

NOTES

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**NEW RECORDS OF COPEPODS *OITHONA NANA* AND *ACARTIA MARGALEFI*  
FROM THE BLACK SEA OFF THE COAST OF THE CRIMEA**

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A. O. Kovalevsky Institute of Biology of the Southern Seas of RAS, Sevastopol, Russian Federation  
E-mail: [artam-ant@yandex.ru](mailto:artam-ant@yandex.ru)

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*Oithona nana* and *Acartia margalefi*, native Black Sea copepods which were not recorded in coastal waters of the Crimea in 1990–2000, were registered in 2020 and 2023 in the course of local zooplankton research along the southern coast of the Crimea, inshore Gurez, and during the 126<sup>th</sup> and 127<sup>th</sup> cruises of the RV “Professor Vodyanitsky.” This short communication provides data on location of the finding sites and presents photographs of these two species.

**Keywords:** copepods, new findings, native species, Black Sea

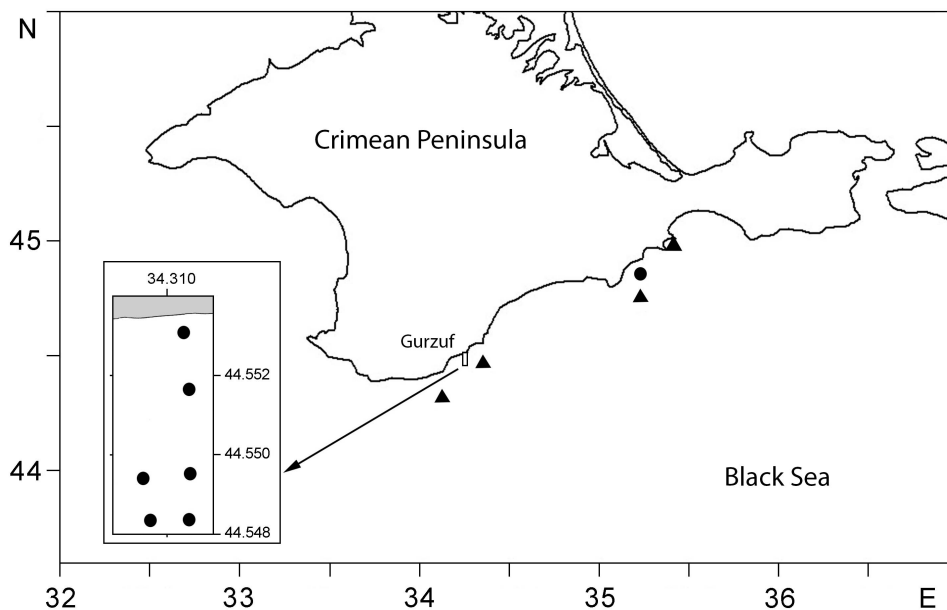
Since the mid-1970s, changes occurred in the nature and degree of anthropogenic load on the Black Sea ecosystem. Since the 1990s, significant climate change was observed associated with general warming and a slow increase in mean annual temperatures of the Black Sea surface layer by 1–2 °C over recent decades [Artamonov et al., 2005]. Under these conditions, new species for the region were recorded in the pelagic zone: the warty comb jelly *Mnemiopsis leidyi* A. Agassiz, 1865 and copepods *Acartia tonsa* Dana, 1849 and *Oithona davisae* Ferrari F. D. & Orsi, 1984 [Temnykh, Nishida, 2012; Zagorodnyaya et al., 2003]. During the same period, native copepods, previously abundant *Oithona nana* Giesbrecht, 1893 and common in coastal waters *Acartia margalefi* Alcaraz, 1976 (*Acartia clausi* “small form” [Belmonte, Mazzocchi, 1997]), practically disappeared from plankton [Gubanova et al., 2014; Zagorodnyaya, Shadrin, 1999; Zagorodnyaya, Skryabin, 1995]. Increased anthropogenic load combined with *M. leidyi* press on biota (the warty comb jelly feeds on zooplankton) resulted in the undermining of the food supply not only for pelagic fish, but also for several demersal fish due to a sharp drop in abundance of copepods and pelagic larvae of bottom animals. This had adverse consequences for the entire Black Sea ecosystem [Modern Condition of Biological Diversity, 2003].

In the early 2000s, a decrease in anthropogenic load due to industrial stagnation in the Black Sea countries and the invasion of an active consumer of the warty comb jelly – the predatory comb jelly *Beroe ovata* Bruguère, 1789 – governed certain changes in the Black Sea biota: the diversity of various taxonomic groups of both zoo- and ichthyoplankton and benthos increased, and the total abundance

of hydrobionts and individual species rose as well [Biological Resources, 2011]. In this regard, the facts of the finding of adult copepods *O. nana* and *A. margalefi* in coastal waters of the Crimea in 2020 and 2023 are of great interest.

## MATERIAL AND METHODS

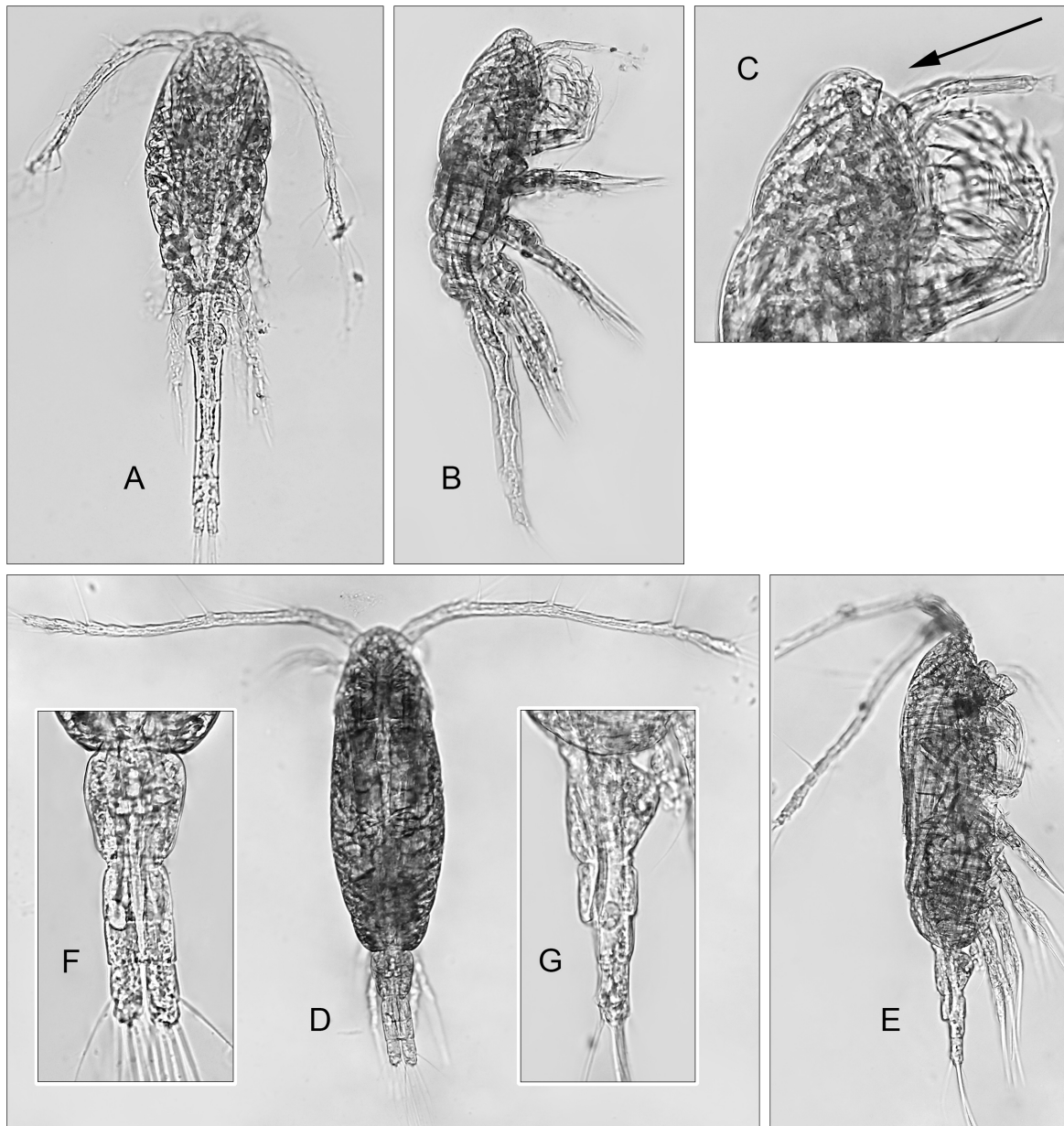
The reported material is based on zooplankton samples taken from a boat at six stations off the southern coast of the Crimea (SCC) in the Gurzuf area in December 2020 and during research cruises of the RV “Professor Vodyanitsky” in March 2023 (the 126<sup>th</sup> cruise, 55 stations) and June 2023 (the 127<sup>th</sup> cruise, 37 stations) (Fig. 1). Zooplankton was sampled with a Juday net,  $\varnothing = 36$ , gauze with a mesh of 112  $\mu\text{m}$  (at stations off the SCC) and 145  $\mu\text{m}$  (in the open sea), with total vertical tows; their length depended on depth at a station. The samples were fixed with 4% neutral formalin. The taxonomic and quantitative composition of zooplankton was studied. Organisms were identified, measured, and counted under an MBS-9 microscope in a Bogorov chamber by the standard counting-portion technique [Kozhova, Melnik, 1978]; rare and/or large organisms were examined in the entire sample. Species names of hydrobionts follow the World of Copepods database [2024].



**Fig. 1.** Location of stations where *Oithona nana* (●) and *Acartia margalefi* (▲) were found. The arrow indicates the study site near Gurzuf

## RESULTS AND DISCUSSION

A native copepod *O. nana* in fairly high abundance ( $380 \text{ ind.}\cdot\text{m}^{-3}$ ) was found along with an invasive copepod *O. davisae* off the SCC, inshore Gurzuf, at six coastal stations in the material sampled in December 2020. The share of *O. nana* in samples averaged 10% of the total copepod abundance; females (Fig. 2A–C), males, and late copepodites were registered. Two years later, in March 2023, sexually mature females of *O. nana* (4 ind.) were recorded off the coast of the Crimea in the material of the 126<sup>th</sup> cruise of the RV “Professor Vodyanitsky” (see Fig. 1).



**Fig. 2.** *Oithona nana*, female, total length of 0.56 mm, southern coast of the Crimea near Gurzuf, December 2020 (A, dorsal view; B, lateral view; C, anterior head, lateral view, the arrow indicates the absence of a rostrum). *Acartia margalefi*, female, total length of 0.62 mm, June 2023 (D, dorsal view; E, lateral view; F, urosome, dorsal view; G, urosome, lateral view)

Mature females (Fig. 2D–G) and males of *A. margalefi* (a total of 28 ind.) were noted in coastal waters of the Crimea in samples from four stations in the material of the 127<sup>th</sup> cruise of the RV “Professor Vodyanitsky” (June 2023) (see Fig. 1).

Our findings do not allow to assess the current state of populations of these species off the coast of the Crimea. Apparently, their records are associated with a drop in anthropogenic load on biota and a decrease in *M. leidy* press on the Black Sea plankton, on copepods in particular. In this regard, it is advisable to continue monitoring the taxonomic composition of zooplankton: this will help to better understand the biodiversity of pelagic communities, describe the spatial and temporal dynamics, and reveal trends in its formation in the region.

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## НОВЫЕ НАХОДКИ КОПЕПОД *OITHONA NANA* И *ACARTIA MARGALEFI* В ЧЁРНОМ МОРЕ У БЕРЕГОВ КРЫМА

**Ю. А. Загородняя, И. Е. Драпун, И. Ю. Прусова, Е. В. Попова**

ФГБУН ФИЦ «Институт биологии южных морей имени А. О. Ковалевского РАН»,  
Севастополь, Российская Федерация  
E-mail: [artam-ant@yandex.ru](mailto:artam-ant@yandex.ru)

Черноморские аборигенные виды копепод *Oithona nana* и *Acartia margalefi*, которых на протяжении 1990–2000 гг. не регистрировали у берегов Крыма, были обнаружены в 2020 и 2023 гг. у Южного берега Крыма, в прибрежной зоне возле Гурзуфа, и в морских экспедициях на НИС «Профессор Водяницкий» (126-й и 127-й рейсы). Представлены фотографии найденных копепод и места их обнаружения.

**Ключевые слова:** копеподы, новые находки, аборигенные виды, Чёрное море