Benthic fauna of the Bay of Nhatrang, Southern Vietnam

Volume 2

Editors: T.A. Britayev, D.S. Pavlov



Moscow 2012

Benthic fauna of the Bay of Nhatrang, Southern Vietnam. Vol. 2. Moscow: KMK Scientific Press Ltd. 2012. 491 p.

The book contains 9 chapters describing different groups of marine invertebrates: symbiotic polychaetes; mollusks – chitons, gastropods of the family Eulimidae, nudibranchs; pontoniin shrimps; commercial and mangrove species of crabs; sea stars and crinoids. In the result of the processing of the samples, collected in the Bay of Nhatrang, 474 species of invertebrates are described, nearly half of them (218 species) were found in Vietnam for the first time. Eight new for science species are described. For each species the localities and general distribution data, synonymy and for many species diagnoses and descriptions are provided. The book is illustrated by 62 line drawings text figures and 70 plates with 502 original color photographs of live specimens taken in nature or in aquaria immediately after collecting. This volume significantly increases the knowledge not only about the fauna of the Bay, but of Vietnam in general.

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Recommended citation:

The whole volume – Britayev T.A., Pavlov D.S. (Eds.). 2012. *Benthic fauna of the Bay of Nhatrang, Southern Vietnam. Vol. 2.* Moscow, KMK, 491 pp.

The chapter – Britayev T.A., Antokhina T.I. 2012. Symbiotic polychaetes from Nhatrang Bay, Vietnam. In Britayev T.A., Pavlov D.S. (Eds.). *Benthic fauna of the Bay of Nhatrang, Southern Vietnam. Vol. 2.* Moscow, KMK: 11–54.

ISBN 978-5-87317-860-5

Eulimidae (Gastropoda, Ptenoglossa) of Nhatrang Bay

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ABSTRACT. Seventeen species of symbiotic gastropods (Gastropoda, Eulimidae) were found in Nhatrang Bay, (South Vietnam) in the South China Sea: 5 species from starfishes, 7 species from crinoids, 3 species from echinoids, 2 species from holothurians. This research has doubled the species list for symbiotic gastropods of Eulimidae family in Vietnam waters, extending it to 32 species. Previously 15 eulimid species have been noted, only 3 of which were known in associations with hosts. Only one species that we found, *Thyca crystallina*, has been earlier recorded on starfishes *Linckia laevigata*. All symbionts have been found on their hosts, and for some of them hosts were recorded for the first time (in particular, for *Goodingia* sp., *Annulobalcis* spp., and *Stilifer variabilis*).

Echinoderms like other large marine animals with sedentary life style are often occupied by various symbionts. More than 825 species (from protozoans to fishes) are associated with different representatives of this phylum [Jangoux 1990]. In symbiotic associations, the host serves as a buffer between symbionts and the environment, which decreases the influence of abiotic factors on the symbionts and makes biological interactions more distinct [Lyskin, Britayev 2005].

The Eulimidae family is diverse but rather poorly investigated group of symbiotic gastropods. This family includes approximately 1500 species which are almost exclusively associated with all major groups of echinoderms [Warén 1983; Jangoux 1990]. Both ectoparasites and endoparasites are found in Eulimidae. Many ectoparasitic eulimids penetrate echinoderm integuments with their proboscises to reach coelomic cavity, water vascular system, or hemal system, and presumably feed on host's fluids, coelomocytes, or internal tissues. Some species consume echinoderm dermis. Endoparasitic eulimids dwell in the digestive tract or in coelomic cavity. In addition to their feeding activities, eulimids impact their hosts by causing attachment lesions and gall formation, for example in asteroids, ophiuroids and crinoids [Harms 2006].

Despite the fact that eulimids species are parasitic, only few of them were found in an association with host organisms. This is due to the fact that only a limited number of eulimid species are permanently associated with hosts. Probably most species parasitize hosts for a limited time and then leave to hide somewhere on the bottom [Bouchet, Warén 1986]. Many eulimids are not host specific.

Most species of this family occur in tropical waters [Warén 1983]. In Vietnam eulimid fauna was poorly investigated. Previous studies recorded 15 species but only three of them were found with their hosts [Hylleberg, Kilburn 2003; Lyskin, Britayev 2005; Thach 2005, 2007; Moolenbeek 2009].

Below is a list of Eulimidae species found by us with short descriptions.

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Materials and methods

Mollusks were collected in Nhatrang Bay, Vietnam on different echinoderms species in 2006–2010, from depths between 0 and 15 m using SCUBA equipment (Fig. 2). Echinoderms were individually placed in Zip-lock plastic bag under water and transported to the boat. Following that, each individual host was washed in a 5–10% ethyl alcohol solution, detached symbionts were collected and fixed in a 70% ethyl alcohol solution. In the laboratory, symbionts were identified and measured (using microscope with magnification 10×2 and 10×4).

Systematic account

Class Gastropoda Cuvier, 1795

Subclass Caenogastropoda Cox, 1960

Family Eulimidae Philippi, 1853

Annulobalcis Habe, 1965

Type species: Annulobalcis shimazui Habe, 1965 (by monotypy).

This genus includes 10 species which inhabit Indo-West Pacific and Brazil waters [Habe 1965; Habe 1974; Simone, Martins 1995; Simone 2002; Dgebuadze, Fedosov, Kantor 2012].

Annulobalcis albus Dgebuadze, Fedosov et Kantor, 2012 (Pl. 17 A, B)

Annulobalcis sp. 1: Dgebuadze, Kantor 2010 (partim): figs 2 a,v; 4 a. *Annulobalcis albus* Dgebuadze, Fedosov, Kantor 2012: 142, 144–46, figs. 2; 6 A, B.

Material examined. South China Sea, Nhatrang Bay, Islands Tre, Mun, and Nok, 2007–2010, 4–10 m, on *Oxycomanthus bennetti* (Müller, 1841) (Crinoidea, Comasteridae) – 452 specimens.

Diagnosis. Shell conical, glossy, grayish white, smooth except thin sigmoid scars corresponding to shape of outer lip. Aperture ovate with strongly marked angle between columellar and parietal margins. Outer lip evenly rounded in ventral view, protruded in the middle part in lateral view.

Measurements. Average size: 4.7 mm in height.

Taxonomic notes. The species lacks spiral sculpture. It can be distinguished from another species without sculpture, *Annulobalcis marshalli* Warén, 1981 from New Zealand, by smaller shell size and aperture shape. This species resembles *Annulobalcis cicatricosa* (Warén, 1981) from Australia in shell proportions, but its teleoconch is formed by more numerous whorls. It also it resembles *Annulobalcis vinarius* in shell shape, but differs in coloration of soft parts and host specificity. For differences with *Annulobalcis wareni* see description of that species. **Diagnosis.** Shell small, translucent, with slightly curved axis. Teleoconch whorls nearly flat, separated by shallowly adpressed suture. The body whorl is high, constitutes more than half of shell height. Aperture is small, oval. Straight parietal margin gradually passes into columellar. Columella short, slightly concave. Outer lip evenly rounded, with weakly expressed anal sinus located near the suture.

Measurements. Average size: 1.4 mm in height.

Ecological notes. This genus was found on holothurians, ophiuroids and echinoids. In our investigations specimens were found on sea urchin *Phyllacanthus* cf. *imperialis*.

Distribution in Nhatrang Bay. Nok Island. First time found in Vietnam.

Discussion

Rich fauna of Eulimidae (more than 180 species) was recorded in Japanese waters [Higo *et al.* 1999; Okutani 2000]. However, only half of them were found with hosts. In Nhatrang several species common to the Japanese fauna were discovered: *Echineulima mittrei, Stilifer utinomi, Thyca crystallina* and *Thyca nardoafrianti*. Among common genera Japanese authors noted 4 species of *Curveulima*, 2 species of *Annulobalcis*, 1 species of *Parvirois*, more than 50 species of *Melanella*, 5 species of *Vitreobalcis* and 5 species of *Vitreolina*.

Only 7 eulimid species have been noted in seas around China. All specimens were found without hosts from depths up to 40 m [Zhang 2008]. There are no common species to Vietnam and the single common genus is *Melanella (Melanella major* and *Melanella martinii)*.

Poppe, in the book about Philippine marine shells, has mentioned 20 species of eulimids; for 14 of them hosts were detected [Poppe 2008]. The single species – *Thyca crystallina* was also found in Vietnam. Two undescribed species of *Annulobalcis*, 3 species of *Parvioris* and 8 species of *Melanella* were also noted in Philippine waters.

Our results have doubled the number of species on the list of symbiotic gastropods of the family Eulimidae in Vietnam waters, extending it to 32 representatives. Previously only 15 eulimid species have been noted [Hylleberg, Kilburn 2003; Lyskin, Britayev 2005; Thach 2005, 2007; Moolenbeek 2009]. In our studies, all species of symbiotic mollusks were found with their hosts, and for some of them hosts were observed for the first time. However we suggest that this species list is not yet complete.

It is obvious that the knowledge of Indo-Pacific Eulimidae fauna is far from being saturated. This is confirmed by the fact that there is still very little overlap between species lists of closely situated areas, such as Vietnam and China. Further research in Vietnamese waters is required as Nhatrang Bay seems to be very rich in terms of biodiversity. While Eulimidae is a very numerous group in tropical waters, it is still insufficiently studied.

Acknowledgements

The authors want to express their thanks to the administration and the staff of the Coastal Branch of Russian-Vietnam Tropical Center for the help in organizing and conducting field studies; Dr. Temir A. Britayev for his assistance during investigations; col-

leagues from laboratory of morphology and ecology of marine invertebrates (A.N. Severtzov Institute of Ecology and Evolution, RAS) for assistance in material collecting and to Oleg V. Savinkin for making some photos of mollusks. The study was supported by the Russian Foundation for Basic Research, under grant 12–04–31017.

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Брюхоногие моллюски семейства Eulimidae (Gastropoda, Ptenoglossa) залива Нячанг

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РЕЗЮМЕ. В заливе Нячанг Южно-Китайского моря (южный Вьетнам) обнаружено 17 видов симбиотических брюхоногих моллюсков из семейства Eulimidae: 5 видов на морских звездах, 7 видов на морских лилиях, 3 вида на морских ежах и 2 вида на голотуриях. Результаты исследований удвоили список видов симбиотических брюхоногих моллюсков семейства Eulimidae в водах Вьетнама, увеличив его до 32. Ранее отмечалось 15 видов эулимид, лишь для трех из которых были известны хозяева. Только один из обнаруженных нами видов – *Thyca crystallina* – был отмечен ранее на морских звездах *Linckia laevigata*. Все виды моллюсков-симбионтов были обнаружены с хозяевами, а для некоторых из них хозяева были установлены впервые (в частности, для *Goodingia* sp., *Annulobalcis* spp. и *Stilifer variabilis*).

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Plate 17. **A** – Annulobalcis albus, holotype, 6.0 mm; **B** – Annulobalcis albus on the host – feather star Oxycomanthus bennetti; **C** – Annulobalcis vinarius, holotype, 2.9 mm; **D** – Annulobalcis vinarius on the arm of feather star Himerometra robustipinna; **E** – Annulobalcis wareni, holotype, 3.8 mm; **F** – Annulobalcis wareni, live specimen.