



# Benthic fauna of the Bay of Nhatrang Southern Vietnam

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Joint Vietnamese-Russian Tropical Research  
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**BENTHIC FAUNA OF THE BAY  
OF NHATRANG,  
SOUTHERN VIETNAM**

**KMK Scientific Press  
Moscow ❖ 2007**

**Benthic fauna of the Bay of Nhatrang, Southern Vietnam.** Moscow: KMK Scientific Press Ltd. 2007. 248 p.

The book is dedicated to extremely rich and variable marine coastal fauna of the Southern Vietnam. Most of the studies were conducted in Nhatrang Bay. The book contains 8 chapters, dedicated to different groups of marine invertebrates: scleractinian corals, sipunculids, barnacles, mantis shrimps, pontoniine shrimps, crabs of the families Domeciidae, Trapeziidae, Tetraliidae, Xanthidae (Cymoinae), Calappidae, and sponges. As a result of processing of the collections sampled from 1985 to 2006, 441 species of marine invertebrates were found. Among them one is new for science, 82 species were recorded for the first time in Vietnam, and 128 species — for the first time in Nhatrang Bay. For each species the data on occurrence, distribution, synonymy, and for many species diagnoses or descriptions are provided. The book contains 250 original colored photographs of live animals, made in natural conditions, aquaria, or immediately after collection.

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## FOREWORD

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Vietnam is considered as one of the major centers of biodiversity of both terrestrial and aquatic faunas. Presently more than 7000 species of marine invertebrates, 2038 species of marine fishes, and 54 marine reptiles are known to inhabit coastal waters of Vietnam. Nevertheless the inventory is far from being complete even for such diverse and ecologically important groups as sponges, scleractinian and soft corals, echinoderms. Nemertean, polychaete worms, myzostomids, sipunculids, echiurids, small crustaceans, and ascidians are studied even less.

Rapid development of the Vietnam economy is accompanied by active exploitation of biological resources, deterioration of habitats, pollution of the coastal areas, and, as a result, by reduction of the biodiversity and disappearance of certain species and entire communities. Recently the Government of Vietnam understands the importance of the problem and is paying noticeable attention to conservation of the biodiversity, particularly by organizing the protected marine territories. National and international programs aimed to protection and sustainable management of biodiversity of the coastal waters are being launched.

Publication of this book is an attempt of partial filling the gaps in our knowledge of the fauna of coastal waters of Vietnam. Nhatrang Bay is situated in the southern part of Vietnam. It was selected as a study area because it contains variable habitats: coral reefs and fragments of mangroves, sandy exposed beaches, rocks, soft bottoms with different degree of silting, polluted areas, as well as relatively pristine areas around islands in the eastern part of the Bay. The Bay itself is better studied in comparison with many others, since from mid 30<sup>th</sup> of the last century the marine biological station (later the Institute of Oceanography of Vietnam) was operating here. Besides in 1988 the Coastal Branch of the Vietnam-Russia Tropical Research Centre was established and studies of the fauna and ecology of the coastal waters communities started.

The Nhatrang City is situated in the Bay, and it is rapidly developing as an international resort. Increasing of population and the number of tourists leads to intensification of the anthropogenic influence due to increasing of the residential waters and intensive development of aquaculture. This in turn is in controversy with the necessity of preservation of unique underwater landscapes, marine fauna and flora, which are attracting tourists. In 2002–2003 the marine resort was established in Nhatrang Bay, due to which it was possible to conserve and even restore some parts of the coral reefs, intertidal mangroves, communities of hard and soft bottoms. Nevertheless the situation is still complex and studies of the biodiversity of macrobenthos remain an important task for protection of the biota of the Bay.

The basis of this book is the material, collected in Nhatrang Bay mostly in 2002–2006 basing on the Coastal Branch of the Tropical Research Centre. Nevertheless, some of the material used in some research was collected in 1985 and 1987 prior to the establishment of the Tropical Research Centre by the joint expeditions of the A.N. Severtzov Institute of Ecology and Evolution and the Institute of Oceanography of Vietnam and in the early period of the Tropical Center in 1988–1990.

The book contains 8 chapters dedicated to different groups of the marine invertebrates: scleractinian corals, sipunculids, barnacles, mantis shrimps, pontonine shrimps, crabs of the families Domeciidae, Trapeziidae, Tetraliidae, Xanthidae (Cymoinae), Calappidae, and sponges. Selection of the taxa was determined, in the first turn, by the activity of the taxonomists working on these groups. Identification of the sponges was the most complex task. Nevertheless we decided it useful to include the preliminary list of species recorded in the Bay in 2004. Presently the collections are being processed of alcionarians, polychaete worms of the families Polynoidae and Syllidae, myzostomids, nudibranch gastropods, parasitic gastropods of the family Eulimidae, crinoids, sea stars, holothurians and ascidians. Moreover, peculiar extremely rich fauna of the symbionts of octocoralls, sponges, sea stars and crinoids, which includes very different organisms from sessile ctenophores to brittle-stars and fishes was found in Nhatrang Bay. At the same time rich collections of hydroids, polychaetes, bivalve and gastropod molluscs, isopods, ahipods, decapods, copepods are still not processed. We hope that this book will attract the attention of specialists to rich and peculiar fauna of the Nhatrang Bay and books dedicated to different taxa will follow it.

This work was done due to the organizing support of the administration of the Tropical Center: its general directors V.S. Rumak and Trinh Quoc Khan, directors of the Coastal Department of Tropical Center Yu. N. Sbikin, V.K. Nezdoliy, Nguen Van Doan and Trøn Cphng Hubn. We are grateful to our Russian and Vietnamese colleagues, who assisted in the collection of the material, reviewers, whose efforts improved the quality of the publication, to the translator and editor of the English text A.V. Sysoev, and to Yu.I. Kantor, who designed the layout of the book and contributed to its publication.

*T.A. Britayev, D.S. Pavlov*

## CHAPTER 1

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### Annotated checklist of scleractinian corals, millepores and *Heliopora* of Nhatrang Bay

T.N. Dautova\*<sup>1</sup>, Yu.Ya. Latypov<sup>1</sup>, O.V. Savinkin<sup>2</sup>

**ABSTRACT.** In October-November 2003 and in April-May 2004, reefs of Mieu, Tre, Tam, Mot, Mun Islands in Nhatrang Bay and Ran Cau and Bau Thanh Bays have been investigated. Colonies of various species were photographed on the site (1347 underwater photos), then collected and identified in the laboratory. Presently the fauna Cnidaria with consolidated calcareous skeleton of Nhatrang Bay includes 195 species, which belong to 54 genera of Scleractinian corals, one species of *Heliopora* and two species of *Millepora*. Of them, 43 species of 15 genera were unreliably known or not known for Nhatrang Bay, 3 species were previously unknown for Vietnam and 1 species is described as new. The bulk of species diversity, as in majority of Ly Sonefs of both Vietnam and Indo-Pacific, is formed by the species of five genera *Acropora* (32 species), *Montipora* (12), *Porites* (15), *Favia* (11), *Fungia* (6), representing 40.4% of the entire fauna of scleractinians in the study area. About a third of all scleractinians are known from all reefs of Nhatrang Bay. Some species of scleractinian corals (*Acropora cytherea*, *A. hyacinthus*, *A. nobilis*, *A. formosa*, *Montipora aequituberculata*, *M. hispida*, *Porites nigrescens*, *P. cylindrica*, etc.) are capable to form monospecific settlements covering the entire substratum of a reef flat or reef slope on many hundreds of square meters.

The productivity of coastal waters of Vietnam (the abundance of fish, shrimps, rock lobsters, commercial mollusks and sea algae) is determined to a considerable degree by the state of coral reefs. The first data about scleractinians of Vietnam appeared in 1937 after publication of Ly Sonsults of the expedition aboard the «De Lanessan» [Serene, 1937]. This publication listed 64 species of scleractinians belonging to 33 genera. A more complete list of the scleractinians, mainly of South Vietnam (including Nhatrang Bay), has been presented 15 years later by famous Russian naturalist Dawydoff [1952]. It contained about 230 species of scleractinians from 51 genera. Some genera contained 5 to 12 synonymous species names, but the basic part of Vietnamese scleractinian fauna, which was already quite comparable to corals of Australia and Indonesia, has been established correctly. The first attempt to analyse the distribution of scleractinians in Nhatrang Bay was undertaken by Loi [1967], who distinguished 4 typical facies with dominant species for reefs of some islands and capes and compiled a list including 78 species.

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Fig.1. A. *Pocillopora eydouxi*. Expanding colony with flattened widely separated branches. B. *Pocillopora meandrina*. Small colonies.

Рис. 1. А. *Pocillopora eydouxi*. Расширяющаяся колония с уплощенными редкими ветвями. В. *Pocillopora meandrina*. Мелкие колонии.

## CHAPTER 2

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### **Peanut worms of the phylum Sipuncula from coastal waters of Vietnam (Nhatrang Bay)**

V.V. Murina\*

**ABSTRACT.** Eight species of sipunculans belonging to 6 genera and 5 families were found in the material (155 specimens) collected in Nhatrang Bay (southern Vietnam, South China Sea) during spring and autumn 2003–2004 monitoring of soft bottom fauna. Three species are new records for the South China Sea: *Aspidosiphon muelleri kovalevskii*, *Aspidosiphon (Akrikos) mexicanus* and *Onchnesoma steenstrupii steenstrupii*. The highest population density up 121 specimens per m<sup>2</sup> was recorded for *Apionsoma trichocephalus*. Biogeographic and bathymetric distribution of 25 sipunculan species from the South China Sea is analyzed. Among them, about 52% of species belong to tropical-temperate biogeographic group and the same percentage (52%) belongs to littoral bathymetric group of species. At present, the sipunculan fauna of coastal waters of the South China Sea contains 15% of species and subspecies, 65% of genera and 100% of families of the phylum Sipuncula known from the World Ocean.

The fauna of sipunculans of South Vietnam was considered recently in a regional review [Murina, 1989] based on vast collections of the Far Eastern Branch of Russian Academy of Sciences, which were taken on littoral and upper sublittoral of the South China Sea islands (1980–1982, 215 specimens), as well as on the collection (23 specimens) made by the author during a cruise of the R/V «Akademik Nesmeyanov». Based on this and previous publications [Fischer, 1923; Leroy, 1942; Dawydoff; 1952; Murina, 1964, 1974], the fauna of the South China Sea and the Gulf of Tonkin consists of 25 species from 11 genera and 6 families. The present work provides data on the sipunculan fauna of upper sublittoral of Nhatrang Bay (South Vietnam). It is based on a collection of sipunculans (155 specimens) from benthic samples taken by researchers of the Institute of Ecology and Evolution of Russian Academy of Sciences in the course of monitoring studies of the bay bottom fauna in 2003 and 2004. A total of 8 species from 6 genera and 5 families have been found. Three species, *Aspidosiphon muelleri kovalevskii*, *Aspidosiphon (Akrikos) mexicanus* and *Onchnesoma steenstrupii steenstrupii*, are new for the South China Sea fauna. All these species are well described in other publications [Murina, 1989; Cutler, 1994], therefore only data on localities, distribution and, sometimes, taxonomic remarks are given here. Names of all taxa are cited in accordance with the monograph of Edward Cutler [1994].

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## CHAPTER 3

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### Barnacles (Cirripedia, Thoracica) of Nhatrang Bay

O.P. Poltarukha<sup>1</sup>, T.N. Dautova<sup>2</sup>

**ABSTRACT.** The fauna of barnacles (Cirripedia, Thoracica) of Nhatrang Bay (South Vietnam) was studied. A total of 32 barnacle species have been found in the bay: *Acasta sulcata*, *Armatobalanus allium*, *A. quadrivittatus*, *Balanus amphitrite*, *B. reticulatus*, *B. trigonus*, *B. variegates*, *Cantellius euspinulosus*, *C. iwayama*, *C. secundus*, *C. septimus*, *Chinochthamalus scutelliformis*, *Chirona amaryllis*, *Chthamalus malayensis*, *Euacasta porata*, *Galkinia decima*, *G. indica*, *Hiroa stubblingsi*, *Ibla cumingi*, *Lepas anatifera*, *Megabalanus ajax*, *M. tintinnabulum*, *Nobia conjugatum*, *N. grandis*, *Octolasmis warwicki*, *Pollicipes mitella*, *Savignium crenatum*, *S. milleporum*, *Tesseropora alba*, *Tetraclita japonica*, *T. squamosa*, *Tetraclitella costata*. Additional 7 species, *Lepas anserifera*, *L. pectinata*, *Acasta japonica*, *Archiacasta tenuivalvata*, *Balanus condakovi*, *Solidobalanus socialis* and *Tetrachthamalus sinensis*, were reported for the region in the literature but have not been found by the authors. Among the species found, two species (*Octolasmis warwicki* and *Savignium milleporum*) are new records for Nhatrang Bay and 12 (*Armatobalanus allium*, *Cantellius iwayama*, *C. secundus*, *C. septimus*, *Galkinia decima*, *G. indica*, *Hiroa stubblingsi*, *Megabalanus ajax*, *Nobia conjugatum*, *N. grandis*, *Savignium crenatum* and *Tetraclitella costata*) are new for Vietnamese fauna. Of the latter, two species (*Galkinia decima* and *Hiroa stubblingsi*) were not found earlier in the South China Sea. The distribution of Cirripedia species within Nhatrang Bay is discussed. The species new for Vietnamese fauna are described, and a key is given to identification of all barnacles presently known from Vietnam.

A systematic study of cirriped fauna of Vietnam shores has started in the second half of the 20th century [Broch, 1947; Davydoff, 1952; Stubbings, 1963; Zevina & Tarasov, 1963; Zevina, 1968]. In 1992, Zevina et al. published the most complete monograph on species of this group inhabiting the shores of Vietnam. It included descriptions of 66 species. A review of barnacles of the South China Sea was published in 2000; it recorded 315 species from the area, though only a small fraction of them was indicated for Vietnamese coast [Jones et al., 2000]. Thus, the species composition of Cirripedia in this region was until recently considered relatively well studied.

At the same time, the literature almost lacks data on Vietnamese coral-inhabiting species of barnacles, mainly from the family Pyrgomatidae. The monograph of 1992 [Zevina et al., 1992] lists only one species of coral-inhabiting barnacles: *Cantellius euspinulosus* from the Gulf of Tonkin, without indication of the host coral species. One more species, *Savignium milleporum* was earlier found on the hydroid *Millepora platyphylla* in the Gulf of Siam near An Thoi and Tho Tu islands [Gladkov & Moshchenko,

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## CHAPTER 4

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### Mantis shrimps (Crustacea: Stomatopoda) of Nhatrang Bay

Zdenek Duris\*

**ABSTRACT.** A complete checklist of Vietnamese species of Stomatopoda is provided. Twenty one species are reported from Nhatrang Bay, Vietnam; notes on morphology, habitat, colour and distribution of the examined species are given. *Alima neptuni*, *Anchisquilla chani* and *Odontodactylus japonicus* are new for Vietnamese fauna. *Acanthosquilla manningi*, *Fallosquilla fallax*, *Gonodactylellus affinis* and *Levisquilla inermis* are recorded for the first time in Nhatrang Bay. Specific affiliation is unclear for two different specimens of *Cloridina* that will be reported in detail in a separate publication. Species of special interest are illustrated by line drawings and colour photographs.

The recent knowledge of the stomatopod crustaceans of Vietnam is based upon works of Ch. Gravier, R. Serène and C. Dawydoff whose publications, as well as Serène's unpublished data, were widely commented by Manning [1995]. Important contribution to the knowledge of the stomatopods of Vietnam has been brought also by Russian authors [Blumstein, 1970, 1974; Makarov, 1978, 1979], as a result of Soviet expeditions to the Gulf of Tonkin. They reported altogether 43 species, including 19 in addition to those known from Serène's collections.

Manning [1995] listed 72 species of Vietnamese Stomatopoda. Together with last revisions, new reports [Ahyong, 2001; Ahyong, Moosa, 2004], and the present material, the number increases to 84 species known in Vietnam (see the list below). The keys to identification, concise synonymies and diagnoses of Vietnamese species have been already published in recent accounts [Manning, 1995; Ahyong, 2001].

The onset of research on stomatopods of Nhatrang Bay dates back to 1930s. Serène reported 36 species from Nhatrang Bay in his unpublished thesis [see Manning, 1995]. The present work provides data on 21 species of stomatopods collected by Drs. T.A. Britayev and I.N. Marin (A.N. Severtzov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow) in that region in 2003 and 2004. Four are new for Nhatrang Bay and another four are new for Vietnamese fauna. The material is deposited in the Zoological Museum of Moscow State University (ZMMU). The following abbreviations are used in the text: TL — total length of the body (from the tip of rostrum to the end of the submedian teeth of the telson), CL — carapace length (median length of the carapace without the rostrum), RL, RW — rostral length and width (resp.), TeL, TeW — telson length and width (resp.), CoW — cornea width, CI — corneal index (corneal width x 100/carapace length).

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Fig. 71. A— *Gonodactylus chiragra* (Fabricius), ♀ 86 mm. B— *G. smithii* Pocock, ♀ 25.5 mm. C— *Odontodactylus japonicus* (de Haan, 1814), ♂ 67 mm. D— *O. scyllarus* (Linnaeus), ♀ 99 mm

## CHAPTER 5

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### The Calappidae and Matutidae (Crustacea, Decapoda) of Nhatrang Bay

Ivan Marin\*, Nguyen Thi Hai Thanh\*\*

**ABSTRACT.** Nine species of family Calappidae, *Calappa calappa* (Linnaeus, 1758), *C. capellonis* (Laurie, 1906), *C. chypeata* (Borradaile, 1903), *C. gallus* (Herbst, 1803), *C. hepatica* (Linnaeus, 1758), *C. lophos* (Herbst, 1782), *C. philargius* (Linnaeus, 1758), *C. pustulosa* Alcock, 1896, *Cycloes granulosa* de Haan, 1837 and four species of family Matutidae, *Ashtoret lunaris* (Forskel, 1775), *A. miersii* (Henderson, 1887), *Matuta planipes* Fabricius, 1798 and *M. victor* (Fabricius, 1781), are reported from Nhatrang Bay. Nine of them are for the first time recorded from the area, increasing the number of Vietnamese species of these families to fourteen. There is a negative impact on the abundance and distribution of species of the genus *Calappa* in Nhatrang Bay due to fishery activities. Most of the species are absent in the coastal zone of islands and occur only on sand and muddy bottoms in deeper parts of the bay. One species, *C. gallus*, is represented only by specimens deposited in the collections of National Oceanographic Museum of Vietnam (Nhatrang City). Other species of this genus, such as *C. calappa*, *C. philargius* and *C. lophos*, are actively fishery extracted at present time. It is clear that this indiscriminant catching of mature and juvenile specimens by trawls and the destruction of habitats in the bay can catastrophically decrease their populations in future.

Crabs of the families Calappidae and Matutidae known as box crabs, shame-faced or moon crabs, are one of the most fascinating crabs in the tropical and subtropical seas of the World Ocean [Galil & Clark, 1994]. Presently, the family Calappidae includes nine genera: *Acanthocarpus* Stimpson, 1871, *Calappa* Weber, 1795, *Calappula* Galil, 1997, *Cryptosoma* Brulle, 1837, *Cycloes* de Haan, 1837, *Cyclozodion* Williams et Child, 1998, *Mursia* Desmarest, 1823, *Paracyclois* Miers, 1886; *Platymera* H. Milne Edwards, 1837 and four genera are known in Matutidae: *Ashtoret* Galil et Clark, 1994, *Izanami* Galil et Clark, 1994, *Matuta* Weber, 1795, *Mebeli* Galil et Clark, 1994 [Galil, Clark, 1994; Schweitzer, Feldmann, 2000]. One extinct genus of matutid crabs, *Szaboa* Мьller et Galil, 1998, is known from Miocene [Мьller & Galil, 1998]. Genera *Ashtoret*, *Calappula*, *Cycloes*, *Izanami*, *Matuta*, *Mursia*, and *Platymera* occur in the Indo–West Pacific and Eastern Pacific regions while *Cryptozoma* and *Mebeli* occur in the Atlantic Ocean. *Calappa* is the only genus that occurs in both the Indo Pacific and Atlantic Oceans.

The study of calappid crabs began at the end of the 18<sup>th</sup> century with the publications of J.F.M. Herbst [Herbst, 1782–1804]. Since then, much work has been done on their

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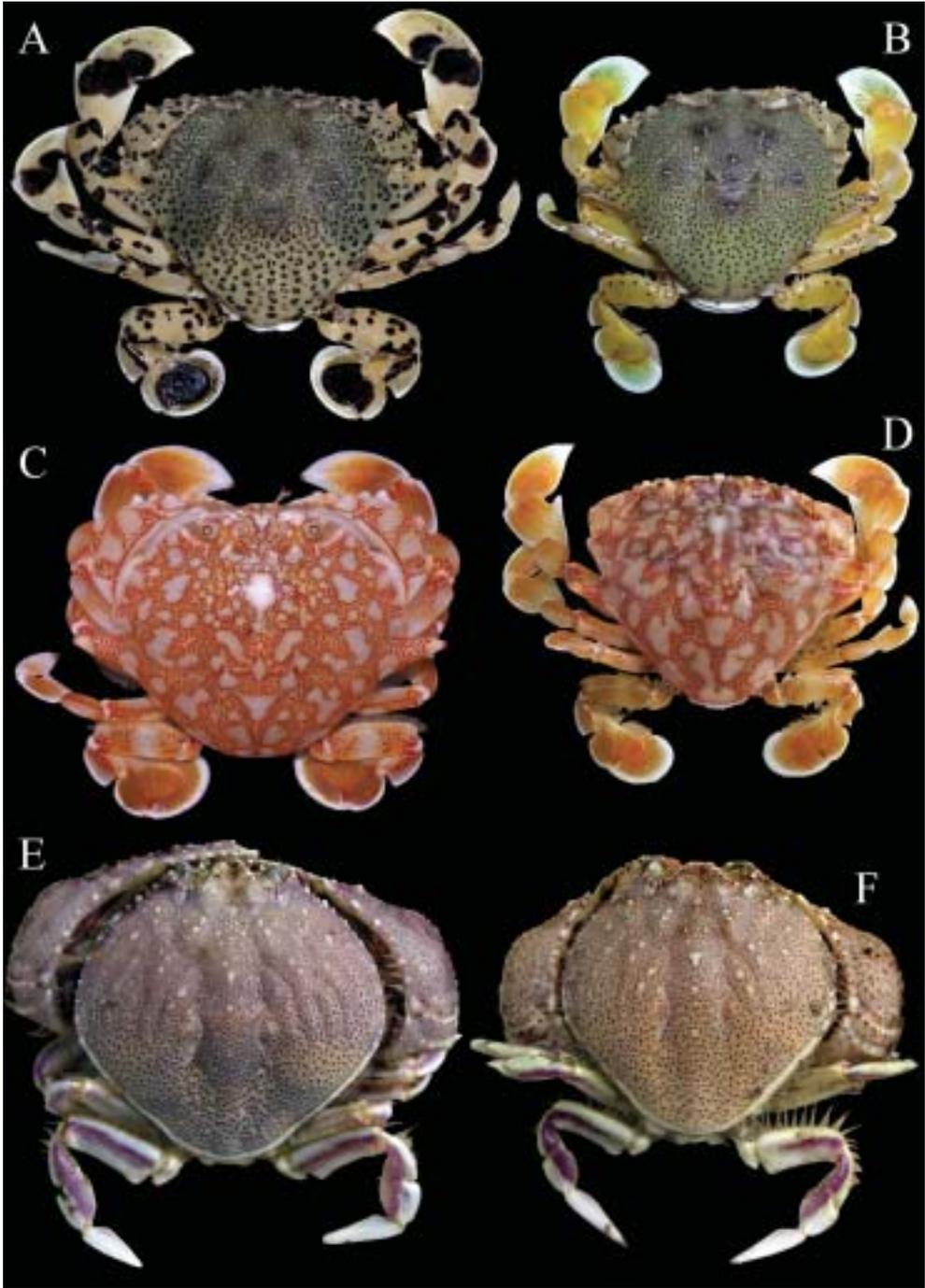


Fig. 78. *Ashtoret lunaris* (Forskål, 1775): A — ♂, 65 mm; B — ♀, 60 mm; *A. miersii* (Henderson, 1887), C — ♀, 48 mm; D — ♂ 42 mm; *Cycloes granulosa* de Haan, 1837: E — ♂, 50 mm; F — ♀, 43 mm.

## CHAPTER 6

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### **Further records and preliminary list of pontoniine (Caridea: Palaemonidae: Pontoniinae) and hymenocerid (Caridea: Hymenoceridae) shrimps from Nhatrang Bay**

I.N. Marin, O.V. Savinkin\*

**ABSTRACT.** Symbiotic and free-living shrimps were collected from large marine invertebrates and different substrates from the littoral zone to the depth of 80 m with a suction pump, SCUBA and trawls in Nhatrang Bay in 2003–2006. Among this material, 43 species of the Pontoniinae new to Vietnamese waters were found. Two species of the Hymenoceridae are recorded for this region for the first time. Based on this and previously published data, the current list of the Vietnamese fauna comprises 85 pontoniine and 2 hymenocerid species. Known hosts of all species and a discussion of distribution within the Nhatrang Bay are presented.

Representatives of the families Palaemonidae and Hymenoceridae are among the most commonly encountered benthic shrimps in the Indo-West Pacific. Their diversity and distribution were extensively studied, and faunas of many regions are relatively well known [e.g. Chace & Bruce, 1993; Müller, 1993; Li, 2000; Bruce, 2003]. According to recent reviews, the caridean fauna of Indo-Malayan region including waters of South China Sea and adjacent coastal areas of Singapore, Malaysia, Thailand, Cambodia, Vietnam, China, Hong Kong, Taiwan, Philippines and Indonesia includes over 170 pontoniine [De Grave, 2001; Bruce, 2003; Li et al., 2004] and three hymenocerid species [Chace & Bruce, 1993]. Vietnam, however, appears to be the least studied region in the area, with only 42 pontoniine species [Kemp, 1922; Bruce, 1993; Britayev & Fakhruddinov, 1994; Bruce & Okuno, 2005; Marin, 2005; 2006a; Marin & Anker, 2005; Marin et al., 2005; Marin & Chan, 2006] and no records of hymenocerid shrimps. Based on extensive collections of Russian-Vietnamese Tropical Centre in Nhatrang Bay, 43 pontoniine and two hymenocerid species new to Vietnamese fauna are reported in this paper.

### **Material and methods**

Shrimp specimens were collected in Nhatrang Bay from the intertidal zone to the depth of 70–80 m during four seasons: September–November 2003, April–September 2004, September–November 2005 and April–October 2006. Intertidal species were collected with suction («yabby») pump from burrows/mounds in sand and mud. Different habitats, including coral reefs, rocky, sandy and muddy bottoms, as well as large marine invertebrates (corals, mollusks, echinoderms etc.), possible hosts of many crustaceans, were observed by SCUBA in the upper sublittoral (1–45 m). Free-living shrimps were

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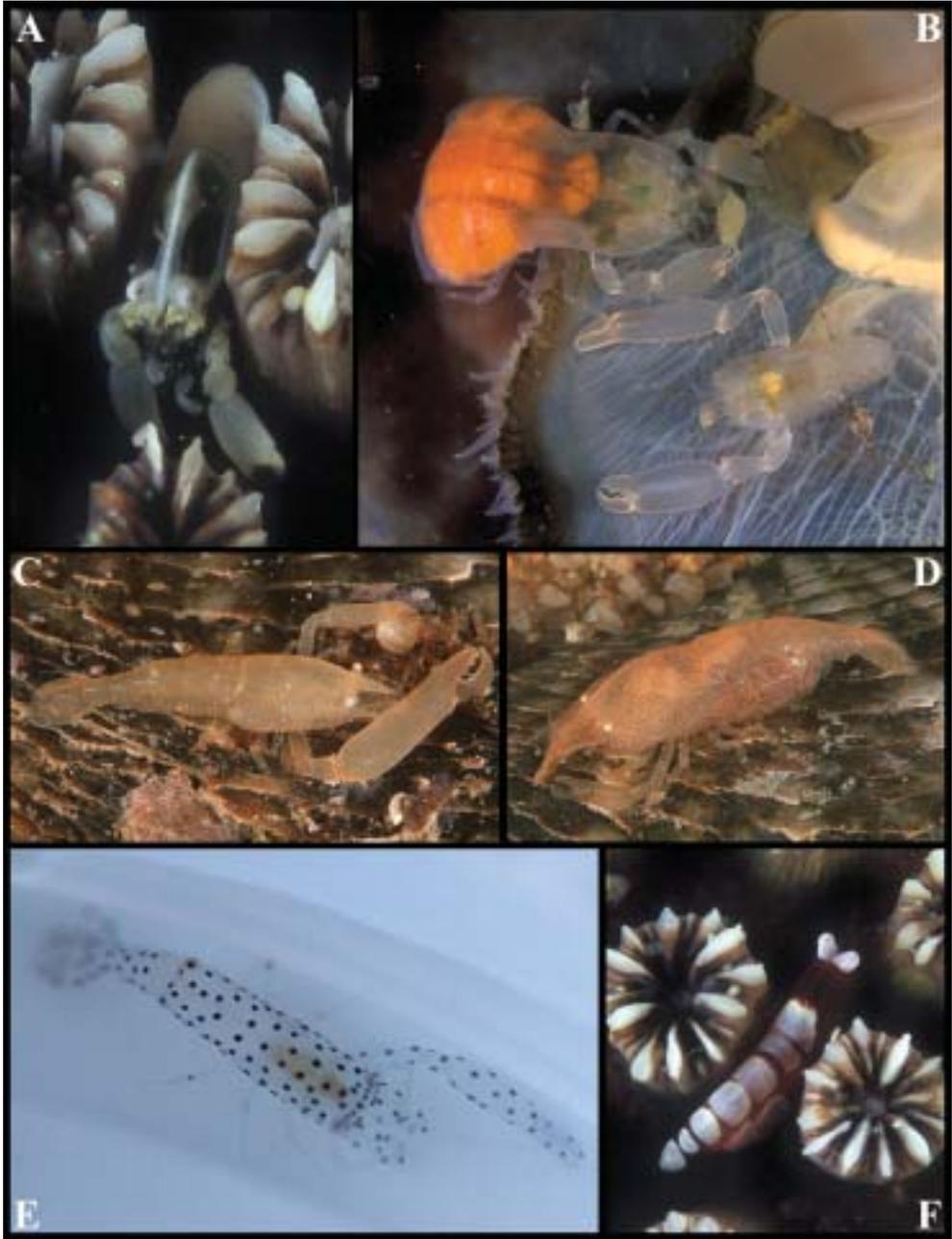


Fig. 83. A — *Anapontonia denticauda* Bruce, 1966, ♀, on *Galaxea astreata*; B — *Chernocaris placunae* Paulson, 1967, ♂♀, inside bivalve *Placuna sella*; *Anchistus custoides* Bruce, 1977: C — ♂; D — ♀; E — *Anchistus miersi* (De Man, 1888), ♂; F — *Brucecaris tenuis* (Bruce, 1969), ♀; G — *Ischnopontonia lophos*, ♀, on coral *Galaxea astreata*.

## CHAPTER 7

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### Corall-associated crabs (Decapoda: Domeciidae, Trapeziidae, Tetraliidae, Xanthidae: Cymoinae) from Nhatrang Bay

I. N. Marin\*, V. A. Spiridonov\*\*

**ABSTRACT.** A collection of brachyuran crabs associated with anthozoans from Nhatrang Bay (southern Vietnam) includes 21 species of trapezoid crabs and 5 species of the genus *Cymo* de Haan, 1833 (Xanthidae). *Palmyria palmyrensis* (Rathbun, 1923), *Tetralia nigrolineata* Serĭne et Dat, 1957, *Tetralia rubridactyla* Garth, 1971, *Tetraloides nigrifrons* (Dana, 1852), *Quadrella maculosa* Alcock, 1898, *Quadrella reticulata* Alcock, 1898, and *Trapezia septata* Dana, 1852 were recorded in Vietnam for the first time, while *Trapezia speciosa* Dana, 1852 and *Cymo tuberculatus* Ortmann, 1893 previously recorded in the area were not found. Observations on coral hosts of all species are provided; 15 species are illustrated with colour photos partly taken in natural habitats. The total number of 21 trapezoid species is among the highest numbers known for restricted areas, i.e. 26 species for both Mollucca Islands and French Polynesia, 21 for Reunion, 19 species for Seychelles, Madagascar, Kenya and Somalia each, and 17 species for New Caledonia. Cluster analysis of the best studied local/regional faunas showed somewhat differing results when applying different measures of similarity, however the Nhatrang fauna always appeared to be most similar to the fauna of the Seychelles and not to «neighboring» faunas of Taiwan and Mollucca Islands. Other cases of closer faunal similarity of distant areas along with lesser similarity of «neighboring» areas indicate the absence of clear faunal subdivisions within the Indo-Pacific fauna of trapezoid crabs. We speculate that the composition and the history of coral communities, morphological characteristics of colonies of particular coral taxa and other environmental conditions determine the composition of local trapezoid crab faunas recruited mostly from the common Indo-Pacific pool of species.

Brachyuran crabs are one of the most diverse taxonomic groups living in coral reef communities. Serĭne [1972] estimated that more than 500 of the 2000 Indo-West-Pacific brachyuran species known by that time live in coral reefs. However, most of the species use coral habitats as shelter and clearly prefer dead corals [Monteforte, 1987; Neumann, Spiridonov, 1999; Spiridonov, Neumann, in press]. Brachyurans occurring as obligate symbionts in live corals are generally limited to a few genera and species of the families Cryptochiridae, Xanthidae *sensu lato* and especially Trapeziidae Miers, 1886 *sensu lato* [Castro, 1976]. The former Trapeziidae *sensu lato* are now regarded as a taxon of the superfamily rank consisting of the families Domeciidae Ortmann, 1894, Tetraliidae Castro, Ng et Ah Yong, 2004 and Trapeziidae [Castro et al., 2004]. They always have been a

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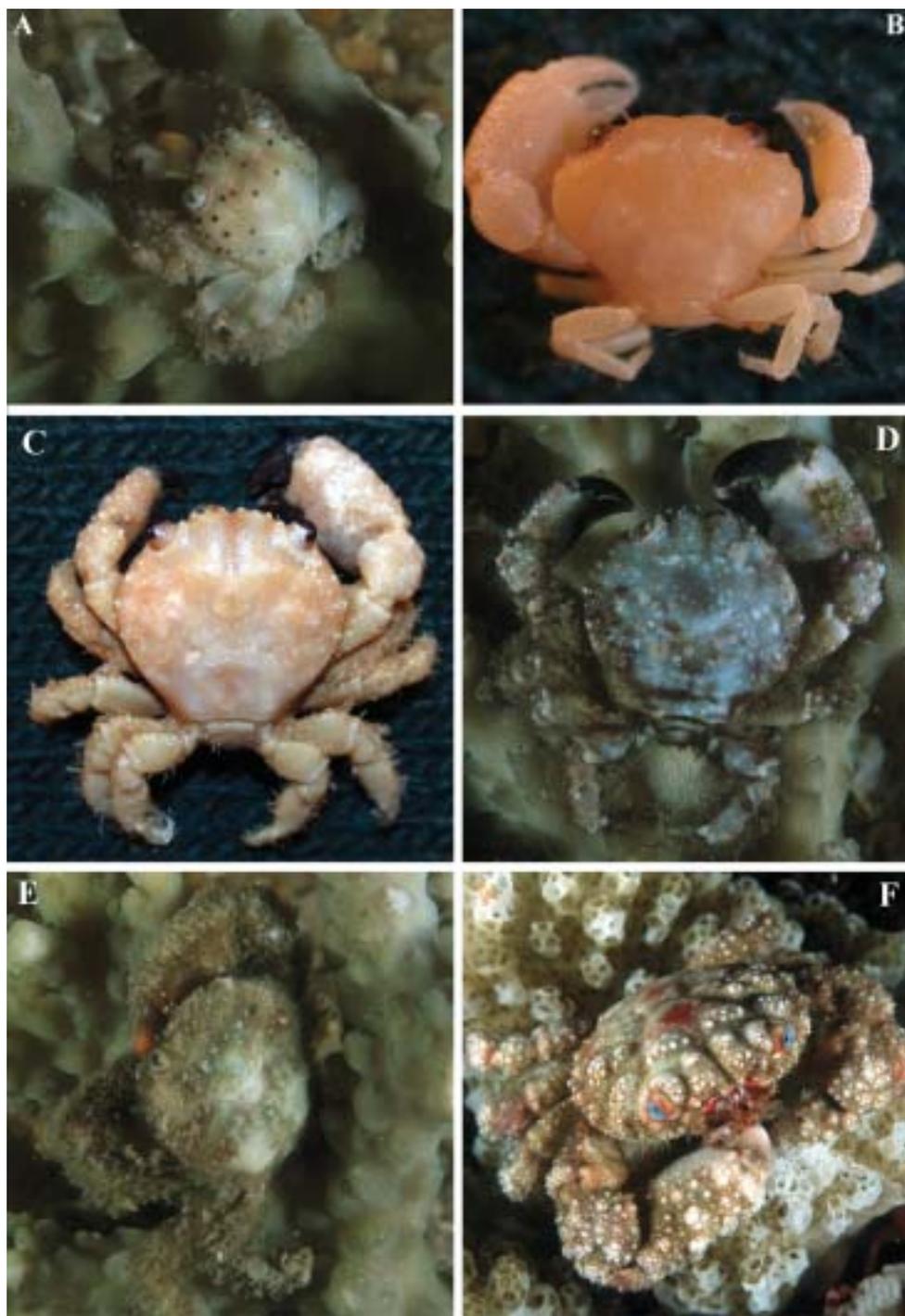


Fig. 100. A — *Domecia hispida* Eydoux et Souleyet, 1842; B — *Jonesius triunguiculatus* (Borradaile, 1902); C — *Cymo anderoussyi* (Audouin, 1826); D — *Cymo melanodactylus* De Haan, 1833; E — *Cymo deplanatus* A. Milne Edwards, 1873; F — *Cymo quadrilobatus* Miers, 1884.

## CHAPTER 8

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### Porifera (Demospongia) of the Nhatrang bay

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**ABSTRACT.** The faunistic study of shallow-water sponges (Demospongia) of the Nhatrang Bay Vietnam was performed. The analysis was based on an independent study and some dates of this region. 89 species belonging to 63 genera, 36 families and 11 orders were identified found on depths down to 40 m. The fauna of Demospongia of the South-China Sea remains poorly studied, with new species still unnamed. Sponges of the Nhatrang Bay are common for tropical water of Pacific and Indian oceans.

The study of the species diversity of marine fauna is the first stage to analyzing ecosystem. Today it is very important for some ecosystems that are exposed by anthropogenic influence and have a threat of disturbance of biological balance.

The study of the quantitative and qualitative distribution of the prevailing groups in marine benthos (sponges in particular) in different biocoenological, physical, chemical and hydrological parts of the seas allows to understand the patterns of distribution of these animals and their penetration into the investigated areas. Furthermore the results of such investigations may serve as a base to the long-term monitoring of bottom ecosystems and prognostication of their possible transformation as a result of an increasing anthropogenic influence and global climate changes. Sponges are sitting bottom animals and therefore are convenient for some biological and ecological investigations.

Species diversity of tropical sponges is very high. In many biocoenoses sponges play a dominant role in biomass. The history of investigation of the Nhatrang Bay benthos is not long (Dawydoff, 1952). The other recent publication (Hooper et al., 2000) deals with the fauna of sponges of the entire South China Sea. Therefore the fauna of sponges is not enough known. This study contain only common in the Nhatrang Bay species of Demospongia that can be found in shallow water and is not full faunistic description of Porifera of Vietnam.

### Materials and methods

The present study was performed on the base of material that was collected in two expeditions of A.N. Severtzov Institute of Ecology and Evolution to Vietnam in 2003 and 2004, and collections deposited in the Institute Oceanography in Nhatrang. Places of collection were shallow water near islands in the Nhatrang Bay. All of species of sponges were collected by divers at depths 2–30 m and fixed by ethanol spirit. The structure of skeleton spicules and fibers was used for species identification.

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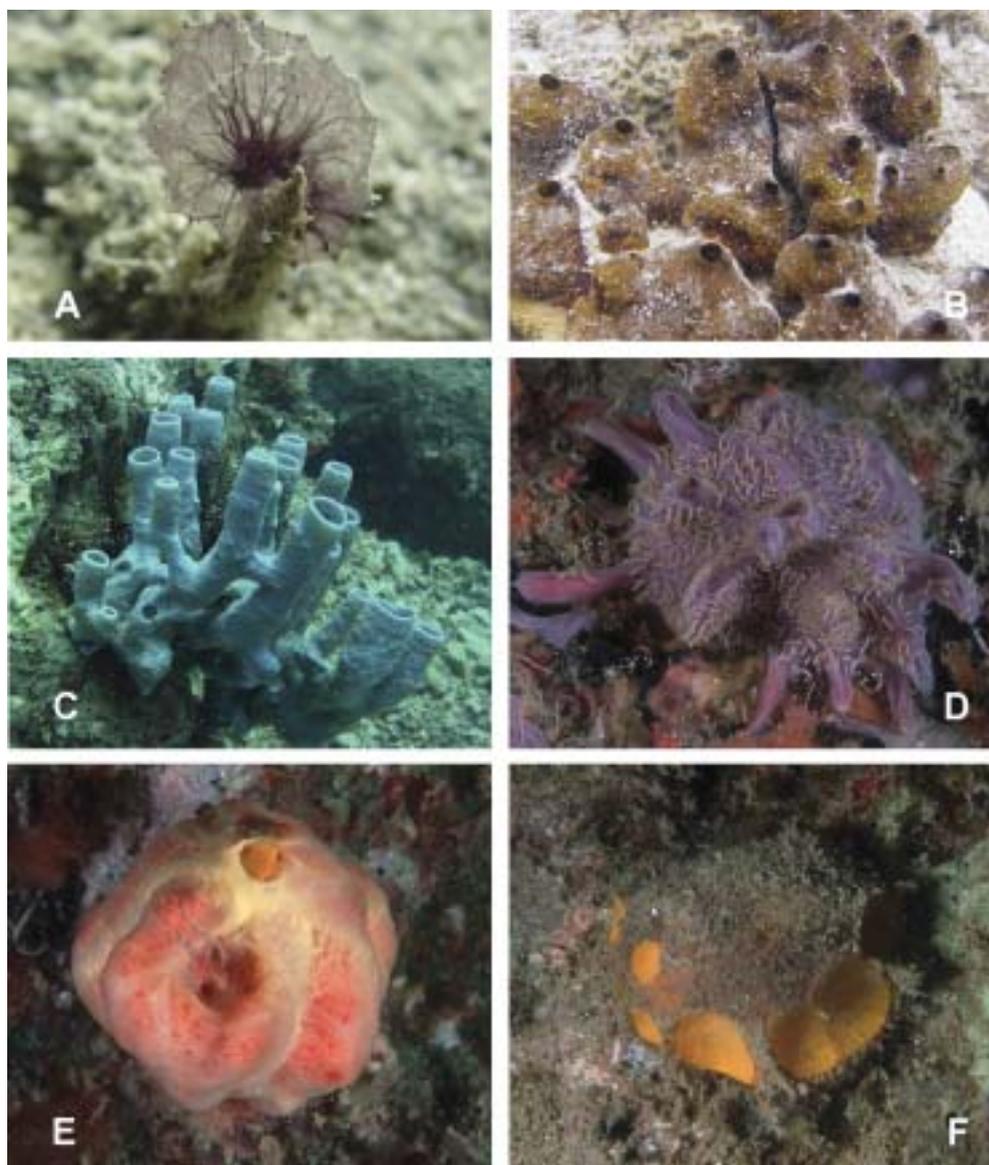


Fig. 103. Sponges of Nhatrang Bay: A — *Oceanapia sagittaria*; B — *Jaspis stellifera*; C — *Niphates olemda*; D — *Chalinula nematifera* with tubos polychaete worm *Polydorella* sp. (Spionidae) on the surface; E — *Monanchora unguiculata*; F — *Cinachyra australiensis*.

Рис. 103. Губки залива Нячанг. А — *Oceanapia sagittaria*; В — *Jaspis stellifera*; С — *Niphates olemda*; D — *Chalinula nematifera* с трубками полихеты *Polydorella* sp. (Spionidae) на поверхности; Е — *Monanchora unguiculata*; F — *Cinachyra australiensis*.