



A new genus and two new species of Argeiinae (Crustacea: Isopoda: Bopyridae) from the Indo-west Pacific

Jianmei An, Pengchi Zhang & Gustav Paulay

To cite this article: Jianmei An, Pengchi Zhang & Gustav Paulay (2017): A new genus and two new species of Argeiinae (Crustacea: Isopoda: Bopyridae) from the Indo-west Pacific, Journal of Natural History

To link to this article: <http://dx.doi.org/10.1080/00222933.2016.1270362>



Published online: 08 Jan 2017.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)

A new genus and two new species of Argeiinae (Crustacea: Isopoda: Bopyridae) from the Indo-west Pacific

Jianmei An^a, Pengchi Zhang^a and Gustav Paulay^b

^aSchool of Life Science, Shanxi Normal University, Linfen, China; ^bFlorida Museum of Natural History, University of Florida, Gainesville, FL, USA

ABSTRACT

Three hosts from Indo-west Pacific including Kiribati, Guam Island and Australia were examined, and found to be infested by three species of the subfamily Argeiinae. We describe *Paraeragia kiribatiensis* gen. nov., sp. nov. from Kiribati infesting *Synalpheus gracilirostris*. The new genus is most related to *Eragia* and it can be distinguished by female with triangular pleon, lateral plates extend posteriorly, paired uropods, widely opened brood pouch. *Argeiopsis guamensis* sp. nov. from Guam Island infesting *Synalpheus* cf. *stimpsoni*. The new species is most similar to *Argeiopsis inhacae* but differs in female with curved posterior margin of first oostegite, partly fused pleomeres, and male with head separated from first pereomere, pleon as wide as seventh pereomere. We also record *Stegoalpheon kempi* from Australia for the first time, infesting *Alpheus* cf. *perplexus*. Keys to the nine genera of Argeiinae, and to three species of *Argeiopsis* are provided. A table for all 13 species of Argeiinae with localities and host records is also provided. A table comparing the distribution of lateral plates and morphology of pleopods and uropods among argeiine genera is presented.

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:284AB32C-6AE5-45BC-9C5D-01B3030D6DE6>

ARTICLE HISTORY

Received 13 June 2016
Accepted 28 November 2016

KEYWORDS

Bopyridae; Argeiinae; new genus; new species; biodiversity

Introduction

The bopyrid subfamily Argeiinae Markham, 1977 is presently comprised of eight genera and eleven species, all parasitizing caridean and stenopodidean shrimp. Examination of hosts in the collections of the Florida Museum of Natural History, University of Florida, revealed three caridean specimens that were infested by argeiine bopyrids, each represents a different species. Two of these species are new, and one represents a new genus as well.

Markham (1977) erected the bopyrid subfamily Argeiinae based on five genera (*Argeia* Dana, 1853; *Argeiopsis* Kensley, 1974; *Bopyrosa* Nierstrasz & Brender à Brandis, 1923; *Parargeia* Hansen, 1897; *Stegoalpheon* Chopra, 1923) with species found infesting shrimp species from the family Crangonidae, *Alpheus*, *Eualus* and *Stenopus*.

Table 1. Characters of females in the nine genera of Argeiinae.

Genus	Lateral plates	Pleopods	Uropods
<i>Argeia</i> Dana, 1853	√	Biramous	Uniramous
<i>Argeiopsis</i> Kensley, 1974	×	Biramous	Biramous
<i>Bopyrosa</i> Nierstrasz & Brender à Brandis, 1923	√	Uniramous	Uniramous
<i>Eragia</i> Markham, 1994	√	Uniramous	Uniramous
<i>Gareia</i> Bourdon & Bruce, 1983	×	Biramous	Uniramous
<i>Paraeragia</i> gen. nov.	√	Uniramous	Uniramous
<i>Parargeia</i> Hansen, 1897	×	Biramous	Uniramous
<i>Stegoalpheon</i> Chopra, 1923	√	Biramous	Uniramous
<i>Stegoargeia</i> An, Boyko & Li, 2015	×	Biramous	Uniramous

Bourdon and Bruce (1983) added *Gareia*, characterized by a fused pleon, with the type species infesting *Pseudathanas darwiniensis* (Alpheidae) from Australia. Markham (1994) described *Eragia* with the type species based on a female specimen with a quadrate pleon, infesting *Prionocrangon paucispina* (Crangonidae) from New Caledonia. Williams and Boyko (2010) described the male of *Eragia profunda* Markham, 1994, and discussed relationships in the subfamily Argeiinae. An et al. (2015) erected the new genus *Stegoargeia* for *Argeia lowisi* Chopra, 1923 and *Argeia nierstraszi* Shiino, 1958, and reviewed the subfamily Argeiinae.

These eight genera, with eleven species, currently constitute the Argeiinae (Boyko and Schotte 2016). Although the validity of the Argeiinae has been the subject of discussion (Adkison et al. 1982; Trilles 1999; Boyko and Kazmi 2005), it is difficult to place these genera into any other subfamily. Evaluation of the subfamilial classification of bopyrids awaits phylogenetic analysis, although Boyko et al. (2013) derive a phylogeny of epicaridean taxa based on 18S rDNA.

The lateral plates of the pleomeres are confused in the Argeiinae. Chopra (1923) pointed out that lateral plates are absent in *Stegoargeia lowisi* but the outer rami of the pleopods are placed so close to the margins that they superficially appear to be lateral plates. Shiino (1958) confirmed the absence of lateral plates in *Stegoargeia lowisi* and also in *Stegoargeia nierstraszi* (Shiino, 1958), and noted that both had biramous pleopods. Markham (1977) summarized the subfamily and gave the diagnosis of five genera, and thought all five had lateral plates and uniramous pleopods. However, Adkison et al. (1982) argued that *Argeiopsis* lacks lateral plates and has biramous pleopods. An et al. (2015) further confirmed this. Given the confusion surrounding lateral plates of bopyrids, it is important to define this feature. In female bopyrids, the lateral plates are lateral extensions of the pleon; contiguous with it and without any articulation. The pleopods may also extend laterally, but are separated from the pleon by a clear articulation. Table 1 summarizes the distribution of lateral plates and the nature of pleopods and uropods across the Argeiinae.

Examination of decapod specimens deposited in the Florida Museum of Natural History, University of Florida (UF) led to the finding of a new genus and two new species of argeiine bopyrids parasitizing three shrimp specimens, and these are described below. The hosts and distribution of the 13 species of Argeiinae now known are summarized in Table 2.

Table 2. Localities and hosts of 13 species of Argeinae Markham, 1977.

Species	Type host and localities	Other hosts and localities
<i>Argeia pugettensis</i>	<i>Metacragon munita</i> (Washington)	<i>Argis alaskensis</i> (Washington; California) <i>Argis crassa</i> (Rathbun) (California) <i>Argis dentata</i> (Rathbun) (California; Washington) <i>Argis lar</i> (Owen) (Japan; California; Korea) <i>Argis ovifer</i> (Rathbun) (California) <i>Argis</i> spp. (Kamchatka Peninsula and Bering Sea) <i>Crangon affinis</i> De Haan, 1849 (Japan; China) <i>Crangon alaskensis</i> Lockington (California; Washington) <i>Crangon alba</i> Holmes (California) <i>Crangon cassiope</i> de Man (China) <i>Crangon crangon</i> (Linnaeus) (China) <i>Crangon dalli</i> Rathbun (California) <i>Crangon franciscorum franciscorum</i> Stimpson (California; Washington) <i>Crangon nigromaculata</i> Lockington (California) <i>Crangon propinquus</i> Stimpson (Japan; California) <i>Crangon</i> spp. (Kamchatka Peninsula and Bering Sea) <i>Eualus suckleyi</i> (Stimpson) (Washington) <i>Lissocrangon stylirostris</i> (Holmes) (British Columbia; Oregon) <i>Mesocrangon munitella</i> (Walker) (Washington) <i>Metacragon munita</i> (Dana) (British Columbia; California; Washington) <i>Neocrangon communis</i> (Rathbun) (California; Washington) <i>Neocrangon sagamiensis</i> (Bals) (Japan) <i>Neocrangon resima</i> (Rathbun) (Washington) <i>Stenopus hispidus</i> (Olivier) (Philippines)
<i>Argeia atlantica</i> Markham, 1977	<i>Metacragon jacqueti</i> (A. Milne-Edwards) (Bahamas)	
<i>Argeiopsis inhacae</i> Kensley, 1974	<i>Stenopus hispidus</i> (Olivier) (Mozambique)	
<i>Argeiopsis kensleyi</i> Boyko & Kazmi, 2005	<i>Microprosthemata validum</i> Stimpson (Pakistan)	
<i>Argeiopsis guamensis</i> n.sp.	<i>Synalpheus</i> prox. <i>stimpsonii</i> (de Man) (Guam Island)	
<i>Bopyrosa phryxiformis</i> Nierstrasz & Brender à Brandis, 1923	Unknown host (Philippines)	
<i>Eragia profunda</i> Markham, 1994	<i>Prionocrangon</i> sp. (New Caledonia)	
<i>Gareia arafurae</i> Bourdon & Bruce, 1983	<i>Pseudathanas darwiniensis</i> Bruce (Australia)	
<i>Paraeragia kiribatiensis</i> sp. nov.	<i>Alpheus</i> sp. (Line Islands)	
<i>Paraeragia omata</i> Hansen, 1897	<i>Metacragon procax</i> (Faxon) (Mexico)	

(Continued)

Table 2. (Continued).

Species	Type host and localities	Other hosts and localities
<i>Stegoalpheon kempii</i> Chopra, 1923	<i>Alpheus</i> prox. <i>lobidens</i> De Haan, 1849	<i>Alpheus rapax</i> Fabricius (Japan) <i>Alpheus</i> sp. (India; China)
<i>Stegoargeia lowisi</i> (Chopra, 1923)	<i>Alpheus</i> prox. <i>euphrosyne</i> de Man (Andaman Islands, Bay of Bengal)	<i>Alpheus malabaricus</i> (Fabricius) (India) <i>Alpheus palludicola</i> Kemp (India)
<i>Stegoargeia nierstraszi</i> (Shiino, 1958)	<i>Alpheus bisincisus</i> De Haan, 1849 (Japan)	<i>Alpheus rapax</i> Fabricius (Japan) <i>Alpheus brevisrostris</i> (Olivier) (Japan) <i>Alpheus</i> sp. (Indonesia)

Key to nine genera of Argeiinae based on females

1. Pleon with lateral plates..... 2
Pleon without lateral plates..... 6
2. Pleopods biramous 3
Pleopods uniramous 4
3. Body broader than long *Stegoalpheon* (one species)
Body longer than broad *Argeia* (two species)
4. Pereon much wider than pleon; 5
Pereon about as wide as pleon *Bopyrosa* (one species)
5. Pleon quadrate, about as long as pereon *Eragia* (one species)
Pleon triangular, much shorter than pereon *Paraeragia* gen. nov.
6. Uniramous uropods..... 7
Biramous uropods..... *Argeiopsis* (three species)
7. Pleon fused *Gareia* (one species)
Pleomeres distinct..... 8
8. Brood pouch closed, maxilliped with articulated palp *Parargeia* (one species)
Brood pouch widely open, maxilliped without palp or with non-articulated
palp *Stegoargeia* (two species)

Material and methods

All materials examined are deposited in the Florida Museum of Natural History, University of Florida (UF). Bopyrids were viewed and drawn using a LEICA MZ16 stereomicroscope, the figures were scanned using a CanonScan 9900F, and edited using Adobe Photoshop CS6.

Systematics

Order **ISOPODA** Latreille, 1817
Suborder **CYMOTHOIDA** Wägele, 1989
Family **BOPYRIDAE** Rafinesque-Schmaltz, 1815
Subfamily **Argeiinae** Markham, 1977
***Paraeragia* gen. nov.**

Diagnosis

Female. Body distorted. Head quadrate, without frontal lamina, extending into a distorted pereomere 1; maxilliped with setose palp. Pereon broader than long; with reduced coxal plates on pereomeres; first oostegite with nearly smooth ridge. Pleon of six separate pleomeres; first five with lateral plates and uniramous pleopods; uropods uniramous.

Male. Head oblong, with dark eyes. All seven pereomeres of equal width; first two pereopods with much larger dactyli than subsequent pereopods. Pleonal segments fused; pleopods absent.

Etymology. *Paraeragia* is derived from the name of the most similar genus, *Eragia*. Gender feminine.

Type species: *Paraeragia kiribatiensis* gen. nov., sp. nov., by present designation.

***Paraeragia kiribatiensis* gen. nov., sp. nov.**
(Figures 1 and 2)

Material examined

UF Arthropoda 42226: holotype ♀, allotype ♂, infesting *Synalpheus gracilirostris* de Man, 1910 (UF Arthropoda 40882); Kiribati, Line Islands, Millennium Island, 'tent site', 12 m, host in live *Pocillopora*, 9.91° S, 150.21° W. 5 November 2013, coll., Francois Michonneau, Matthieu Leray, Nancy Knowlton.

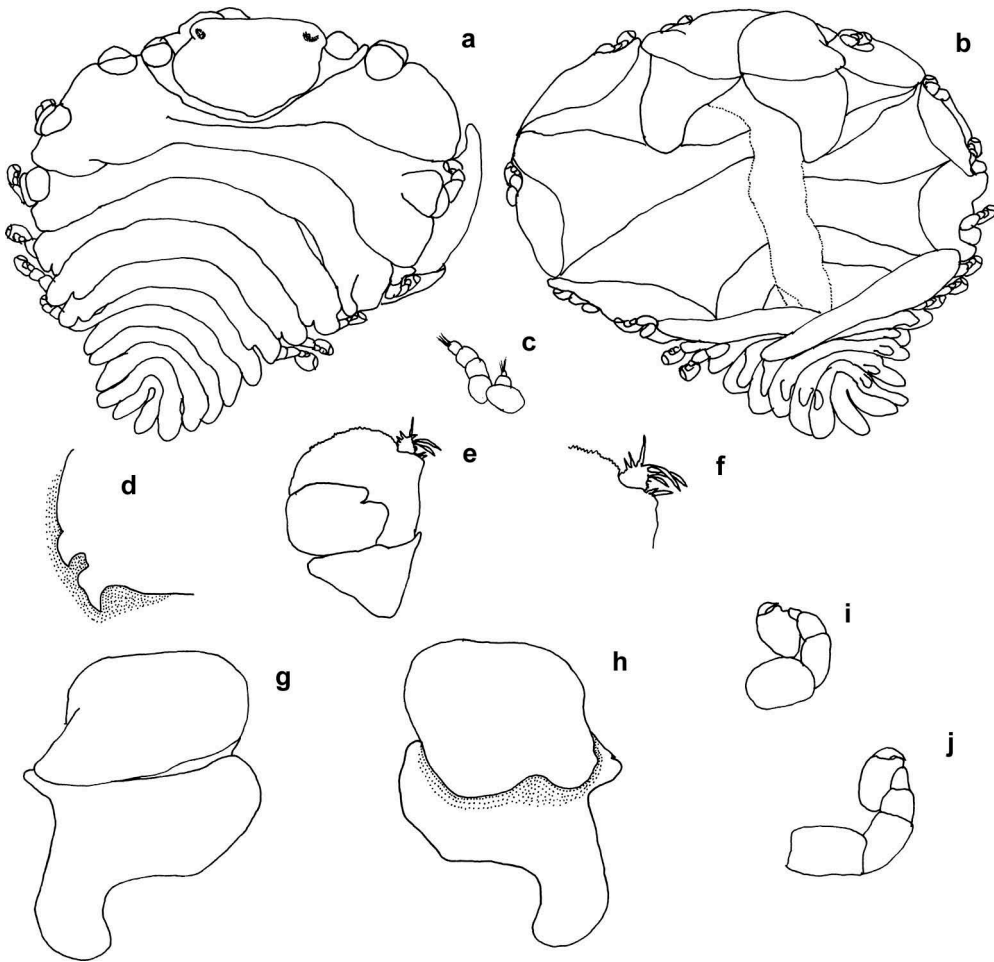


Figure 1. *Paraeragia kiribatiensis* sp. nov. Holotype female: (a) Dorsal view. (b) Ventral view. (c) Right antenna and antennule. (d) Right barbula. (e) Right maxilliped, external view. (f) Palp of right maxilliped. (g) Right oostegite 1, external view. (h) Right oostegite 1, internal view. (i) Left pereopod 1. (j) Left pereopod 7. Scale = 1 mm (a, b), 0.34 mm (c, f, i, j), 0.54 mm (d, e, g, h).

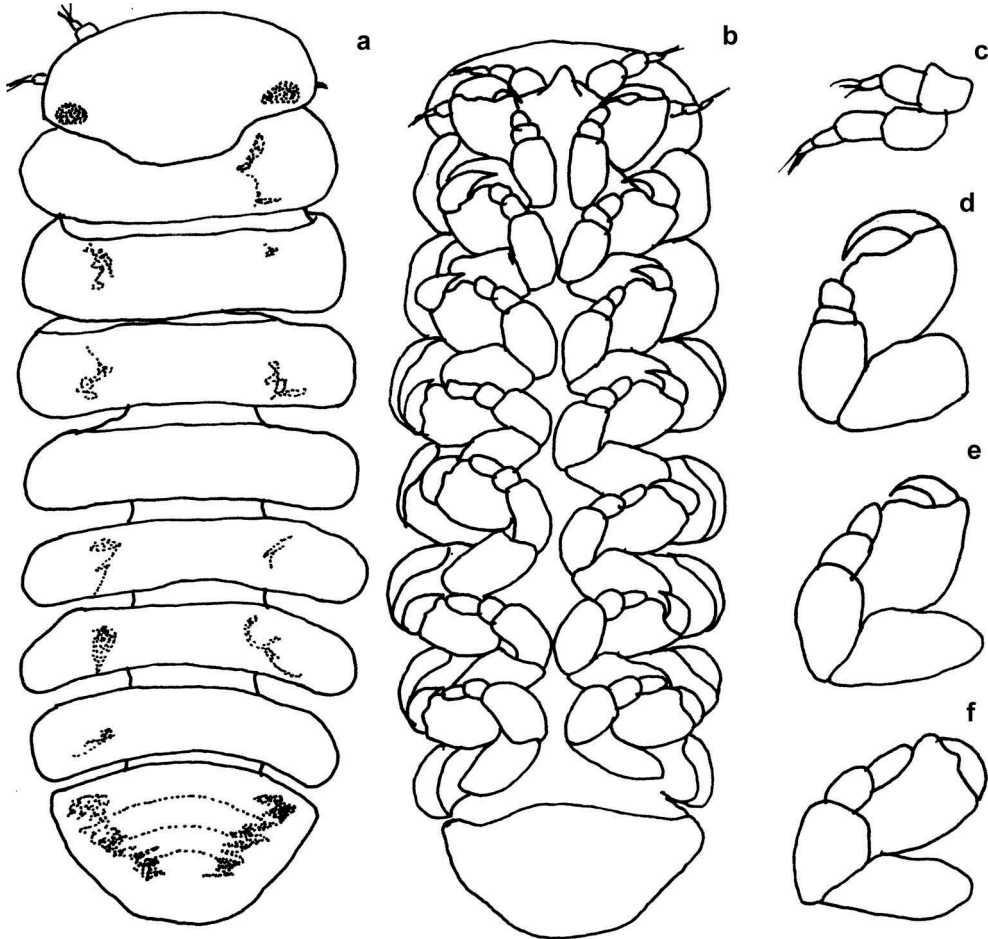


Figure 2. *Paraeragia kiribatiensis* sp. nov. Allotype male: (a) Dorsal view. (b) Ventral view. (c) Right antenna and antennule. (d) Left pereopod 1. (e) Left pereopod 3. (f) Left pereopod 7. Scale = 1 mm (a, b), 0.70 mm (c, d, e, f).

Description of holotype female (Figure 1)

Length 2.62 mm, maximum width 2.54 mm, head length 0.58 mm, head width 0.84 mm. Body outline oval, slightly distorted (Figure 1(a,b)). Head quadrate, without frontal lamina, extending into pereomere 1 (Figure 1(a)). Black eyes on the anterolateral corners of the head (Figure 1(a)). Antennule of three articles; antenna of four articles; terminal article of antennules and antenna setose (Figure 1(c)). Barbula with two blunt lateral projections on each side, flat near centre (Figure 1(d)). Maxilliped triangular, articulated, with setose palp (Figure 1(e,f)).

Pereon broadest across third pereomere (Figure 3(a)). Pereomeres mostly distinct, pereomeres 2 and 3 fused on their left side (Figure 1(a)). Pereon wider than long, with reduced coxal plates on first four pereomeres on the left side and on the first three pereomeres on the right side (Figure 1(a)). Round tergal projection present only on the right side of pereomeres 2 and 3. Brood pouch widely open (Figure 1(b)). First oostegite with nearly

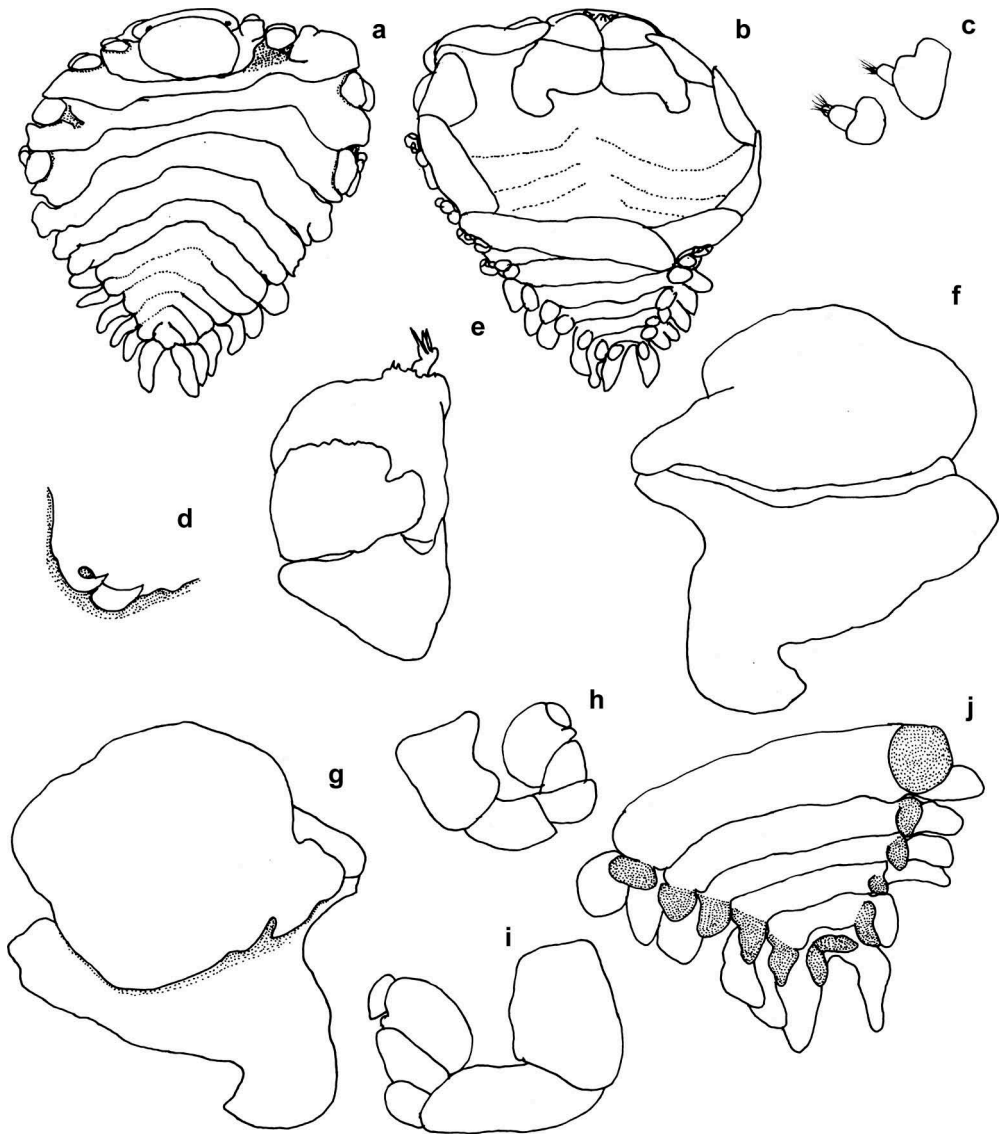


Figure 3. *Argeiopsis guamensis* sp. nov. Holotype female: (a) Dorsal view. (b) Ventral view. (c) Right antenna and antennule. (d) Right side of barbula. (e) Right maxilliped, external view. (f) Right oostegite 1, external view. (g) Right oostegite 1, internal view. (h) Left pereopod 1. (i) Left pereopod 7. (j) Ventral view of pleon (endopodites shaded). Scale = 1 mm (a, b), 0.18 mm (c, h, i), 0.39 mm (d), 0.32 mm (e, f, g), 0.40 mm (j).

smooth ridge and round posterolateral point (Figure 1(g,h)), and posterior margin of the first oostegite also smooth. Pereopods slightly larger posteriorly (Figure 1(i,j)), with blunt dactyli.

Pleon of six pleomeres, first five bearing lateral plates and small uniramous pleopods (Figure 1(b)). Uropods resembling lateral plates, uniramous.

Description of allotype male (Figure 2)

Length 1.40 mm, maximum width, across pereomere 3, 0.52 mm, head length 0.24 mm, head width 0.42 mm, pleonal length 0.26 mm. With scattered black pigmentation on dorsal surface of pereon and pleon.

Head oblong, black eyes near posterior margin (Figure 2(a)). Antennae extending beyond head, visible in dorsal view. Antennule of three articles, antennae of five or six articles, terminal articles of antennules and antennae setose (Figure 2(c)).

All pereon segments distinct (Figure 2(a)), pereomere sides parallel, subequal in width, lacking midventral projections (Figure 2(b)). First pereopods with longest dactyli, second pereopods with second largest dactyli, all seven pereopods with sharp, pointed dactyli (Figure 2(d–f)). Carpi increasing in size posteriorly (Figure 2(d–f)).

Pleon fused into single piece, but with faint lines suggesting demarcation of first three segments on dorsal surface (Figure 2(a)). Pleopods and uropods absent.

Etymology

The specific name, *kiribatiensis* refers to the type locality of Kiribati, Line Islands.

Remarks

These specimens are placed in Argeiinae because the female has a round body outline, a head without frontal lamina, a brood pouch that is widely open, a first oostegite with a simple internal ridge, and a pleon with six distinct pleomeres, whereas the male has a fused pleon. Among the eight currently recognized arginine genera, four have lateral plates on the pleon (*Argeia*, *Bopyrosa*, *Eragia*, *Stegoalpheon*), and four lack them (*Argeiopsis*, *Gareia*, *Parargeia*, *Stegoargeia*). *Paraeragia* has prominent lateral plates, but the uniramous pleopods and uropods distinguish it from *Argeia* and *Stegoalpheon*. *Paraeragia* differs from *Eragia* (based on Markham 1994; Williams and Boyko 2010) in the following characters (character states in *Eragia* given in parentheses): female: (1) triangular pleon, much shorter than pereon (quadrate pleon, pereon and pleon of equal length); (2) lateral plates extend posteriorly (extend laterally); (3) uropods paired, (uropods absent or present on right side only); (4) brood pouch widely open, (brood pouch almost closed); (5) oostegite 1 with blunt and round posterolateral point (with very slender and pointed posterolateral point); male: (1) faint lines demarcate anterior segments of pleon (pleon entire) (unique of species in the subfamily); (2) with black eyes (lacking eyes); (3) antennae with three articles (seven articles); (4) antennule with four articles (three articles); (5) pereopods decreasing in size from anterior to posterior (increasing in size); (6) body dorsally pigmented (unpigmented). *Paraeragia* differs from *Bopyrosa* in: (1) body about as long as wide (much longer than wide); (2) pleon much narrower than the pereon (wider than pereon because of large lateral plates); (3) lateral plates not conspicuously extended (markedly extended).

Genus *Argeiopsis* Kensley, 1974

Type species: *Argeiopsis inhacae* Kensley, 1974, by monotypy

Argeiopsis guamensis sp. nov.

(Figures 3 and 4)

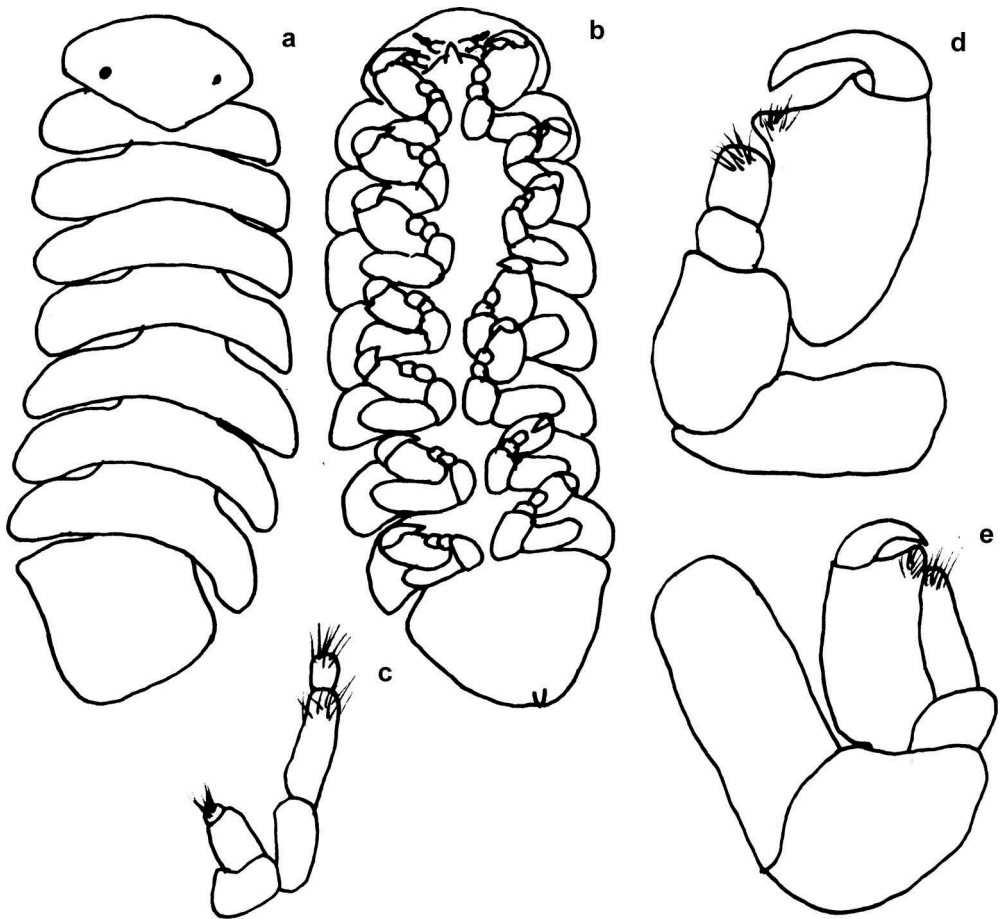


Figure 4. *Argeiopsis guamensis* sp. nov. Allotype male: (a) Dorsal view. (b) Ventral view. (c) Left antenna and antennule. (d) Left pereopod 1. (e) Left pereopod 4. Scale = 1 mm (a, b), 0.29 mm (c, d, e).

Material examined

UF Arthropoda 42224: holotype ♀, allotype ♂, infesting *Synalpheus* cf. *stimpsonii* (de Man, 1888) (UF Arthropoda 2135); Mariana Islands, Guam Island, Tumon, Gun Beach, fore reef, 13.5° N, 144.8° E, host commensal on the crinoid *Phanogenia gracilis*, 30 m, 1 June 2000, coll. Lisa Kirkendale.

Description of holotype female (Figure 3)

Length 4.23 mm, maximum width 3.84 mm, head length 0.77 mm, head width 1.08 mm. Body outline triangular, almost symmetrical (Figure 3(a,b)).

Head quadrate with short frontal lamina, wider than long. Black eyes on the boundary between head and frontal lamina (Figure 3(a)). Antennule of two articles; antenna of three articles; both with broad, bulging bases and with setose terminal articles (Figure 3(c)). Barbula with two pairs of falcate lateral projections on each side, flat near centre (Figure 3(d)). Maxilliped articulated, with setose palp (Figure 3(e)).

Pereon broadest across third pereomere (Figure 3(a)). Small coxal plates on first four pereomeres on right, and on first two pereomeres on left (Figure 3(a)). Dorsolateral bosses on first four pereomeres on both sides, but tergal projections only on second and third right pereomeres. Brood pouch widely open (Figure 3(b)). First oostegite (Figure 3(f,g)) with two articles subequal in length; posterolateral point of distal segment rounded; internal ridge almost unornamented, except for a conspicuous incision. Pereopods increasing in size posteriorly (Figure 3(h,i)); bases of first three pereopods with lobes along flexor margins.

Pleon of six pleomeres; first five pleomeres clearly demarcated on right side but only faintly demarcated on left. Lateral plates absent. Five biramous, unequal pleopods present, exopodites much larger than endopodites (Figure 3(b,j)). Endopodite of first pleopod globose, others plate-like; left pleopods much larger than those on right. Sixth pleomere with biramous uropods, also with much larger exopodite than endopodite.

Description of allotype male (Figure 4)

Length 2.56 mm, maximum width, across pleon 5, 1.06 mm, head length 0.43 mm, head width 0.71 mm, pleonal length 0.63 mm.

Head oblong, with triangular posterior margin (Figure 4(a)). Small black eyes close to posterior margin (Figure 4(a)). Antennule of three articles, bases stout, distal article setose. Antennae of three articles, bases slender, terminal two articles setose (Figure 4(b,c)).

All pereon segments distinct. First four pereomeres subequal in width, lacking mid-ventral projections (Figure 4(b)). First pereopods each with much larger dactylus and much shorter carpus than those of other six. Posterior six pereopod pairs subequal in size and structure (Figure 4(d,e)). All propodi and carpi with setae on inner surface (Figure 4(d,e)).

Pleon fused into a single piece; only first pleomere of left side discernible from sharp marginal angle (Figure 4(a)). Anal cone on the ventral surface near the posterior margin of pleon (Figure 4(b)).

Etymology

The specific name *guamensis* refers to the type locality of Guam Island.

Remarks

As with the other two species of *Argeiopsis*, females of the new species have biramous pleopods and uropods, lacking lateral plates, and have a widely open brood pouch, whereas males have fused pleons. Based on the descriptions given by Kensley (1974) and Adkison et al. (1982), the new species is most similar to *Argeiopsis inhacae* Kensley, 1974, but differs in the following characters (character states in *A. inhacae* given in parentheses): female: (1) first oostegite with curved posterior margin, posterolateral point rounded, extending posteriorly, (with straight posterior margin, posterolateral point somewhat pointed, extending laterally); (2) pleomeres partly fused, (pleomeres distinct); male: (1) head separated from first pereomere (fused with first pereomere); (2) pleon nearly as wide as seventh pereomere (pleon much narrower than seventh pereomere).

The new species can be distinguished from *Argeiopsis kensleyi* Boyko & Kazmi, 2005 by the structure of the first oostegite, maxilliped, and barbula of the female. In the female of *A. kensleyi* a posterolateral point is absent on the first oostegite, the maxilliped

palp lacks setae, and the barbula has one pair of projections on each side (Boyko and Kazmi 2005).

The host, *Synalpheus stimpsonii* (de Man, 1888), is known to be part of a species complex that has not yet been revised (Hultgren et al. 2014).

Key to species of *Argeiopsis*

1. First oostegite without posterolateral point, maxilliped with curved, non-setose palp..... *A. kensleyi*
First oostegite with posterolateral point, maxilliped with long setose palp..... 2
2. Posterolateral point of first oostegite directed laterally *A. inhacae*
Posterolateral point of first oostegite directed posteriorly..... *A. guamensis* sp. nov.

Stegoalpheon kemp Chopra, 1923

(Figures 5 and 6)

Stegoalpheon kemp Chopra, 1923: 462, 464–467, text fig. 8, pl. 13, fig. 1–7 [India, infesting *Alpheus* cf. *lobidens*]; Shiino, 1951: 26–29, figs 1–2 [Japan, infesting *Alpheus rapax*]; Pillai, 1954: 20; Pillai, 1966: 188–190, figs 12–20 [India, infesting *Alpheus* sp.]; Shiino, 1958: 61 [Japan, infesting *Alpheus rapax*]; Rao & Ramaprasad, 1964: 588–589, figs 1–2 [India, infesting *Alpheus malabaricus*]; Shiino, 1972: 8; Kannupandi, 1976: 87–93, figs 1–3; Markham, 1977: 109–111, 119–120; Adkison et al., 1982: 337; Kensley, 2001: 226; An, 2006: 65–65, fig. 27; An et al., 2008: 225–226, fig. 2 [China, infesting *Alpheus* sp.]; Liu, 2008: 693; Williams & Boyko, 2010: 150; An, 2011: 134–136, figs 5-5-5-7 [same material as An et al., 2008]; An et al., 2015: 20–22, fig. 3.

Stegoalpheon choprai Pillai, 1954: 20 [India, infesting *Alpheus paludicola*]; Rao & Ramaprasad, 1964: 588; Markham, 1977: 109, 111, 120; Kensley, 2001: 226; Williams & Boyko, 2010: 150.

Stegoalpheon [sic] *kemp* – Rao & Ramaprasad, 1964: 588 (figure caption).

Material examined

UF Arthropoda 42225, 1♀, 1♂, infesting *Alpheus* cf. *perplexus*. (UF Arthropoda 27567). Australia, Western Australia, Ningaloo reef, Norwegian Bommies, 5–6 m, 22.6206° S, 113.6424° E; 27 May, 2010, coll., Slava Ivanenko, Arthur Anker.

Remarks

Chopra (1923) erected the genus *Stegoalpheon* for *S. kemp*, based on females with five pairs of triramous pleopods: with two ventral rami and a third ramus arising dorsally in the form of a vertical ridge. Shiino (1951, 1958) recorded *S. kemp* from Japan, and suggested that the triramous pleopods described by Chopra (1923) should be reinterpreted as biramous, with the dorsal ramus representing a lateral plate. Pillai (1954) provided a very brief description of *S. choprai* and later (Pillai 1966) relegated it into synonymy with *S. kemp*.

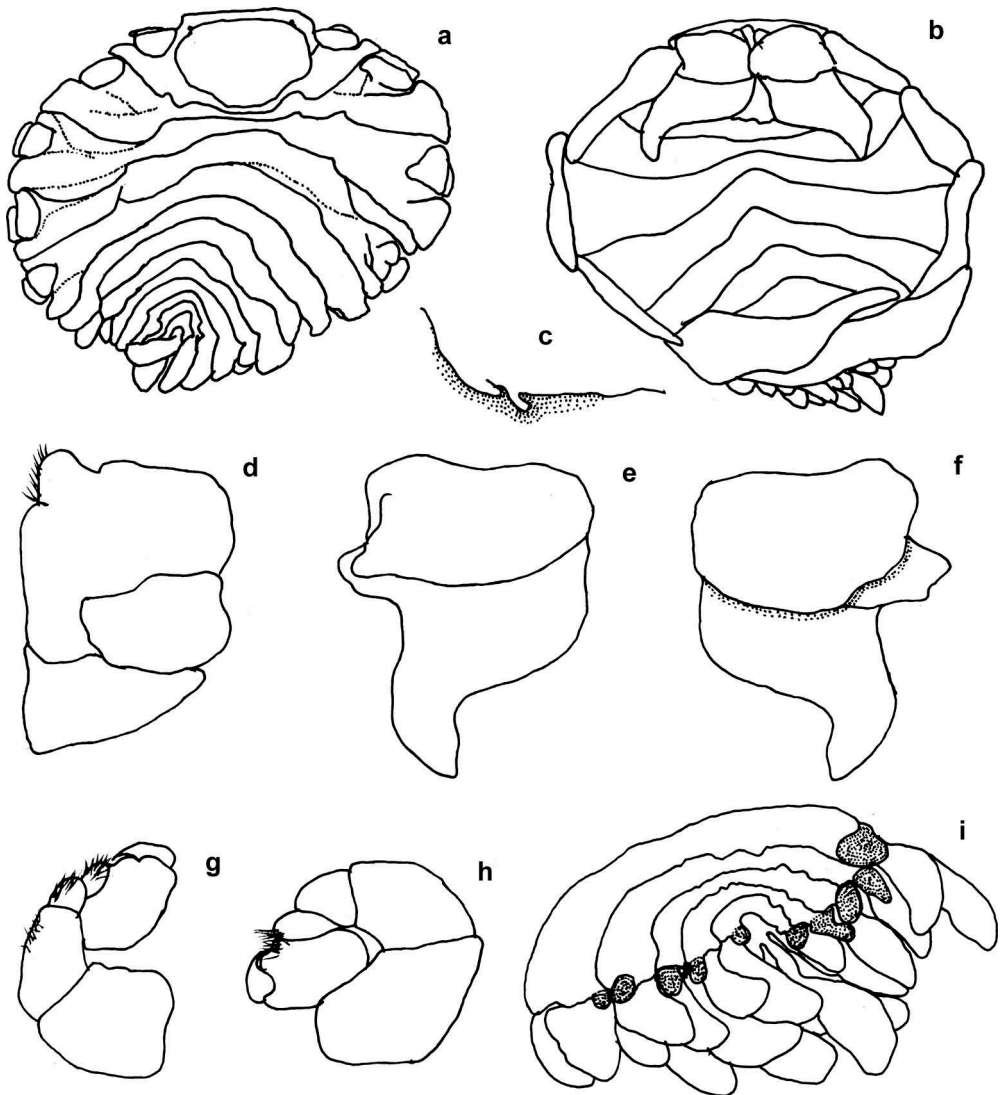


Figure 5. *Stegoalpheon kempfi* Chopra, 1923. Female: (a) Dorsal view. (b) Ventral view. (c) Right side of barbula. (d) Left maxilliped, external view. (e) Right oostegite 1, external view. (f) Right oostegite 1, internal view. (g) Left pereopod 1. (h) Left pereopod 7. (i) Ventral view of pleon (endopodites shaded). Scale = 1 mm (a, b), 0.42 mm (c, e, f, i), 0.26 mm (d), 0.14 mm (g, h).

The present specimens extend the range of this species from India, the Andaman Islands and Japan, to Western Australia. The Australian specimens conform well with Chopra's (1923) description (Figure 5(a,b)) with a similar first oostegite (Figure 5(e,f)), and in the overall morphology of the male (Figure 6). However, they show some minor differences: (1) barbula (Figure 5(c)) with two pairs of small projections on each side, versus specimens of Shiino (1951) with four pairs, and of Chopra (1923) with two pairs of triangular projections; (2) maxilliped (Figure 5(d)) with a short palp having a ciliated margin, versus specimens of Chopra (1923) and Shiino (1951) with maxilliped lacking a

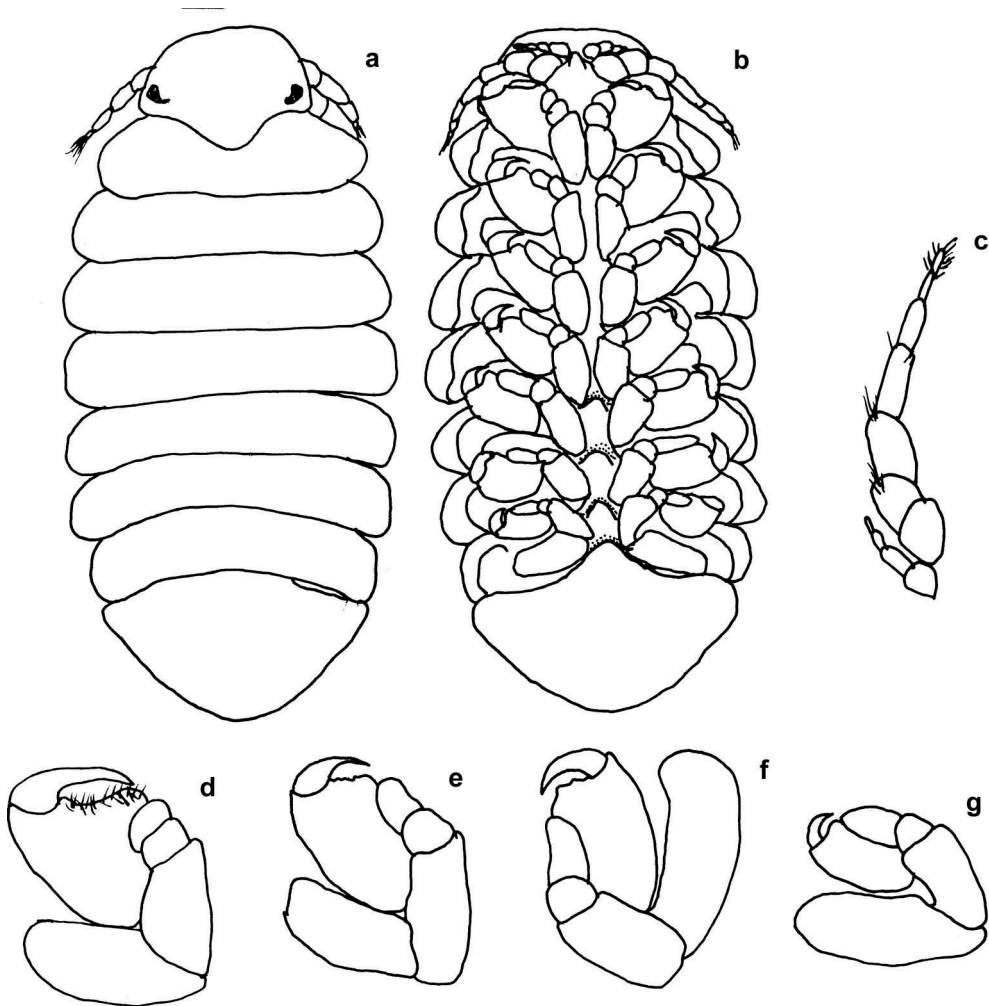


Figure 6. *Stegoalpheon kempii* Chopra, 1923. Male: (a) Dorsal view. (b) Ventral view. (c) Left antenna and antennule. (d) Right pereopod 1. (e) Right pereopod 2. (f) Right pereopod 3. (g) Right pereopod 7. Scale = 1 mm (a, b), 0.55 mm (c, d, e, f, g).

palp. (3) endopodites (Figure 5(i)) much smaller than respective exopodites, whereas described specimens (Chopra 1923; Shiino 1951; Pillai 1966) had subequal exopodites and endopodites. These differences are probably the result of different degrees of maturity of the studied specimens.

Acknowledgements

We are indebted to all collectors of the specimens in the Florida Museum of Natural History. We also wish to thank Mandy Bemis and John Slapcinsky of the Florida Museum of Natural History for all the help during the first author's visit.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the National Natural Science Foundation of China [31471970];

References

- Adkison DL, Heard RW, Clark GT. 1982. Description of the male and notes on the female of *Argeiopsis inhacae* (Crustacea: Isopoda: Bopyridae). *Proc Biol Soc Wash.* 95:334–337.
- An JM. 2006. Study on the taxonomy and zoogeography of the Family Bopyridae (Crustacea: Isopoda) in the China seas [Ph.D. dissertation]. Institute of Oceanology of Chinese Academy of Sciences. vii + 225 pp.
- An JM. 2011. Taxonomy of parasitic isopods from China. Beijing: Science Press; p. 163.
- An JM, Boyko CB, Li XZ. 2015. A review of bopyrids (Crustacea: Isopoda: Bopyridae) parasitic on caridean shrimps (Crustacea: Decapod: Caridea) from China. *B Am Mus Nat Hist.* 399:1–85.
- An JM, Yu HY, Li XZ. 2008. Subfamily Argeiinae (Crustacea, Isopoda, Epicaridea) from China. *Acta Zootaxonomica Sinica.* 33:225–226.
- Bourdon R, Bruce AJ. 1983. Six bopyrid shrimp parasites (Isopoda, Epicaridea) new to the Australian fauna. *Crustaceana.* 45:96–106.
- Boyko CB, Kazmi QB. 2005. A new species of *Argeiopsis* Kensley, 1974 (Crustacea: Isopoda: Bopyridae: Argeiinae) from the northern Arabian Sea. *Zootaxa.* 1002:59–64.
- Boyko CB, Moss J, Williams JD, Shields JD. 2013. A molecular phylogeny of Bopyroidea and Cryptoniscoidea (Crustacea: Isopoda). *Syst Biodivers.* 11:495–506.
- Boyko CB, Schotte M. 2016. Argeiinae Markham, 1977. In: Boyko CB, Bruce NL, Merrin KL, Ota Y, Poore GCB, Taiti S, Schotte M, Wilson GDF, editors. (2008 onwards) World marine, freshwater and terrestrial isopod crustaceans database. [cited 2016 Apr 23]. Accessed through: World Register of Marine Species Available from: <http://www.marinespecies.org/aphia.php?p=taxdetail&id=589328>
- Chopra B. 1923. Bopyrid isopods parasitic on Indian Macrura. *Rec Ind Mus.* 25:411–550.
- Dana JD. 1853. Crustacea. Part II. In: United States Exploring Expedition. During the years 1838, 1839, 1840, 1841, 1842. Under the command of Charles Wilkes. U. S. N. C. Sherman. Philadelphia. 14: 689–1618.
- Hansen HJ. 1897. Reports on the dredging operations off the west coast of Central America to the Galapagos Islands, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S. Fish Commission Steamer Albatross during 1891, Lieut. Commander Z. L. Tanner, U.S. Navy, commanding. XXII. The Isopods. *Bulletin Museum of Comparative Zoology Harvard College.* 31: 95–129.
- Hultgren KM, Hurt C, Anker A. 2014. Phylogenetic relationships within the snapping shrimp genus *Synalpheus* (Decapoda: Alpheidae). *Mol Phylogenet Evol.* 77:116–125.
- Kannupandi T. 1976. A study on the cuticle of *Stegoalpheon kempfi* Chopra (Isopoda: Crustacea) in relation to its parasitic mode of life. *J Exp Mar Biol Ecol.* 25:87–94.
- Kensley B. 1974. Bopyrid Isopoda from Southern Africa. *Crustaceana.* 26:259–266.
- Kensley B. 2001. Biogeography of the marine Isopoda of the Indian Ocean, with a check-list of species and records. In: Kensley B, Brusca RC, editors. *Isopod systematics and evolution. Crustacean Issues* 13. Rotterdam: Balkema; p. 205–264.
- Latreille PA. 1817. Contenant les crustacés, les arachnides et les insectes. Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Deterville, Paris.

- Liu RE, editor. 2008. Checklist of Marine Biota of China Seas. Beijing: Science Press; p. 1267.
- Markham JC. 1977. Description of new western Atlantic species of *Argeia* Dana with a proposed new subfamily for this and related genera (Crustacea Isopoda, Bopyridae). Zool Meded. 52:107–123.
- Markham JC. 1994. Crustacea Isopoda: Bopyridae in the MUSORSTOM collections from the tropical Indo-Pacific I. Subfamilies Pseudioninae (in part), Argeiinae, Orbioninae, Athelginae and Entophilinae. In: Crosnier A, editor. Résultats des Campagnes MUSORSTOM, volume 12. Vol. 161. Paris: Mémoires du Muséum National d'Histoire Naturelle; p. 225–253.
- Nierstrasz HF, Brender a Brandis, GA. 1923. Die Isopoden der Siboga-Expedition. II. Isopoda Genuina. I. Epicaridea. Siboga Expeditie Monographie. 32b: 57–121.
- Pillai NK. 1954. A preliminary note on the Tanaidacea and Isopoda of Travancore. Bull Cent Res Institute Univ Travancore Trivandrum Nat Sci. 3C:1–21.
- Pillai NK. 1966. Isopod parasites of south Indian crustaceans. Crustaceana. 10:183–191.
- Rafinesque CS. 1815. Analyse de la Nature ou Tableau de l'univers et des corps organisés. Palerme. 1–224.
- Rao KSPB, Ramaprasand TNC. 1964. A note on *Stegoalpheon kempfi* Chopra. Current Science. 33:588–589.
- Shiino SM. 1951. Some bopyrid parasites found on the decapod crustaceans from the waters along the Mie Prefecture. Rep Fac Fish Prefect Univ Mie. 1:26–40.
- Shiino SM. 1958. Note on the bopyrid fauna of Japan. Rep Fac Fish Prefect Univ Mie. 3:27–74, pl. 3.
- Shiino SM. 1972. The Epicaridea (list of species) from Japan. Kansai Shizenkagaku. 24:7–10.
- Trilles JP. 1999. Ordre des isopodes sous-ordres des épicarides (Epicaridea Latreille, 1825). In: Forest J, editor. Traité de Zoologie. Anatomie, systématique, biologie. Tome VII, Fascicule IIIA. Crustacés Pécararides. Part 8. Vol. 19. Prince de Monaco: Mémoires de l'Institut Océanographique, Fondation Albert 1er; p. 279–352.
- Wagele JW. 1989. On the influence of fishes on the evolution of benthic crustaceans. Zeitschrift für zoologische Systematik und Evolutionsforschung, 27: 297–309.
- Williams JD, Boyko CB. 2010. First description of the male of *Eragia profunda* Markham, 1994 (Crustacea: Isopoda: Bopyridae), with comments on relationships in the subfamily Argeiinae. Proc Biol Soc Wash. 123:149–152.