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ON FINDING
OF *MONOCOROPHIUM INSIDIOSUM* CRAWFORD, 1937
(AMPHIPODA, COROPHIIDAE)
IN THE COASTAL WATERS OF CRIMEA (BLACK SEA),
A NEW SPECIES FOR THIS REGION

© 2018 V. A. Grintsov

Kovalevsky Institute of Marine Biological Research RAS, Sevastopol, Russian Federation

E-mail: vgrintsov@gmail.com

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An illustrated description of morphology of *Monocorophium insidiosum* Crawford, 1937 from the Crimean coastal waters is given. In this work, 744 specimens from different locations and substrates of the Crimean coastal waters have been analyzed. The main specific parameters of species from the Crimean coastal waters are as follows: rostrum of males is about one half of first article of antenna I length, dactylus of gnathopod II is equipped with 2–4 additional spines along the inner side (both for males and females). Variability is observed in parameters of the following parts: first article of antenna I peduncle, fourth article of antenna II peduncle, inner side of gnathopod II dactylus, and outer sides of the outer and inner rami of uropod II. Morphological parameters of specimens from the Black Sea, the Mediterranean Sea (literature data), and the North America coast (Vancouver area, literature data) have been compared. Specimens from the Black Sea are morphologically similar, but have some differences from the North American ones. In particular, first article of antenna I peduncle of specimens from the North America have conical process (specimens from the Black Sea have rounded process); fifth article of antenna II peduncle is with proximal medial tooth (specimens from the Black Sea are without proximal medial tooth); and outer ramus of uropod II has medial spine (Mediterranean specimens are without such a spine). These differences should be taken into account when carrying out hydrobiological research.

Keywords: Amphipoda, *Monocorophium*, morphology, Black Sea, Crimea

Amphipoda is an important component of many benthic communities of the coastal waters of Crimea. Corophiidae is a family of Amphipoda which is typical for this region. In the Black Sea, 13 species of this family are registered [1]. Among them, six ones belong to the Ponto-Caspian complex: *Chelicorophium nobile* (G. O. Sars, 1895), *Ch. chelicorne* (G. O. Sars, 1895), *Ch. mucronatum* (G. O. Sars, 1895), *Ch. sowinskyi* (Martynov, 1924), *Ch. curvispinum* (G. O. Sars, 1895), *Ch. robustum* (Sars, 1895) (not found near the coast of Crimea); four species belong to the Atlantic-Mediterranean complex: *Crassikorophium crassicorne* Bruzelius, 1859, *Crassikorophium bonelli* (Milne-Edwards, 1830), *Corophium volutator* (Pallas, 1766), *Corophium orientale* Schellenberg, 1928; one species, *Chelicorophium maeoticum* (Sowinsky, 1898), is endemic to the Black Sea and the Sea of Azov; one species, *Medicorophium runcicorne* Della Valle, 1893, is endemic to the Black and Mediterranean seas; and one species, *Monocorophium acherusicum* (Costa, 1853), is cosmopolitan. *Monocorophium insidiosum* Crawford, 1937 was first revealed near the coasts of Crimea in our samples in 1999 [7]. However, the description and specific features of morphology of this species in this region hadn't been presented before. Detailed morphological description is an important part of a research, as it helps

to analyze variability of morphology of species in different locations of its areal and to differentiate it from other species with close morphology. The aim of this work is to give a detailed morphological description of *M. insidiosum* and to point out its morphological features specific for this region.

MATERIAL AND METHODS

Specimens of *M. insidiosum* were sampled at different locations and on different substrates (artificial constructions and rocks) in the coastal waters of Crimea. The specimens were isolated and put in jars with 75 % ethanol. For identification of specimens and study of their morphology, an optical microscope MBS-9 with the magnification power of 8×2 or 8×4 was used. A standard micrometer eyepiece scale was used for measuring morphological details. Detailed analysis of morphology was carried out using an optical microscope Mikmed-5 with the magnification power of 10×10 or 10×20 .

Specimens from the following locations of Crimea were studied: Sevastopol, Kazach'ya Bay, algae, 2001, 14 spec. (σ ♀); Sevastopol, Kazach'ya Bay, mussel collectors, 2001, 43 spec. (σ ♀); Sevastopol, Kazach'ya Bay, spongia on mussel collector, 2004, 12 spec. (σ ♀); Sevastopol, Martynova Bay, mole fouling, 1999, 56 spec. (σ ♀); Sevastopol, Martynova Bay, mussel collectors, 2000, 77 spec. (σ ♀); Karadag, fouling on rock, 2003, 48 spec. (σ ♀); the Swan Islands, algae on bottom, 2005, 200 spec. (σ ♀); Laspi Bay, pier fouling, 2011, 44 spec. (σ ♀); Opuk Cape, stones on mud, 2011, 250 spec. (σ ♀). Material has been deposited in the collections of Department of Aquaculture and Marine Pharmacology, The A. O. Kovalevsky Institute of Marine Biological Research of Russian Academy of Sciences, #25.1 (curator: Vladimir Grintsov, adds: 2 Nakhimov ave., Sevastopol, 299011, Russia).

For the description of morphology and variability of morphological parameters, specimens from Laspi Bay pier fouling were used as they were richly represented by Amphipoda of different size and sex. The sampling depth varied from 0 to 3 m; the sampling date was June 18, 2011.

RESULTS AND DISCUSSION

Males account for about 60 % of all adult specimens within the representative sample under consideration. The description below proves that they belong to *M. insidiosum*.

Male. Length 4.5 mm. Head. Rostrum about one-half length of first article of antenna I (Fig. 1A).

Antenna I: articles with many setae; first article of peduncle with rounded process proximally (Fig. 1A), with spine ventro-distally (Fig. 1B); flagellum shorter than peduncle with ten articles, some articles with aesthetascs. Antenna II longer than antenna I: fourth article width making one-half of its length; extero-distally with a long-curved tooth having interiorly a small spine with two smaller rounded processes (Fig. 1E) and posterior wide and slightly protruding tooth; flagellum with three articles: first longest, second middle, third rudimentary with two curved spines, of second article length, distally.

Mouthparts. Typical for genus. Maxilla I: inner part rudimentary without setae. Maxilla II: inner part with setae. Maxillipeds: inner plate small.

Pereon. Gnathopod I: smaller than gnathopod II, coxa I antero-ventral corner produced nearly triangular form; merus, ischium and carpus with long plumose setae; propodus expanded, palm with teeth and three spines interiorly (Fig. 2A). Dactylus with teeth about $\frac{2}{3}$ of length interiorly.

Gnathopod II: basis expanded, merus interiorly with two rows of long plumose setae, carpus distally with a row of long plumose setae; propodus proximally ($\frac{1}{4}$ of its length) with a row of long plumose setae; dactylus with one rudimentary and fine additional teeth interiorly (Fig. 2D).

Pereopods III–IV: basis expanded, merus with massive process anteriorly (Fig. 2B). Pereopod V smallest: basis expanded; carpus extero-distally with 3 stout curved spines, more distally with 4 stout curved spines; propodus intero-distally with spine. Pereopod VI: basis expanded, close to oval form; carpus exteriorly with two rows of stout curved spines (four in middle part and five distally); propodus intero-distally with spine (Fig. 2E). Pereopod VII much longer than other pereopods: basis oval with long plumose setae; merus, carpus and propodus long; propodus intero-distally with spine.

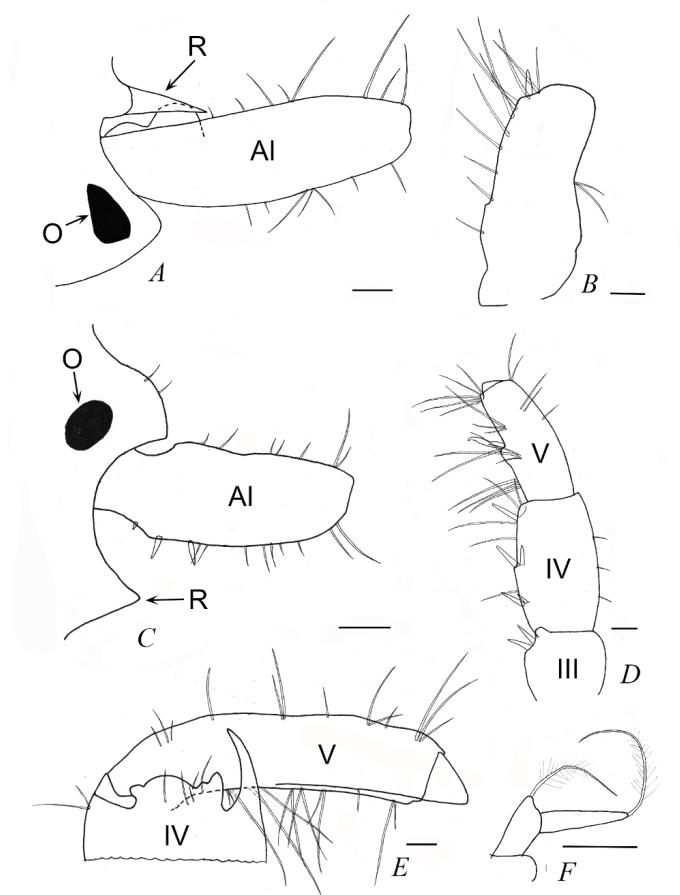


Fig. 1. Details of morphology of the head and mouthparts of *M. insidiosum* specimens. Crimea, Laspi Bay. The length of the specimens is 4.4 mm (male) and 4.5 mm (female). A – fragment of the head and first article of antenna I peduncle, dorsal view, male; B – first article of antenna I peduncle, lateral view, male; C – fragment of head and first article of antenna I peduncle, dorsal view, female; D – third, fourth, and fifth articles of antenna II peduncle, ventral view, female; E – distal part of fourth and fifth articles of antenna II peduncle, lateral view, male; F – mandible palp, female. The scale lines on all panels correspond to 0.1 mm. AI – antenna I; R – rostrum; O – eye; III, IV, V – third, fourth and fifth articles of antenna II peduncle

Рис. 1. Детали морфологии цефалона и ротовых органов исследованных особей *M. insidiosum*. Крым, бухта Ласпи. Самец — 4,4 мм, самка — 4,5 мм. А — элементы головы и первый членик стебелька антенны I самца, вид сверху; В — первый членик стебелька антенны I самца, вид сбоку; С — элементы головы и первый членик стебелька антенны I самки, вид сверху; D — третий, четвёртый и пятый членики стебелька антенны II самки, вид с вентральной стороны; E — дистальный конец четвёртого членика и пятый членик стебелька антенны II самца, вид сбоку; F — пальпус мандибулы самки. Масштабная линейка здесь и далее — 0,1 мм. AI — антенна I; R — рostrum; O — глаз; III, IV, V — третий, четвёртый и пятый членики стебелька антенны II

Pleon. Third segment with two rows of setae at post-dorsal edge (Fig. 3).

Epimeral plates close to rounded, third biggest, first smallest. First and second epimeral plates extero-laterally with thin plumose setae. Third epimeral plate extero-laterally with thin setae.

Urosome. All segments fused, uropods arising from lateral notches (Fig. 3). Uropod I: rami $\frac{1}{2}$ of peduncle length (Fig. 4A) extero-distally with broad projection, distally with broad tooth between inner and outer rami, intero-distally with spine; extero-laterally with rows of spines; outer ramus with row of spines exteriorly, with group of stout spines distally and process extero-distally; inner ramus intero-laterally with stout spines, distally with group of stout spines and process (Fig. 4A).

Uropod II smaller than uropod I: peduncle with setae exteriorly and with spine intero-distally; outer ramus shorter than inner ramus, distally with three spines (middle one biggest) and pointed process; inner ramus

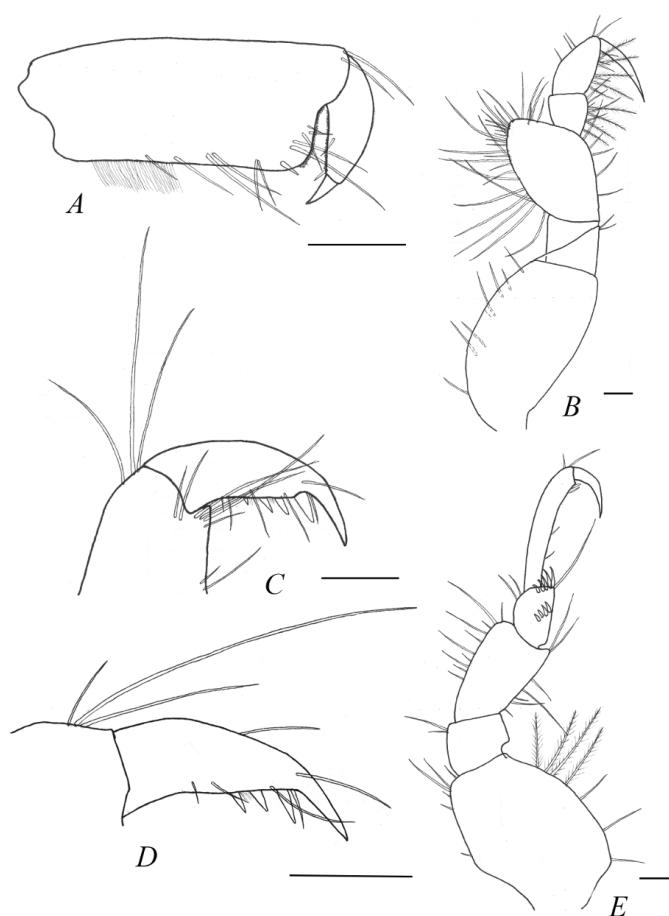


Fig. 2. Morphology of gnathopods and pereopods of *M. insidiosum* specimens. Crimea, Laspi Bay. The length of the specimens is 4.4 mm (male) and 4.5 mm (female). A – gnathopod I, propodus and dactylus, male; B – pereopod III, male; C – gnathopod II, propodus and dactylus, female; D – gnathopod II, propodus and dactylus, male; E – pereopod VI, male

Рис. 2. Детали морфологии гнатоподов и переоподов исследованных особей *M. insidiosum*. Крым, бухта Ласпи. Самец — 4,4 мм, самка — 4,5 мм. А — проподус и коготь гнатопода I самца; В — переопод III самца; С — проподус и коготь гнатопода II самки; D — проподус и коготь гнатопода II самца; Е — переопод VI самца

distally with two spines and pointed process (Fig. 4B). Uropod III: peduncle trapezoidal, shorter than rami, extero-distally with small process; ramus rounded, distally with setae (Figs 3, 4). Telson: trapezoidal with two rows of hooks dorsally and two pairs of setae proximally (Fig. 3). Coxal gills on pereopods III–VI.

Female. Length 4.5 mm, 14 eggs. Head. Rostrum length about $\frac{1}{4}$ of that of first peduncle article of antenna I (Fig. 1C).

Antenna I with many setae: first article of peduncle ventrally with three spines, proximal spine tiny (Fig. 1C); flagellum nearly as long as peduncle, with seven articles, some of articles with aethetascus. Antenna II longer than antenna I: third article of peduncle with two stout spines ventro-distally; fourth article with two pairs of spines ventrally and one spine distally; fifth article ventro-medially with spine (Fig. 1D); flagellum with three articles, first longest, third rudimentary with two curved spines of second article length. Gnathopod I smaller than gnathopod II: palm interiorly with 4–5 spines smaller than male's ones. Gnathopod II: basis narrower than male's one, with nearly parallel edges; dactylus interiorly with three additional spines (Fig. 2C). Right uropod II: inner ramus extero-medially with spine, outer ramus extero-medially with two spines (Fig. 4D, arrows). Left uropod II: outer ramus extero-medially with spine; inner ramus medially without spines (Fig. 4C, arrows).

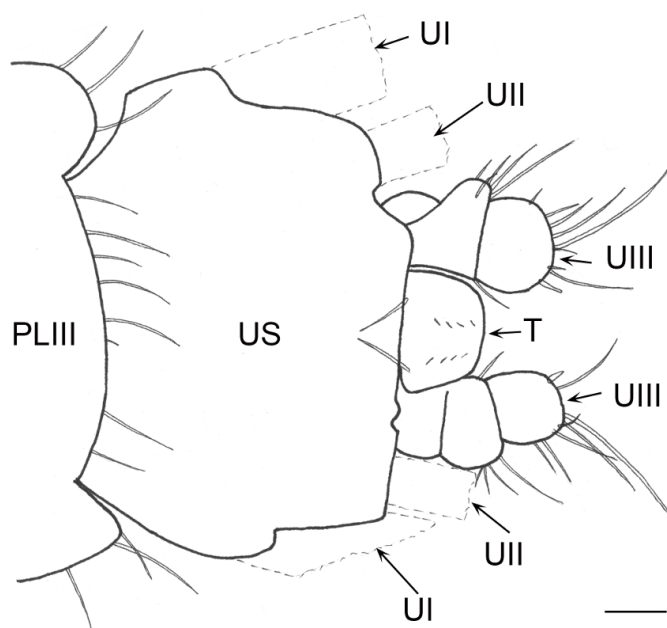


Fig. 3. Morphology of pleosome segment III (PLIII), urosome (US) and telson (T) of *M. insidiosum* male (Crimea, Laspi Bay, 4.4 mm), dorsal view (uropod I (UI) and uropod II (UII) remote, their position is denoted by the dotted line). UIII – uropod III

Рис. 3. Детали морфологии третьего сегмента плеосомы (PLIII), уросомы (US) и тельсона (T) самца *M. insidiosum* (Крым, бухта Ласпи, 4,4 мм), вид сверху (уропода I (UI) и уропода II (UII) удалены, их расположение обозначено пунктирной линией). UIII — уропода III

Morphological variability. Laspi Bay. Antenna I of males: first article of peduncle ventro-distally without spine. Antenna I of females: first article of peduncle intero-proximally with 1–3 spines. Antenna II of males: fourth article distally with additional spine with one or two apices. Gnathopod II (males and females): dactylus interiorly with differing number (2–4) of additional spines even for one specimen. Uropod II (males and females): inner and outer ramus medially with 1–2 spines or without spines.

Crimean coastal zone. Antenna I (10 % of adult male length): first article ventrally with 1–2 spines (the Swan Islands; Opuk Cape). Antenna II (about 10 % of adult specimens): fourth article ventrally with small spines (the Swan Islands; Karadag; Sevastopol, Martynova Bay). Gnathopod II (small adult specimens of 2–3 mm length): dactylus interiorly with two spines (the Swan Islands; Karadag; Opuk Cape).

Comparative analysis. Differences in the key parameters of morphology in the original description of *M. insidiosum* specimens from the English Channel [6], those from the Mediterranean Sea [2, 3, 4, 5, 8] and those from our samples have not been revealed. The specimens from our samples are different from the Mediterranean ones in the presence of medial spines on uropod II rami. However, this parameter differs even for one specimen (see *Female* description and *Morphological variability* subsection).

Specimens from the coast of North America [5] differ from those in our samples in some minor details. Antenna I: first article in the North American specimens is with conical process as opposed to rounded process in our specimens. Antenna II: fifth article of the North American specimens is with middle-proximal spine, whereas in our specimens this article is without spine. But as opposed to specimens from the Mediterranean Sea [2, 3, 4, 5, 8], the North American ones have extero-medial spine on outer ramus of uropod II [5]. Thus, specimens from our samples are morphologically closer to the Mediterranean ones.

Habitat. Specimens of this species are found in the coastal zone, at a depth varying from 0 to 5 m, among organisms (predominantly macroalgae) living on artificial constructions and rocks. The maximal number of specimens registered in our samples is 1760 spec.·m² (January 28, 2004, 3 m depth, fouling community of a concrete pier, Laspi Bay, Sevastopol).

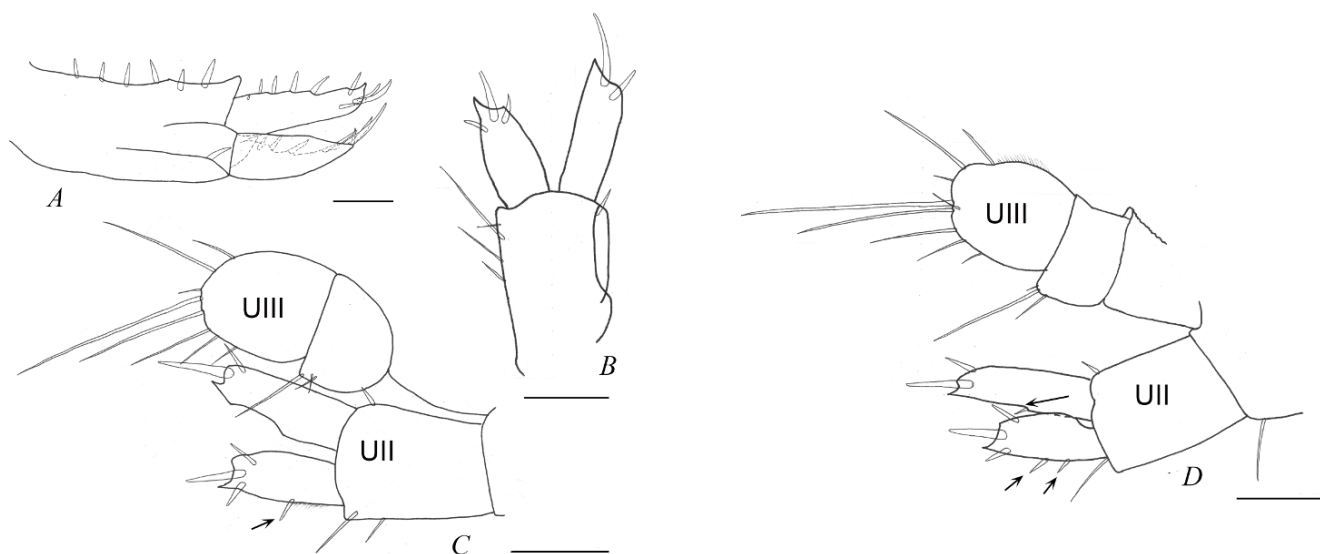


Fig. 4. Morphology of uropods of *M. insidiosum* specimens. Crimea, Laspi Bay. The length of the specimens is 4.4 mm (male) and 4.5 mm (female). A – uropod I, male; B – uropod II, male; C – right uropods II and III, female; D – left uropods II and III, female. UII, UIII – second and third uropods, respectively

Рис. 4. Детали морфологии уропод исследованных особей *M. insidiosum*. Крым, бухта Ласпи. Самец — 4,4 мм, самка — 4,5 мм. А — уропод I самца; В — уропод II самца; С — правые уроподы II и III самки; D — левые уроподы II и III самки. UII — уропод II, UIII — уропод III

CONCLUSIONS

1. The presence of *M. insidiosum* specimens in the coastal waters of Crimea has been proven.
2. Variability of the following morphological parameters of specimens from the coastal waters of Crimea have been revealed: the number of spines of first article of antenna I peduncle vary from 1 to 3; no or 1 additional spine of fourth article of antenna II peduncle have been identified; 2–4 spines on gnathopod II dactylus interiorly have been found; inner and outer rami of uropod II are either with 1–2 extero-medial spines or without spines.
3. Specimens from the coastal waters of Crimea have no key differences from the Mediterranean specimens.
4. Differences in specimens of the coastal waters of Crimea, North America (the Pacific Ocean, Vancouver) [5], and the Mediterranean Sea have been revealed: first article of antenna I is with a conical process in the North American specimens and with a rounded process in Crimean ones; fifth article of antenna II is with middle-proximal spine in the North American specimens and without middle-proximal spine in Crimean ones; outer ramus of uropod II is with medial spine in North American specimens and without spine in Mediterranean ones.

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ОБ ОБНАРУЖЕНИИ

***MONOCOROPHIUM INSIDIOSUM* CRAWFORD, 1937 (AMPHIPODA, COROPHIIDAE)
В ПРИБРЕЖНЫХ ВОДАХ КРЫМА (ЧЁРНОЕ МОРЕ),
НОВОГО ВИДА ДЛЯ ЭТОГО РЕГИОНА**

В. А. Гринцов

Институт морских биологических исследований имени А. О. Ковалевского РАН, Севастополь, Россия
E-mail: vgrintsov@gmail.com

Приведено описание вида *Monocorophium insidiosum* Crawford, 1937 по материалам, собранным у побережья Крыма. Исследованы 744 особи из различных районов и субстратов. Основные отличительные признаки вида следующие: рострум самцов длинный, около $\frac{1}{2}$ длины первого членика стебелька антенны I; коготь гнатопода II вооружён двумя — четырьмя дополнительными шипами по внутреннему краю (самцы, самки). Вариативности подвержены следующие признаки: вооружение первого членика стебелька антенны I; вооружение четвёртого членика стебелька антенны II; вооружение внутренней стороны когтя гнатопода II; вооружение внешнего края внешней и внутренней ветвей уropoda II. В работе сравниваются морфологические признаки особей данного вида с таковыми особей из Средиземного моря (по литературным данным) и тихоокеанского побережья Северной Америки (Ванкувер, по литературным данным). Установлено, что особи из Чёрного моря морфологически сходны со средиземноморскими, но имеют ряд отличий от североамериканских. У североамериканских особей выступ на первом сегменте стебелька антенны I конический (у черноморских особей он закруглённый); пятый членик стебелька антенны II самцов с проксимально-медиальным шипом (у черноморских самцов он отсутствует); присутствует шип в срединной части внешней ветви уropoda II (у средиземноморских особей он отсутствует). Указанные различия следует учитывать при работе с гидробиологическим материалом.

Ключевые слова: бокоплавы, *Monocorophium*, морфология, Чёрное море, Крым