Paguristione uniuropodus, a new genus and a new species of Pseudioninae infesting hermit crabs from China (Crustacea, Isopoda, Bopyridae)

Jianmei An¹, Qiuping Zhao¹, John C. Markham²

¹ School of Life Science, Shanxi Normal University, Linfen, 041004, P. R. China ² Arch Cape Marine Laboratory, Arch Cape, Oregon 97102-0133, U.S. A.

Corresponding author: Jianmei An (anjianmei@hotmail.com)

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Abstract

Paguristione uniuropodus gen. n., sp. n. infests Paguristes sp. in the East China Sea. Paguristione gen. n. differs from the closely related genera Pseudione and Pagurion by its females having indistinct lateral plates on the last two pleomeres and its male with a long tapering pleon of six pleomeres, lacking both pleopoda and uropoda.

Keywords

Paguristes, East China Sea

Introduction

Bopyrid isopods infesting hermit crabs belong to the subfamilies Pseudioninae (branchial parasites) and Athelginae (dorsoabdominal parasites). An, Markham and Yu (2010), An, Williams and Yu (2011) and An, Li and Markham (2013) have reported a total of eight bopyrid species infesting hermit crabs in the South China Sea. Markham (1992) recorded six species of bopyrids infesting hermit crabs in Hong Kong. Boyko (2004)
reported one such species from Taiwan. In Chinese waters as a whole, An (2006) reported ten species of bopyrids infesting hermit crabs. Currently, throughout Asia, 36 species are recorded infesting 48 hermit crabs from Asia (Table 1). Worldwide, McDermott, Williams and Boyko (2010) catalog 83 species of bopyrids infesting hermit crabs, of which 41 species in ten genera are branchial parasites. As hosts worldwide, 11 species of Paguristes are known to bear bopyrids (Table 2); their parasites, all branchially infesting members of the subfamily Pseudioninae, are in the genera Asymmetrione, Pseudione, Parapagurion and now the new genus Paguristione.

Specimens used in this study were collected from the East China Sea in 1958, and one of the authors (An 2006) examined the parasites and reported Parapagurion glabra sp. n. infesting Paguristes sp. in her doctoral dissertation (not a published work in the sense of the ICZN). Further examination shows that they represent a new species in a new genus. The name Parapagurion glabra is here entered into its synonymy.

**Material and methods**

Materials for this study originated from Chinese Comprehensive Oceanographic Survey. All materials examined have been deposited in the Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China (IOCAS). Specimens were viewed and drawn using a Zeiss Stemi SV Apo microscope.

**Taxonomy**

**Family BOPYRIDAE** Rafinesque-Schmaltz, 1815  
**Subfamily Pseudioninae** R. Codreanu, 1967

*Paguristione* gen. n.  
http://zoobank.org/1076C4FA-D580-45AC-A918-B28C2D1FC396

**Diagnosis.** Female. All body segments distinct, almost symmetry. Rudimentary coxal plates present in first four segments. Marsupium complete. Oostegite 1 with simple tubercles on internal ridge. Palp of maxilliped with long setae. All pleomeres distinct. First three pleomeres with lateral plates and biramous pleopoda. Fourth and fifth pleomeres with biramous pleopoda, but lateral plates without lateral plates. Sixth pleomere without lateral plates, uropoda uniramous. Male. All segments distinct. First and last pereomeres respectively much broader than adjacent head and first pleomere. Pereopods of first pair smaller than those of following 3 pairs. Pleon elongate, of 6 distinct pleomeres. No pleopoda or uropoda.

**Etymology.** Combination of the genus name of its host, Paguristes and bopyrid genus name Ione. Gender feminine.

**Type species.** *Paguristione uniuropodus* sp. n., herein designated.
Table 1. Bopyrid isopods infesting hermit crabs in Asian waters.

| Hosts                                      | Localities | References                       |
|--------------------------------------------|------------|----------------------------------|
| *Clibanarius morgani* (de Man, 1888)       | Japan      | Shiino 1958                      |
| *Clibanarius acutus* (de Saint Laurent, 1972) | Thailand   | Markham 1985a; Brunenmeister 1980 |
| *Clibanarius bimaculatus* (De Haan, 1849)  | Vietnam    |Williams and Schuerlein 2005     |
| *Clibanarius infraspinatus* (Hilgendorf, 1869) | Japan      |Markham 1992                     |
| *Lophopagurus* sp.                        | Japan      |Nierstrasz and Brender à Brandis 1932 |
| *Pagurus* sp.?                             | Japan      |Williams and Schuerlein 2005     |

Subfamily Pseudioninae

Table 1. Bopyrid isopods infesting hermit crabs in Asian waters.

| Hosts                                      | Localities | References                       |
|--------------------------------------------|------------|----------------------------------|
| *Paguristes monoporus*                     | Indonesia  | Markham and Boyko 2005          |
| *Paguristes sp.*                           | Indonesia  | Markham 1985a                    |
| *Pseudione calcinii*                       | Japan      | Shiino 1958                      |
| *Pseudione clibanarioides*                 | Japan      | Shiino 1933                      |
| *Pseudione intermedia*                     | Japan      | Nierstrasz and Brender à Brandis 1932 |
| *Pseudione kensleyi*                       | Singapore  | Williams and Schuerlein 2005     |

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| *Pseudione clibanarioides*                 | Japan      | Shiino 1933                      |
| *Pseudione intermedia*                     | Japan      | Nierstrasz and Brender à Brandis 1932 |
| *Pseudione kensleyi*                       | Singapore  | Williams and Schuerlein 2005     |
| Bopyrids                       | Hosts                                      | Localities          | References                  |
|-------------------------------|--------------------------------------------|---------------------|-----------------------------|
| *Pseudione nobili* Nierstraz & Breder à Brandis, 1923 | *Trizocheles spinosus spinosus* (Henderson, 1888) | Indonesia           | Nierstraz and Breder à Brandis 1923 |
| *Pseudionella attenuata* Shiino, 1949 | *Pagurus sp.*                               | Japan               | Shiino 1949                 |
| *Pseudionella spiropaguri* An, Li & Markham, 2013 | *Spiropagurus profundorum* Alcock, 1905 | China               | An, Li and Markham 2013     |
|                               | *Spiropagurus spiriger* (De Haan, 1849)     | China               | An, Li and Markham 2013     |
| *Parasymmetrione tuberculineata* An, Markham & Yu, 2010 | *Clibanarius corallinus* (H. Milne-Edwards, 1848) | South China Sea     | An, Markham and Yu 2010     |
| *Asymmetrione globifera* An, Markham & Yu, 2010 | *Dardanus hessii* (Miers, 1884)              | Beibu Gulf          | An, Markham and Yu 2010     |
|                               | *Spiropagurus sp.*                          | South China Sea     | An, Markham and Yu 2010     |
| **Subfamily Athelginae**      |                                            |                     |                             |
| *Allathelges pakistanensis* Kazmi & Markham, 1999 | *Paguristes perspicax* Nobili, 1906         | Pakistan            | Kazmi and Markham 1999      |
| *Athelges akanoshimensis* var. *tenuibranchiatus* Shiino, 1936 | *Lophopagurus (Australeremus) triserratus* (Ortmann, 1892) | Japan               | Shiino 1936                 |
| *Athelges japonicus* Shiino, 1958 | *Pagurus constans* (Stimpson, 1858)         | Japan               | Shiino 1958                 |
|                               | *Pagurus lanuginosus* De Haan, 1849         | Japan               | Shiino 1958                 |
|                               | *Pagurus middendorffii* Brandt, 1851        | Japan               | Shiino 1958                 |
| *Athelges sp.*                | *Trizopagurus striatus* (Herbst, 1804)      | Indonesia           | Haig and Ball 1988          |
Table 2. Known bopyrids infesting *Paguristes* species with localities and references.

| Bopyrids                      | Host                                      | Type locality | References                  |
|-------------------------------|-------------------------------------------|----------------|-----------------------------|
| *Asymmetrione aequalis* Pardo, Boyko & Mantelatto, 2009 | *P. tomentosus* H. Milne Edwards, 1848    | Peru           | Pardo et al. 2009           |
| *Asymmetrione desulor* Markham, 1975                     | *P. tortugae* Schmitt, 1933               | Brazil         | Bourdon 1979                |
| *Asymmetrione forestii* (Bourdon, 1968)                  | *P. eremita* (Linnaeus, 1767)             | Mediterranean  | Bourdon 1968                |
| *Parapagurion calcinicola* Shiino, 1933                   | *P. monoporus* Morgan, 1987               | Indonesia      | Haig and Ball 1988          |
|                              | *P. sp.*                                   | Thailand       | Markham 1985a               |
| *Parapagurion imbricata* Markham, 1978                    | *P. tortugae* Schmitt, 1933               | Cuba           | Markham 1978                |
| *Pseudione biacuta* Bourdon, 1979                         | *P. robilus* Forest & de Saint Laurent, 1967 | Uruguay        | Bourdon 1979                |
|                              |                                           |                |                              |
| *Pseudione quasimodo* Boyko & Williams, 2004              |                                           |                |                              |
| *Allathelges pakistanensis* Kazmi & Markham, 1999        | *P. perspicac* Nobili, 1906               | Pakistan       | Kazmi and Markham 1999      |
| *Athelges pelagicae* Babic, 1912                          | *P. eremita* (Linnaeus, 1767)             | Adriatic       | Babic 1912                  |
| *Parathelges piriformis* Markham, 1972                    | *P. oxyophthalmus* Holthuis, 1959         | Colombia       | Markham 1978                |
| *Parathelges whiteleggei* Nierstrasz & Brender à Brandis, 1931 | *P. monoporus* Morgan, 1987               | Indonesia      | Haig and Ball 1988          |
| *Pseudostegias otagensis* Page, 1985                      | *P. barbatus* (Heller, 1862)              | New Zealand    | Page 1985                   |
Paguristione uniropodus sp. n.
http://zoobank.org/E7EECB56-131C-4682-825B-1CBE50B12DCE
Fig. 1

Parapagurion grabla An, 2006 (unpublished thesis): 30–31, fig. 8 (invalid name).

Material examined. Infesting Paguristes sp. Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China (IOCAS). Chinese Comprehensive Oceanographic Survey, East China Sea, Station 4081, 28°00'N, 128°30'E, 74m, 5 April 1958, Yulin Liao, coll. Institute of Oceanology, Chinese Academy of Sciences, Qingdao, China (IOCAS). 1♀ holotype, CIEA408101; 1♂, allotype, CIEA408102.

Description of holotype female. Length 5.20 mm, maximal width 3.41 mm across third pereomere, head length 1.0 mm, head width 1.31 mm. Body distorted about 16° (Fig. 1A).

Head subelliptical, fully embedded in pereomere 1, with short frontal lamina completely across anterior margin. Eyes absent (Fig. 1A). Antennae with two articles and three articles respectively (Fig. 1C). Maxilliped (Fig. 1D, E) with prominent round articulating palp, that fringed on medial margin by sparse setae. Plectron short and blunt. Barbula (Fig. 1F) with 2 large sharp falcate projections on each side, medially unornamented.

Pereon broadest across third pereomere. First 3 pereomeres with coxal plates. Brood pouch completely enclosed by oostegites. First oostegite (Fig. 1G, H) with deep groove separating 2 articles externally; internal ridge bearing 4-7 simple projections; posterolateral point extending laterally. Pereopods rudimentary, not extending beyond margins of brood pouch, visible only ventrally; all pereopods with all articles distinct, of nearly same size and structure (Fig. 1I).

Pleon of 6 distinct pleomeres, first three produced into small lateral plates and bearing biramous pleopods; fourth and fifth pleomeres lacking lateral plates. Terminal pleomere greatly reduced and deeply embedded in fifth, bearing uniramous uropoda. All pleopodal rami produced into tapering points and progressively smaller posteriorly, extending to sides of pleon and leaving ventral surface of pleon uncovered.

Description of allotype male

Body outline suboval. Length 2.52 mm, maximal width across third pereomere, 1.05 mm, head length 0.30 mm, head width 0.42 mm, first pleomere width 0.50 mm, fifth width 0.20 mm. All segments distinct (Fig. 1J, K).

Head semicircular, broader than long, much narrower than first pereomere, distinctly separated from first pereomere and not at all embedded into it (Fig. 1J). Eyes absent. Antennae visible only ventrally, not extending to margins of head, of 3 and 4 articles respectively; second antenna with sparse short setae on terminal article (Fig. 1L).

Pereon smoothly rounded, slightly broadest across third pereomere. No midventral tubercles. All pereopods with all articles distinct. Pereopod 1 somewhat smaller than pereopods 2-4, those 3 pairs largest and all of about same size; pereopods 5-7 progressively smaller (Fig. 1M, N). Pereopods 1-4 bearing sharp extended dactyli, dactyli of pereopods 5-7 much reduced.
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Figure 1. Paguristione uniuropodus sp. n. A–I holotype female J–N allotype male. A Dorsal view B Ventral view C Left antennae D Right maxilliped, external view E Palp of right maxilliped F Left side of barbula G Right oostegite 1, external view H Right oostegite 1, internal view I Pereopod 4 J Dorsal view K Ventral view L Left antennae M Pereopod 2 N Pereopod 7. Scale: 1.00 mm (A, B); 0.36 mm (D); 0.17 mm (C, E); 0.50 mm (F–I); 0.47 mm (J, K); 0.23 mm (L–M).

Pleon elongate, extending far posteriorly, of 6 distinct pleomeres deeply separated laterally, each markedly narrower than that before it; pleomere 1 abruptly narrower than last pereomere, it and pleomere 2 much shorter than pleomeres 2-6; every pleomere broadest across posterior edge. Pleopods and uropods completely absent, not even indicated by scars.

Etymology. Latin noun uniuropodus, referring to the uniramous uropoda of the female, used in apposition.

Remarks. The new genus differs from other closely similar hermit-crab-infesting genera Pseudione, Pagurion and Parapagurion thus: female with only rudimentary pleonal lateral plates (only first three pleomeres with small lateral plates) and uniramous uropoda, male with head and pleon abruptly narrower than contiguous pereomeres, first pereopod smaller than pereopods 2-4 and pleopodal appendages completely lacking. Females of Pseudione have distinct pleonal lateral plates on pleomeres 1-5; its males have pleopods, and their heads and pleons are smoothly narrower than the pereon. Females of Pagurion have distinct lamellar pleopodal appendages on all pleomeres.
1-6 and biramous uropoda; its males have equally width pereopods and uniramous pleopods. Females of *Parapagurion* are nearly symmetrical and bear well-developed lateral plates on pleomeres 1-5 and uniramous uropods; the first pereopods of the males are never smaller than the second ones.

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