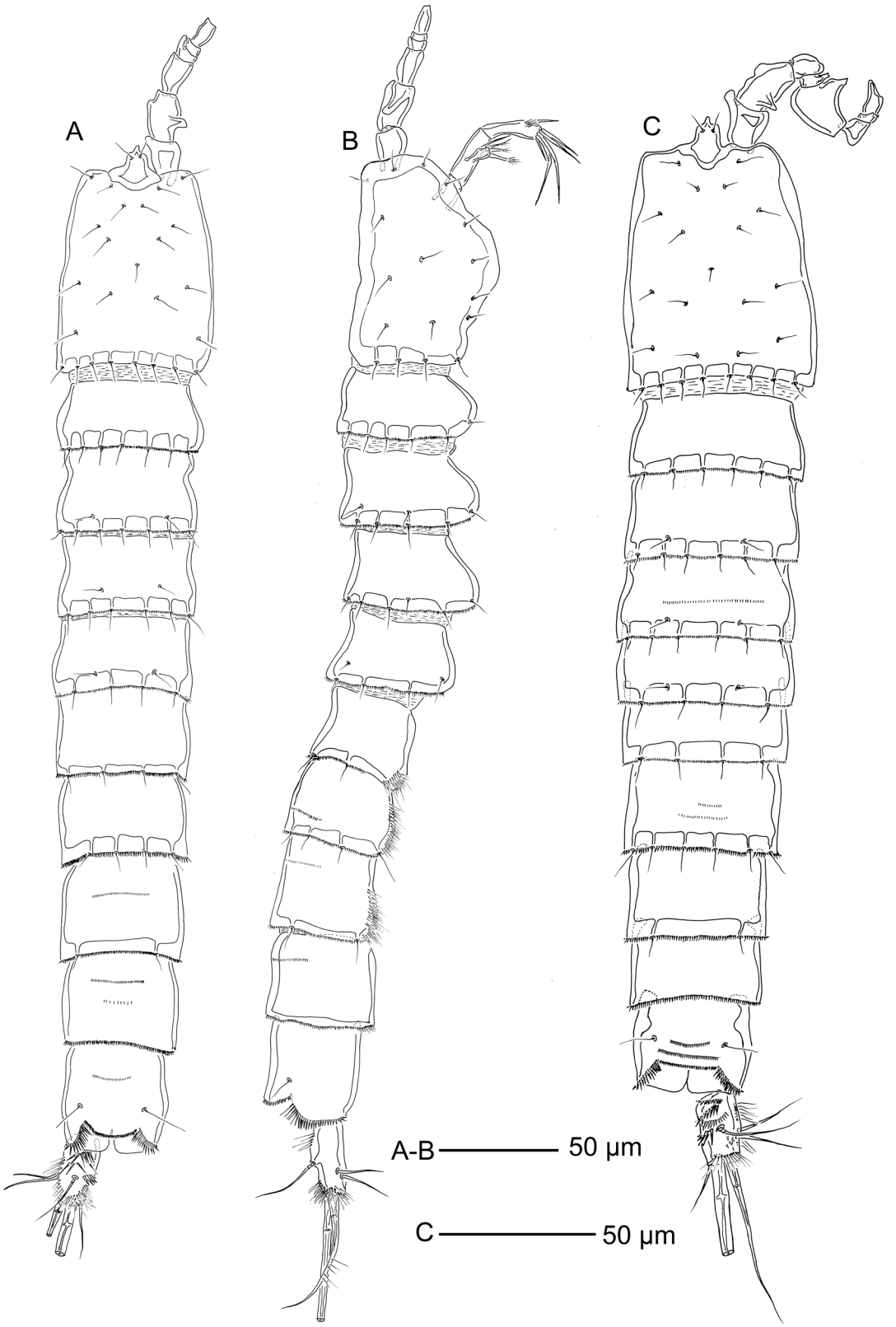

Figure 2. *A. pori*, habitus: A) ♀, dorsal; B) ♀, lateral; C) ♂, dorsal.

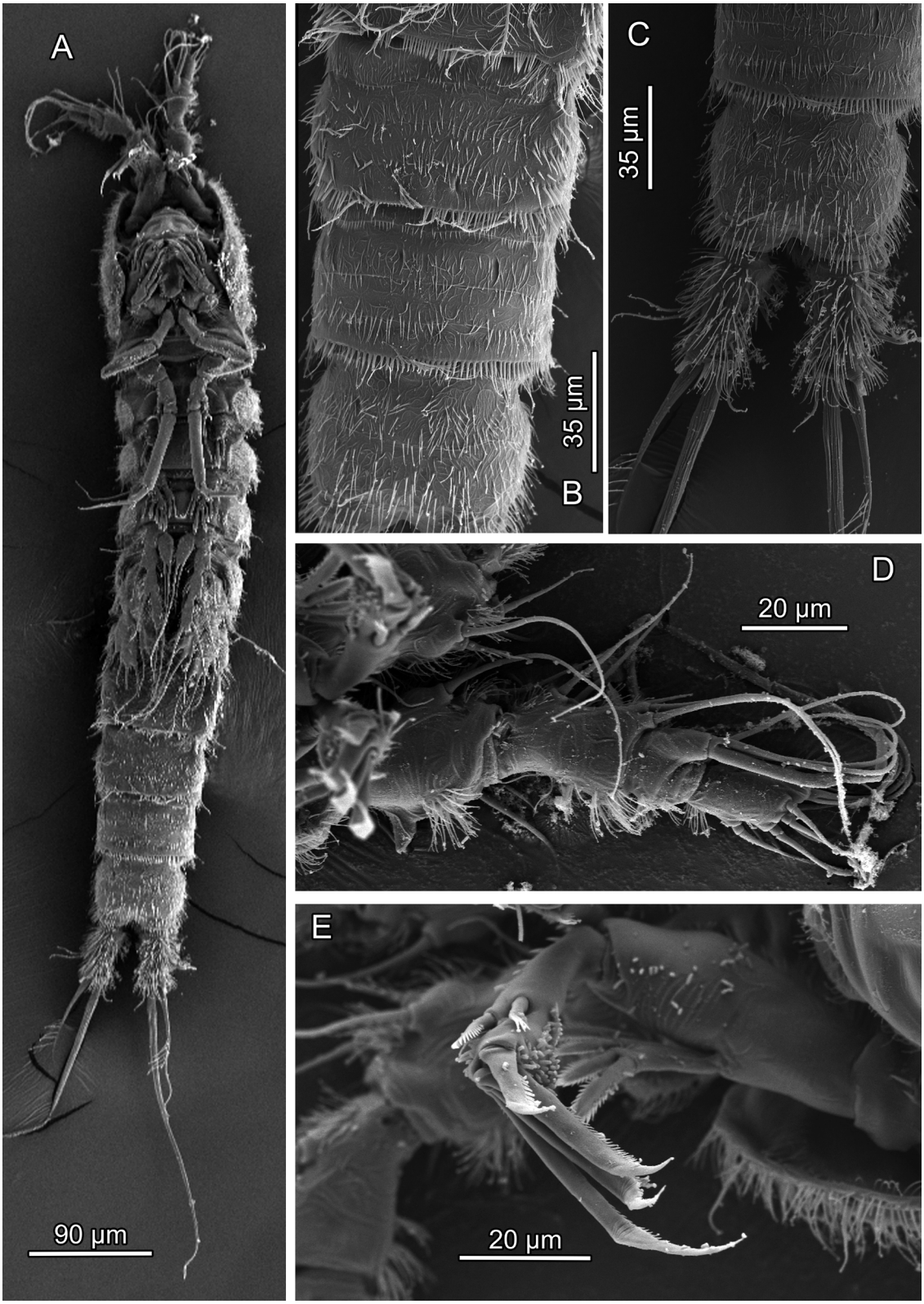

Figure 3. SEM photographs of *A. pori*: A) ♀, habitus, ventral; B) ♀, urosomites, ventral; C) ♀, anal somite and caudal rami, ventral; D) ♀, antennule; E) ♀, antenna.

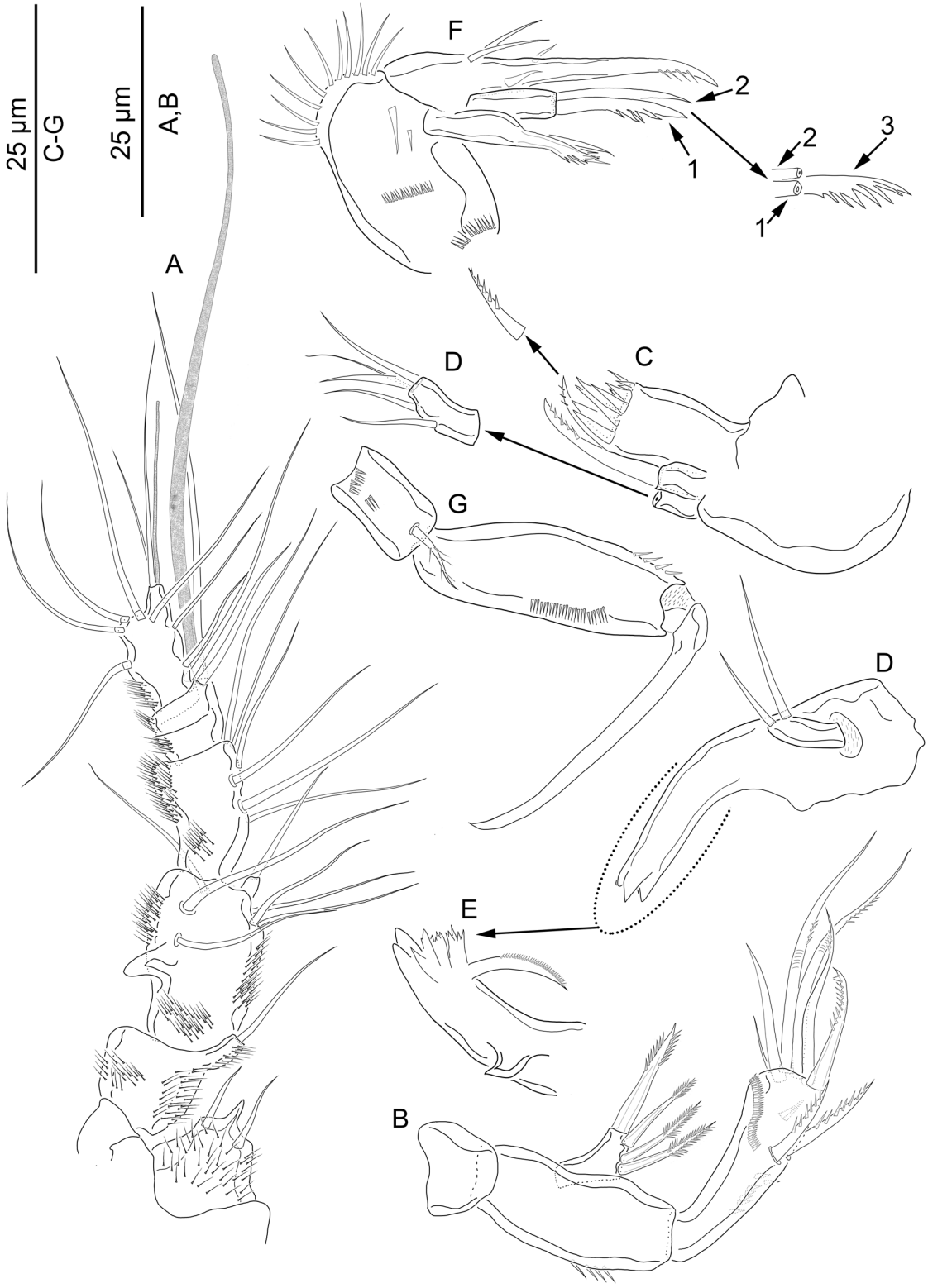

Figure 4. *A. pori*, ♀: A) antennule; B) antenna; C, D) maxillule; E) mandible; F) maxilla; G) maxilliped.

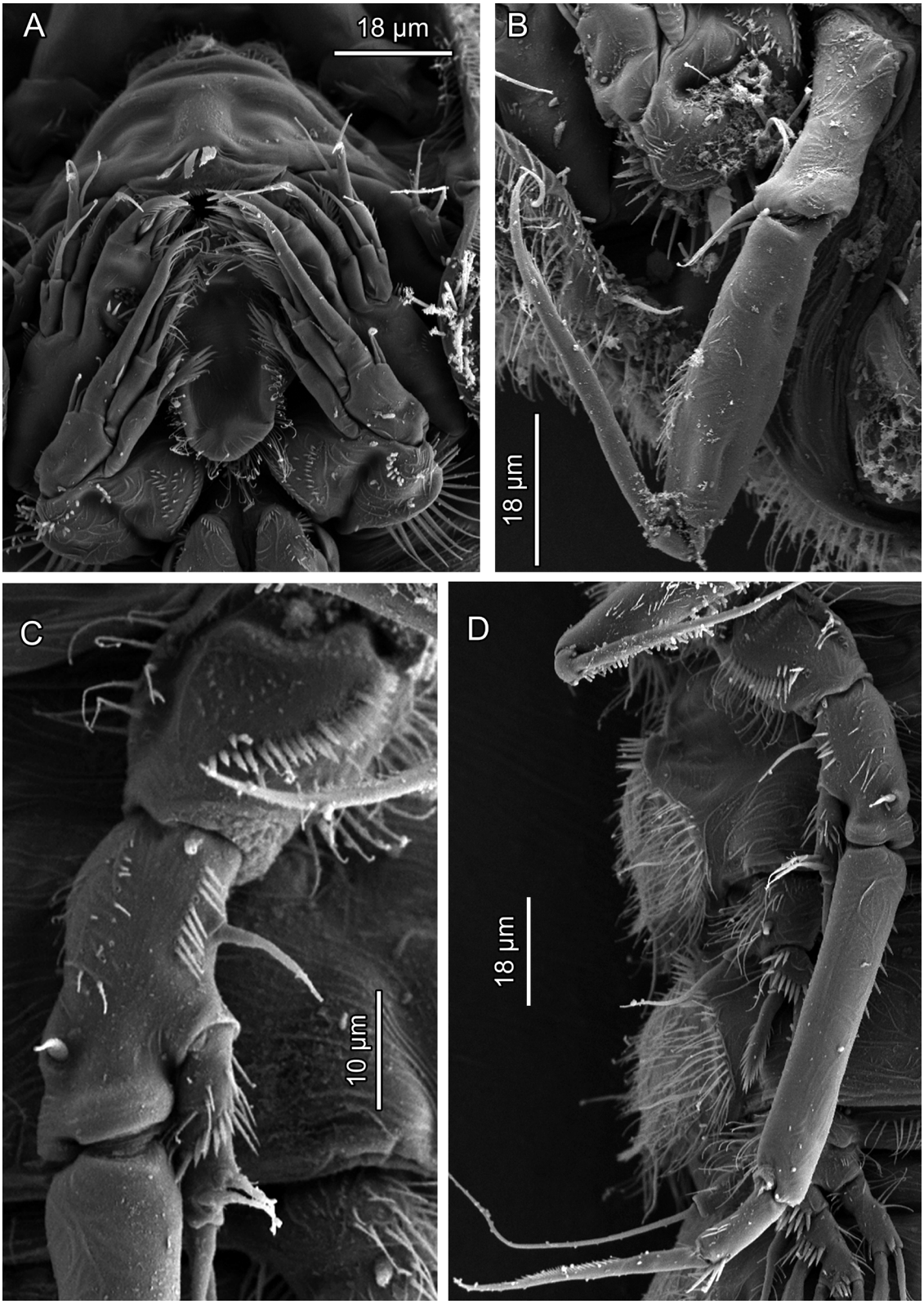

Figure 5. SEM photographs of *A. pori*, ♀: A) mouth parts from ventral view; B) maxilliped; C) P1 coxa, basis, and exopod; D) P1.

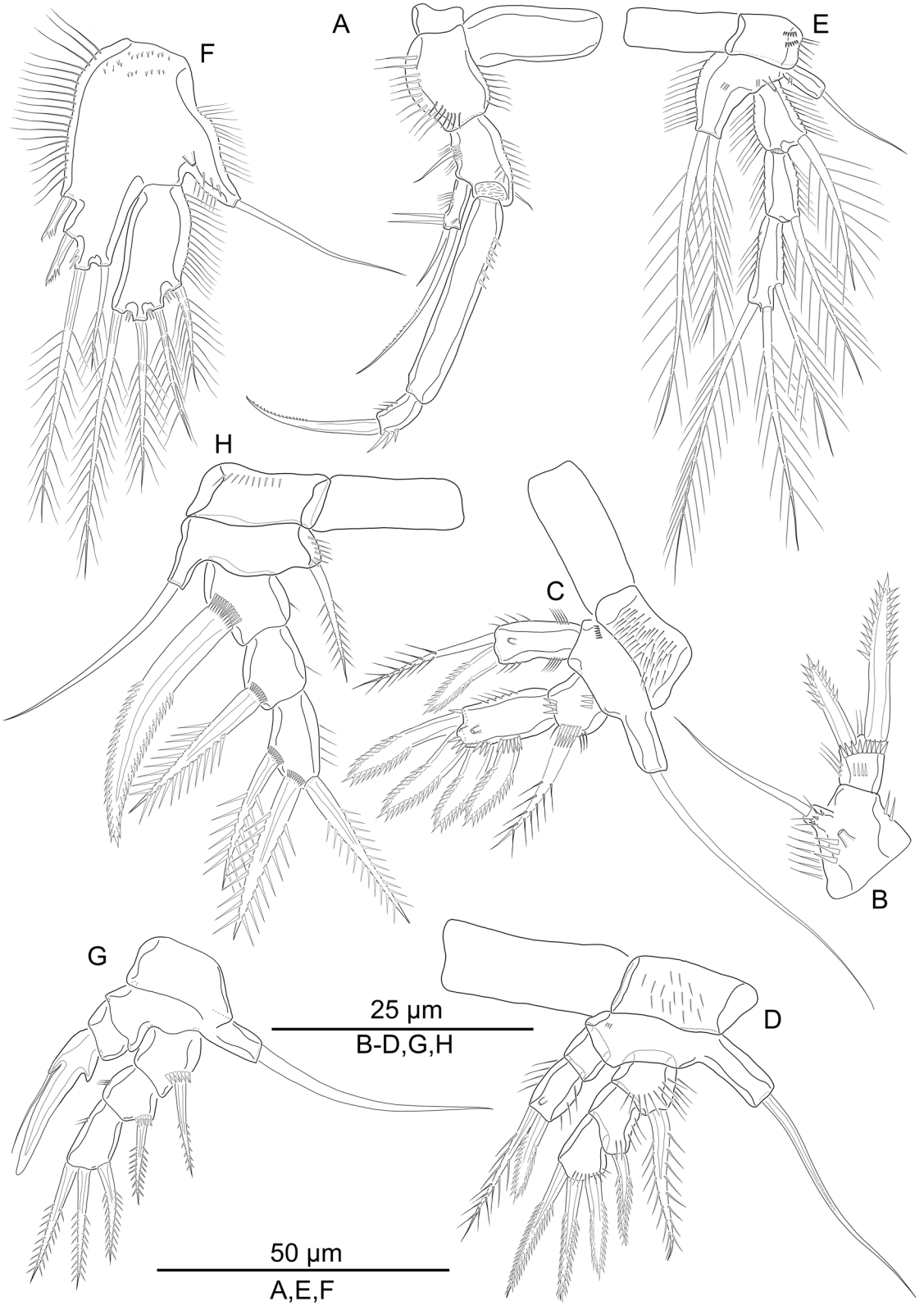

Figure 6. *A. pori,* swimming legs: A) ♀ P1; B) ♀ P2; C, D) ♀ P3 variants; E) ♀ P4; F) ♀ P5; G) ♂ P3; H) ♂ P4.

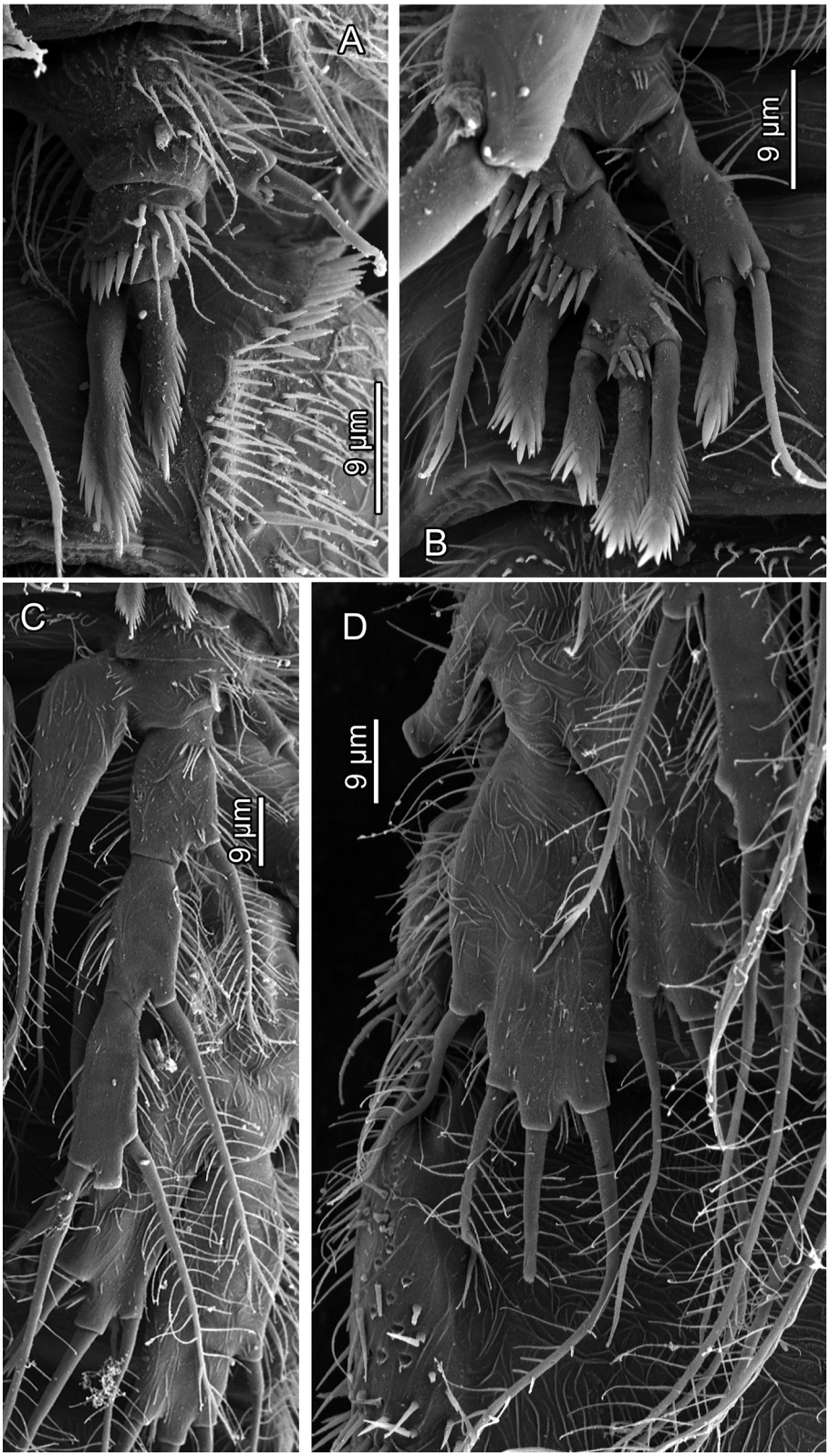

Figure 7. SEM photographs of *A. pori*, ♀: A) P2; B) P3; C) P4; E) P5.

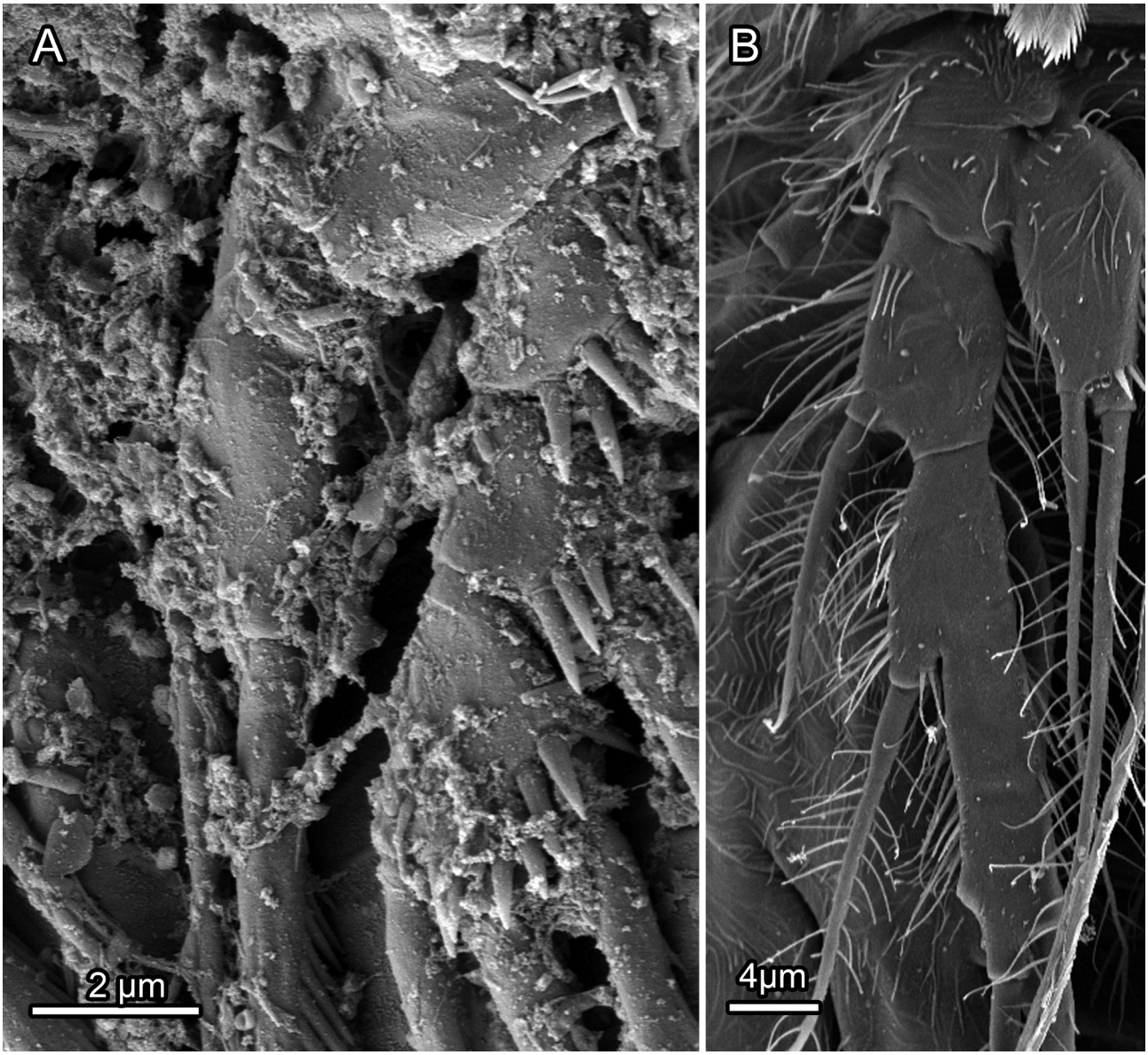

Figure 8. SEM photographs of *A. pori*, ♀: A) P3; B) P4 (asymmetric).

Antennule (Figures 3D, 4A) slender, 6-segmented, segment surfaces furnished with patchy hairs as shown, all setae naked; segment II with a triangular cuticular projection near outer margin of dorsal surface; segment IV with a long aesthetasc fused basally to a seta, originates from a distinct pedestal at ventral surface; segment 6 with apical acrothek consisting of a short aesthetasc fused basally to 2 setae. Setal formula: 1-[1], 2-[7], 3-[6], 4-[1+ae], 5-[1], 6-[8+acrothek].

Antenna (Figures 3E, 4B) with coxa, allobasis, unisegmented exopod and endopod. Coxa squarish and naked; allobasis elongated, about 2.4 times longer than wide, bears a short row of spinules near outer distal corner; endopod elongated, about 3.8 times longer than wide, furnished with a transverse row of spinules apically, bears 2 subapical bipinnate setae at lateral margin, 2 bipinnate, 2 naked, and 2 bipinnate geniculate setae apically; exopod with 4 bipinnate setae.

Mandible (Figures 4D, 4E) with well-developed gnathobase, bearing several teeth and 1 unipinnate seta. Palp reduced, uniramous, and armed with 2 naked setae.

Maxillule (Figures 4C, 4D, 5A): praecoxa well developed, naked; arthrite well developed, distal margin with subequal spines and a unipinnate spine fused at base; coxal endite with long, strong unipinnate spine; basal endite (Figure 4F) with 5 naked setae.

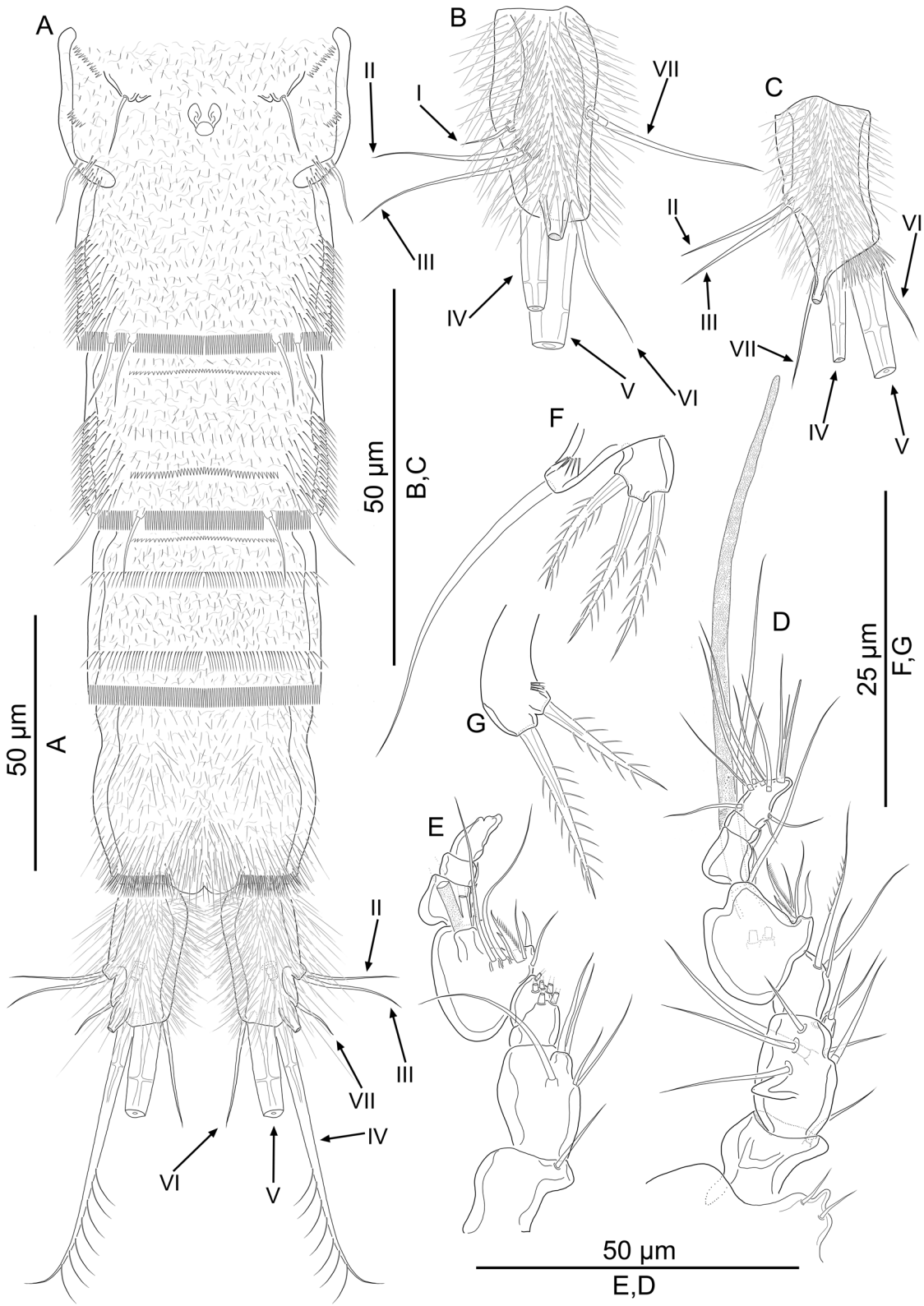

Figure 9. *A. pori*: A) ♀ urosome, ventral; B, C) ♀ caudal rami, B) dorsal, C) lateral; D, E) ♂ antennule; F) ♂ P5; G) ♂ P6.

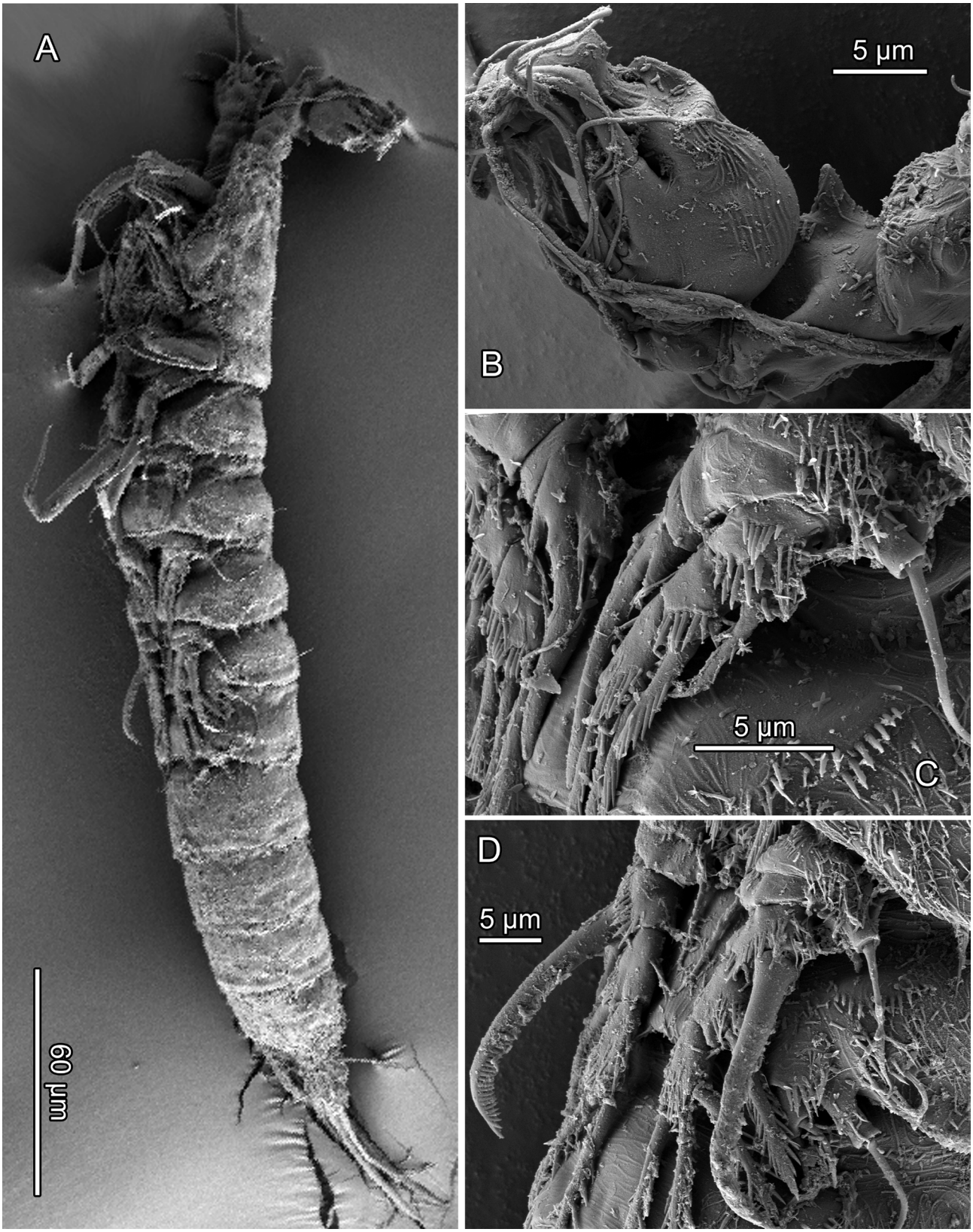

Figure 10. SEM photographs of *A. pori*, ♂: A) habitus, lateroventral; B) antennule; C) P3; D) P4.

Maxilla (Figures 4F, 5A): syncoxa with row of long spinules along outer margin, transverse rows of short spinules on posterior surface; bears 2 endites, first endite bears 2 setae with fringed tip, which are fused to each other and to endite at base; second endite with 3 relatively long and strong setae with fringed tips. Allobasis prolonged to a strong, slightly curved claw carrying 2 long and 2 short naked setae.

Maxilliped (Figures 4G, 5B): syncoxa slightly longer than wide, ornamented with 2 rows of spinules proximally, bears a short plumose seta apically. Basis elongate, about 2.8 times longer than wide, largest at middle part, furnished with a row of spinules at inner margin, bears a few spinules at outer margin. Endopod modified to a long naked claw, about as long as basis.

P1 (Figures 5C, 5D, 6A): intercoxal sclerite enlarged, rectangular, about 2.6 times wider than long; coxa slightly longer than wide, furnished with a row of long spinules at outer margin; basis slightly longer than wide, bears a spinular row and a naked seta at outer margin and a short naked seta near inner distal corner. Endopod 2-segmented, segment 1 elongated, about 6 times longer than wide, furnished with a short row of spinules at proximal part of inner margin; segment 2 relatively short, bears rows of spinules at inner and outer margins, armed with a long, strong unipinnate claw. Exopod unisegmented, relatively short, reaches one-fifth of first exopod segment, furnished with a transverse row of spinule at outer margin, bears 2 naked setae at outer distal corner, 1 short naked seta and 1 long bipinnate geniculate seta at terminal.

P2 (Figures 6B, 7A) highly reduced; intercoxal sclerite, coxa, and basis fused, with a long and naked outer basal seta, bears a pore at anterior surface, furnished with transverse row of spinules at outer margin; uniramous with unisegmented exopod, which bears 2 bipinnate strong setae.

P3 (Figures 6C, 6D, 7D, 8A) intercoxal sclerite rectangular, about 2.3 times wider than long; coxa wider than long, furnished with tiny hairs on anterior surface, basis with a long and naked outer basal seta, which is set on a long pedestal. Endopod variative, unisegmented (Figures 6C, 7D) or 2-segmented (Figures 6D, 8A). In unisegmented condition furnished with spinules at inner and outer margins, bears a pore near distal margin on anterior surface, armed with 1 strong bipinnate spine and 1 relatively long plumose seta terminally; in 2-segmented condition first segment squarish and naked, armature and ornamentation of second segment as in unisegmented. Exopod variative, 2-segmented (Figures 6C, 7D) or 3-segmented (Figures 6D, 8A). In 2-segmented condition segment 1 short and squarish, armed with spinular rows on anterior surface, inner margin naked, bears a long plumose seta at outer distal corner; segment 2 about 2.6 times longer than wide, inner and outer margins furnished with row of spinules, armed with 4 identical strong bipinnate spines (2 at terminal, 2 at outer margin), bears a pore near distal margin at anterior surface. In 3-segmented condition segments 1–3 inner margins naked; segment 1 a strong bipinnate seta, segment 2 with a short bipinnate spine at outer distal corner; segment 3 with 3 identical short bipinnate spines.

P4 (Figures 6E, 7C) coxa ornamented with 2 rows of short spinules near outer distal corner on anterior surface and furnished with tiny spinules at outer margin. Basis with a naked outer basal seta, bears a tube pore on anterior surface near the junction of exopod. Endopod unisegmented, fused to the basis basally, bears long spinules at inner margin, armed with 2 long plumose setae terminally. Exopod 3-segmented; furnished with a transverse row of spinules at proximal part of the outer margin, bears a long plumose seta at outer distal corner, inner margin naked; segment 2 slightly longer than wide, furnished with row of spinules at inner and outer margins, bears a long plumose seta at outer distal corner; segment 3 about 3.5 times longer than wide, furnished with long spinules at inner and outer margins, bears 2 long plumose setae terminally and a relatively short plumose seta at outer distal corner.

P5 (Figures 6F, 7D) baseoendopod furnished with long setules at outer margin and with relatively short setules at inner margin, bears a pore on anterior surface, outer basal setae long and naked, exopodal lobe with 2 plumose setae and 2 short strong setae with fringed tip. Endopod about 2 times longer than its maximum width, outer margin naked, inner margin furnished with long setules, armed with 4 plumose setae.

P6 (Figure 8A) baseoendopod and exopod fused to a small plate, bears 1 short naked seta.

Male. Sexual dimorphism in antennule and P3–P6. Body length from tip of rostrum to posterior margin of caudal rami 331 μm; as in female, except genital double somite (Figures 2C, 10A).

Antennule (Figures 9D, 9E, 10B) 8-segmented subchirocer, all setae naked except the plumose seta at segments 4 and 2 unipinnate setae at segment 5. Segments 1 and 2 with a triangular cuticular projection on dorsal surface, segments 3 and 4 partially fused on dorsal surface, segment 5 swollen, bears a long aesthetasc fused basally to a naked seta; geniculation between segments 5 and 6, segment 8 bears an acrothek consisting of a short aesthetasc fused basally to 2 setae. Setal formula: 1-[1], 2-[8], 3-[3], 4-[4+1 plumose], 5-[7+2 spinulose+ae], 6-[1], 7-[0], 8-[9+ae].

P3 (Figures 6G, 10C) basis partially fused to coxa at outer proximal, outer basal seta long and naked. Endopod 3-segmented, segment 1 completely fused to basis, naked;

segment 2 short and naked; segment 3 drawn into 1 long and 1 short, strong, chitinized projection at tip; bears a naked seta originating from a short pedestal located behind the short projection at tip. Exopod 3-segmented, segments 1 and 2 with a short bipinnate seta at outer distal corner; segment 3 with 3 short bipinnate setae.

P4 (Figures 6H, 10D) coxa as in female, basis with a long and naked outer basal seta; endopod reduced to a plumose seta; exopod 3-segmented, segment 1 armed with a very strong bidentate spine at outer margin, inner margin naked; segment 2 armed with a bipinnate spine at outer distal corner, inner margin naked; segment 3 with 3 bipinnate spines.

P5 (Figure 9F) baseoendopod reduced and fused to the posterior margin of the somite, with a long and naked outer basal seta, exopod squarish, armed with 3 strong bipinnate setae.

P6 (Figure 9G) baseoendopod and exopod fused to a squarish plate, bears 2 bipinnate setae.

3.2. Variation

Variation on the segmentation of the female P3 exopod and endopod was observed among the different populations (see Section 4 for detailed explanation). One female that was collected from Ast58 had an asymmetric P4 exopod; at one side, the second and third segments of the exopod were fused (Figure 8B).

4. Discussion

During an ecological survey of the Israeli Mediterranean coast, Masry (1970) described *Afrolaophonte pori*. Many years after its original description, Cottarelli et al. (1992) reported *A. pori* from the Cetara shore (Ischia, Naples, Italy) and contributed to the taxonomy of the species by providing a redescription based on the Ischia specimens. Although Cottarelli et al. (1992) noted some differences in the structure of the male P3 endopod between the original and Ischia specimens, they preferred to consider the 2 populations conspecific until the study of the topotypic material of *A. pori*. Masry (1970) found *A. pori* at Nahariyya, Nitzanim, and Akhziv stations but neither designated any type material nor specified upon which material his description was based. We have tried to trace the type material, but neither type material nor any topotypic material exists (Professor Dov Por, pers. comm.). Extensive studies carried out along the sandy beaches of Turkish coasts revealed a great number of *A. pori* populations. We have examined numerous specimens collected from the Aegean and Mediterranean Turkish coasts, as well as populations from the easternmost part of the Mediterranean coast relatively close to the terra typica of *A. pori*. The body of material examined in this study is large enough to stabilize the taxonomic status and the distribution pattern of the species. The present redescription of *A. pori* matches well with the original description, setation, and segmentation of the swimming legs, except for the setation of the P1 exopods (with 3 setae in the original description but with 4 setae in the present specimens). In the original description, Masry (1970) did not mention the number of setae in P1. In the figures, the number of setae on the exopod of P1 seems to be 3 in both the male and female, while it was 4 in all specimens examined here. We think that Masry (1970) overlooked the P1 exopodal seta. On the other hand, Masry (1970) neither drew mouth parts nor mentioned them in the text, and the figures are almost devoid of spinular ornamentations on the body somites and appendages; therefore, it is impossible to make further comparisons with the original descriptions.

Cottarelli et al. (1992) attempted to redescribe *A. pori* from the material collected from the Cetara shore (Ischia, Naples, Italy). Our descriptions differ from the Italian material by the following: i) maxilliped having 2 rows of spinules proximally, bearing a short plumose seta apically on the syncoxa, furnished with a row of spinules at inner and outer margins of the basis; ii) mandibular palp with 2 setae; iii) basal endite of maxillule with 5 naked setae; iv) maxilla: syncoxa with transverse rows of short spinules on posterior surface, bears 2 endites, proximal endite bears 2 setae with fringed tips, which are fused to each other and to endite at base, allobasis with 2 long and 2 short naked setae; v) male, P3: endopod 3-segmented, segment 1 completely fused to basis; segment 2 short and naked; segment 3 drawn into 1 long and 1 short, strong, chitinized projection at tip; bears a naked seta originating from a short pedestal located behind the short projection at tip. There are also differences in spinular ornamentations on the body somites and appendages (compare the figures with those of Cottarelli et al. (1992)). We have obtained 2 female and 1 male specimens from Italy; unfortunately, the slide was in too poor a condition to confirm these discrepancies. However, we believe that most of these differences are the result of observational errors. On the other hand, the specimens we attributed to *A. pori* were generally in accordance with Cottarelli et al.'s (1992) redescription, except for the articulation of the P4 endopod to the basis, which was shown as distinct from the basis but described as "…with the usual basis". We had the chance to examine 2 females and 1 male of the Italian specimens, which were embedded in a hard medium (not stated). The medium was not in a good condition to examine the specimens in detail but we could, at least, manage to examine the female P4 endopod, which was clearly fused to the basis.

One of the main difficulties in working with *A. pori* is its small body size (it is one of the smallest laophontids) and its reduced swimming legs; it is therefore very difficult to observe some morphological details such as segmental

boundaries. However, examination with both a modern light microscope equipped with differential interference contrast and a scanning electron microscope revealed that the animals have a significant amount of complex spinular ornamentations, which were overlooked by previous authors; these minor details may serve as a basis for future comparisons with other *Afrolaophonte* species and may be useful for specific discrimination.

One of the important findings of this study is the observation of variations in the female P3 endopod and exopod. Many populations collected along the Aegean shores have had 2-segmented exopods and 1-segmented endopods, which would lead one to believe that these populations may belong to a species new to science. However, the findings of some specimens along the Mediterranean coast that have 2-segmented exopods and 1-segmented endopods, as well as observation of asymmetric P3 rami (e.g., 3-segmented exopod and 2-segmented endopod on one side and 2-segmented exopod and 1-segmented endopod on the other side) on some specimens, have directed us to conclude that all populations of *Afrolaophonte* in the Mediterranean Basin belong to the same morphospecies sharing the same gene pool. The variation we observed in the segmentation of P3 rami also raises some questions about the specific status of the other members of the genus that display remarkable interspecific homogeneity of most characteristics, such as very similar setal formula (Fiers, 1992). The determination of the variations in P3 endopods and exopods within the species indicates that phylogenetic interpretations based on the segmentation and the setation of the swimming legs may be misleading. Species delineation methods using DNA (Fontanento et al., 2015) can provide clearer answers to issues of specific and genetic diversity and distance among and between the populations of the genus *Afrolaophonte*.

It is interesting to note that extensive samplings along the Sea of Marmara (Karaytuğ and Sak, 2006) and Black Sea coasts (personal observations) did not reveal any specimens of *Afrolaophonte*. This may support the supposition by Fiers (1990) that the ancestral stock of *Afrolaophonte* existed in the Tethys and could not expand its range to the Sea of Marmara and the Black Sea due to ecological reasons.

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