

THÀNH PHẦN SINH VẬT CỘNG SINH TRONG HUỆ BIỂN KHÔNG CUỐNG (CRINOIDEA: COMATULIDA) Ở VỊNH NHA TRANG

E.S. Mekhova

*Viện Sinh thái và Tiến hóa Severtzov,
Viện Hàn lâm Khoa học Nga*

Tóm tắt Thành phần sinh vật cộng sinh trong huệ biển không cuống (Crinoidea: Comatulida) được phân tích trên cơ sở của 90 mẫu vật thuộc 31 loài. Mẫu vật được thu thập trong vịnh Nha Trang (Việt Nam) từ năm 2003 – 2005. Tổng số có 56 loài sinh vật cộng sinh đã được ghi nhận thuộc các nhóm giun nhiều tơ Polychaeta - 2 loài, giun Myzostomida – 29 loài, giáp xác mười chân Decapoda – 18 loài, chân bụng Gastropoda – 4 loài, đuôi rắn Ophiuroidea – 1 loài và cá – 1 loài. Tất cả huệ biển có cuống đều có các loài sinh vật cộng sinh sống trong đó. Số lượng loài sinh vật cộng sinh dao động từ 1 – 8 loài/vật chủ. Phần lớn các loài sinh vật cộng sinh được ghi nhận có đời sống gắn chặt với huệ biển có cuống, ngoại trừ loài giun *Hololepidella cf. laingensis* sống trong đuôi rắn.

Mặc dù 100 % huệ biển có cuống đều có sự hiện diện của sinh vật cộng sinh nhưng có sự khác nhau giữa các nhóm. Phổ biến nhất là giun nhiều tơ (chiếm 72 %), tiếp đến là giáp xác mười chân (60 %), giun Myzostomida (53 %), đuôi rắn (22 %) và chân bụng (5 %). Nhóm cá chỉ hiện diện 1 % số lượng vật chủ. Số lượng sinh vật cộng sinh cao nhất lên đến 42 con/vật chủ. Chỉ số này khác nhau giữa các nhóm sinh vật cộng sinh, trong đó giun nhiều tơ có đến 35 con/vật chủ, giun nhiều tơ (33 con/vật chủ), giáp xác mười chân (21 con/vật chủ), chân bụng (4 con/vật chủ) và cá (5 con/vật chủ). Phần lớn các loài sinh vật cộng sinh được ghi nhận đều là những loài mới cho Việt Nam. So sánh kết quả của nghiên cứu này với những nghiên cứu trước đây trong vùng Ấn Độ – Thái Bình Dương cho thấy vùng biển ven bờ Việt Nam khá đa dạng về thành phần giống loài sinh vật cộng sinh.

SYMBIONTS OF UNSTALKED CRINOIDS (CRINOIDEA: COMATULIDA) IN NHA TRANG BAY

E. S. Mekhova

*A. N. Severtzov Institute of Ecology and Evolution
Russian Academy of Sciences, Russia*

Abstract Symbiotic fauna associated with unstalked crinoids (Crinoidea: Comatulida) was studied based on 90 specimens of crinoids belonging to 31 species. Material was collected in the Nhatrang Bay (Vietnam) in the period from 2003 to 2005. Fifty six species of symbionts belonging to: Polychaeta – 2 species, Myzostomida – 29 species, Decapoda – 18

species, Gastropoda - 4 species, Ophiuroidea - 1 species, and Pisces - 1 species were found. All the studied crinoids were infested by several species of symbiotic animals. Number of symbiotic species per host varied from 1 to 8. Most of the examined symbiotic species were obligatory associated with crinoids. The unique exception was polychaete *Hololepidella* cf. *laingensis* recorded earlier on brittle stars.

The infestation prevalence was 100%, however it was different for each group of symbionts. Maximum prevalence was recorded for polychaetes (72%), then followed by decapods (60%), myzostomids (53%), brittle stars (22%), and gastropods (5%). Pisces infected only 1% of hosts. The intensity reached up to 42 individuals of symbionts per host. The maximum meaning of this index was different for each group of symbionts and reached 35 specimens per host in polychaetes, 33 specimens per host in myzostomids, 21 specimens in decapods, 4 specimen in gastropods, 5 specimens in fish. The abundance varied from 1 individual per host (for brittle stars) to 6 per host (for myzostomids). Most species of symbionts were new records for coastal waters of Vietnam. Comparison of present data with previous publications on the diversity of species associated with crinoids in other regions of Indo-Pacific demonstrates very high level of biodiversity in the coastal waters of Vietnam.

I. INTRODUCTION

Feather stars (Crinoidea, Comatulida) are large and slow-moving organisms with complicated branchy structure. Thanks to the factors many different species of animal can live on the sea lilies. In our time fauna of feather stars symbionts was examined on the Great Barrier Reef (Potts, 1915; Clark, 1921), the bay of Bengal (Rao & Sowbhagyavati, 1972), Red Sea (Fishelson, 1974), Marshall Islands and Maldives (Zmarzly, 1984). Also there is studies of single groups of symbionts same as myzostomids (Eekhaut *et al.*, 1998, Grigier, 1989, Grigier, 1992) and decapods (Bruce, 1980, 1982). However there is little information of symbionts complex as a whole. Also for the beach of Vietnam there is little works about fauna sea lilies and single species of symbiotic organisms. In this connection object of this article is description of composition of feather stars symbiotic fauna.

II. MATERIALS AND METHODS

Ninety specimens of 31 crinoid species were collected in the Mot, Mun, Tre, and Noc islands, Nha Trang Bay (Khanh Hoa, Viet Nam) in 2003 - 2005 using scuba diving equipment. Each crinoid was put in separated pack under water and transported to the surface. Crinoids were fixed in 70% ethanol.

III. RESULTS AND DISCUSSION

Thirty-one species of unstalked crinoids and fifty-six species of their symbionts were found. Symbionts belonging to the Polychaeta – 2 species, Myzostomida – 29 species, Decapoda – 18 species, Gastropoda - 4 species, Ophiuroidea - 1 species, and Pisces - 1 species (Table 1). Almost all examined crinoids were infested by symbionts. Number of individual symbionts per host varied from 1 to 42. Maximum species of symbionts per host was 8. Polychaetes and myzostomids were mostly found in higher number per host but the highest species number per host was belonging to decapod.

Table 1. List of symbiont species of crinoids in Nha Trang Bay

Symbiont Taxa		Symbiont Taxa	
Class Polychaeta		Family Palaemonidae	
Family Polynoidae		30	<i>Palaemonella pottsii</i> (Borradaile, 1915)
1	<i>Paradite crinoidicola</i> (Potts, 1910)	31	<i>Palaemonella pottsii</i> (Borradaile, 1915)
2	<i>Hololepidella cf laingensis</i> Britayev et al., 1997	32	<i>Palaemonella rotumana</i>
Class Myzostomida		33	<i>Periclimenes attenuatus</i> Bruce, 1971
Family Myzostomatidae		34	<i>Periclimenes tenuis</i> Bruce, 1969
3	<i>Myzostoma abundans</i> Graff, 1884	35	<i>Periclimenes comensalis</i> Borradaile, 1915
4	<i>Myzostoma agassizii</i> Graff, 1884	36	<i>Pontoniopsis comanthi</i> Borradaile, 1915
5	<i>Myzostoma alatum</i> Graff, 1884	37	<i>Parapontonia nudirostris</i> Bruce, 1968
6	<i>Myzostoma albigum</i>	Family Alpheidae	
7	<i>Myzostoma antenatum</i> Graff, 1884	38	<i>Synalpheus stimpsoni</i> (De Man, 1888)
8	<i>Myzostoma areolatum</i> Graff, 1884	39	<i>S. tropidodactylus</i> Banner & Banner, 1975
9	<i>Myzostoma attenuatum</i>	40	<i>Synalpheus tijoii</i>
10	<i>Myzostoma brevicirrum</i> Graff, 1884	41	<i>Synalpheus demani</i> Borradaile, 1900
11	<i>Myzostoma capitocutis</i>	42	<i>Athanas</i> sp.
12	<i>Myzostoma carinatum</i> Graff, 1884	Family Stenopodidae	
13	<i>Myzostoma compressum</i> Graff, 1884	43	<i>Odontozona</i> sp.
14	<i>Myzostoma coronatum</i> Graff, 1884	Family Galatheidae	
15	<i>Myzostoma fissum</i> Graff, 1884	44	<i>Allogalathea elagans</i>
16	<i>Myzostoma irregulare</i> Graff, 1884	45	<i>Galathea cf. inflata</i>
17	<i>Myzostoma lobatum</i> Graff, 1884	46	<i>Galathea</i> sp.
18	<i>Myzostoma marginatum</i> Graff, 1884	Family Eumedonidae	
19	<i>Myzostoma pulvinar</i> Graff, 1884	47	<i>Harrovia elegans</i>
20	<i>Myzostoma radiatum</i> Graff, 1884	Class Gastropoda	
21	<i>Myzostoma rubro-fasciatum</i> Graff, 1884	Family Eulimidae	
22	<i>Myzostoma testudo</i> Graff, 1884	48	<i>Goodingia</i> sp.
23	<i>Myzostoma vastum</i> Graff, 1884	49	<i>Fusceulima</i> sp.
24	<i>Myzostoma</i> sp.1	50	<i>Annulobalcis</i> sp.
25	<i>Myzostoma</i> sp.2	51	<i>Vitreolina</i> sp.
26	<i>Myzostoma</i> sp.3	Class Ophiuroidea	
27	<i>Myzostoma</i> sp.4	Family Ophiotrichidae	
28	<i>Myzostoma</i> sp.5	52	<i>Gymnolophus obscura</i> (Ljungman, 1867)
29	<i>Myzostoma</i> sp.6	Class Pisces	
Class Crustacea		53	<i>Discotrema lineata</i>
Order Decapoda			

Class Polychaeta

Two species of polychaetes belonging to family Polynoidae was found, *Paradite crinoidicola* and *Hololepidella* cf. *laingensis*. The most frequent species was *Paradite crinoidicola*, found in 72% of examined hosts. In average, 3 individuals of these polychaetes per host were found (ranged from 1 to 35 individuals per host). These polychaetes inhabited on the calyx of host, but they can move from all surface of host body. This species was found on the all species of hosts. Other species of polychaetes was *Hololepidella* cf. *laingensis*, found in 5% of host with an average of 3 individuals per host (1-5 individuals per host). This polychaete inhabited in the arms of the hosts, but can move from all hosts surface too.

Class Myzostomida

There were 29 species belonging to class Myzostomida. There was often found one individual for each species in one host. Species with higher abundant were *Myzostoma antennatum* (65 individuals), *Myzostoma fissum* (45 individuals), *Myzostoma irregulare* (40 individuals), and *Myzostoma vastum* (32 individuals). Myzostomids were found in 53% of examined hosts. Average number of individuals per host was 6, ranged from 1 to 33. The more frequently found myzostomids were associated with several hosts. However, there was most preferably host species for certain symbiotic species, e.g. *Myzostoma antennatum* most prefer host was *Oxycomanthus bennetti* (33 individuals), *Myzostoma fissum* - *Stephanometra echinus* (19 individuals), *Myzostoma irregulare* - *Comanthus parvicirrus* (26 individuals), and *Myzostoma vastum* - *Comatella stelligera* (28 individuals). Location of myzostomids on the hosts do not fixed.

Class Crustacea

Order Decapoda

There were 18 decapod species found including 14 species of shrimps in 3 families; 3 species of galatheids and 1 species of cancers. Decapods lived in 60% of examined hosts with an average of 5 individuals per host (1-21 individuals).but for each other species was shown 2 individual per host on average. Decapod species found in high frequency were *Harrovia elegans* (29 individuals), *Allogalatea elagans* (71 individuals), *Periclimenes comensalis* (39 individuals), and *Pontoniopsis comanthi* (37 individuals). Most rarely species were *Synalpheus tijoii* (1 individual), *Parapontonia nudirostris*, *Periclimenes tenuis*, *Athanas parvus*, and *Odontozona* sp. (2 individuals on

each species). There were ca. 10 Checklist of hosts for most numbering species consist of more that 10 species. It was possible to determine prevalent host for few species e.g. *Allogalatea elagans* prefer host was *Himerometra magnipinna*; *Periclimenes comensalis* - *Comaster nobilis*, *Pontoniopsis comanthi* - *Comanthus alternans*, and *Harrovia elegans* - *Phanogenia multifidus*.

Location of symbionts on the host body was varied from one another. Shrimps inhabited arms of the host, but galatheids and cancers inhabited on the host calyx. Most species of decapods live on a host as a couple.

Class Gastropoda

Gastropods were presented 4 species, *Goodingia*, *Fusceulima*, *Annulobalcis* and *Vitreolina*, belonging to family Eulimidae. They found on 5% of hosts. Maximum 4 individuals per host and minimum 1 individual per host were found. All species was found only one time.

Location of gastropods on the host body was different. *Goodingia* was found on the arms of the host, other species found on the aboral side of the calyx.

Class Ophiuroidea

There was only one ophiuroid species found - *Gymnolophus obscura*, in 22% of hosts. It was only one individual found per any host. Ophiuroid lived on oral side of the host calyx. There were 11 host species but the most preferred host was sea lilies belonging to the family Comasteridae. All species, which was found, was obligatory associated with the crinoids except *Hololepidella laingensis*. But checklists of hosts for number species of symbionts consist of more that one species. However, it is possible to determine most preferred host species. Number of individual symbionts per host varied for different groups. Polychaetes and myzostomids were found several individuals on one host, most species of decapods live as a couple per host, and there was only one ophiuroid per host found. There were often different symbiotic groups lived together on the same host. Most species of symbionts were first time recorded for coastal waters of Vietnam. The comparison of our data with published information on diversity of species associated with crinoids in other regions of Indo-Pacific demonstrates very high level of biodiversity in coastal waters of Vietnam.

REFERENCES

- Bruce A.J., 1980. *Periclimenes carinidactylus* Bruce, a crinoid-associated Pontoniine shrimp, from South Australia. *Crustaceana*. 38(3): 295 – 305.
- Bruce A.J., 1982. The shrimps associated with Indo-West Pacific echinoderms, with the description of a new species in the genus *Periclimenes* Costa, 1844 (Crustacea: Pontoniinae). *Australian Museum Memoir* 16: 191-216.
- Clark A.H., 1921. Monograph of the existing Crinoids: Part 2. *Bulletin United States National Museum* 82(1).
- Eekhaut I., M. J. Grygier, D. Dehen, 1998. Myzostomes from Papua New Guinea, with related Indo-West Pacific distribution records and description of five species. *Bulletin of Marine Science* 62(3): 841-886.
- Fishelson L. Ecology of Red Sea crinoids and their epi- and endozoic fauna. *Marine Biology* 28(2):183-192.
- Grygier M. J., 1989. Three new species of *Myzostoma* (Myzostomida). *Proceedings of the biological society of Washington* 102(3): 793 - 804.
- Grygier M.J., 1992. Hong Kong Myzostomida and their Indo-Pacific distributions/ The marine flora and fauna of Hong Kong and southern China III (ed. Morton). *Proceedings of the Forth International Marine Biological Workshop: The Marine Flora and Fauna of Hong Kong and Southern China, Hong Kong, 11-29 April 1989. Hong Kong: Hong Kong University Press. p.131-147.*
- Potts, 1905. The fauna associated with the crinoids of a tropical coral reef: with especial reference to its colour variations. *Papers from the Department of Marine Biology*. P.71-96.
- Rao K. H., R. Sowbhagyavathi, 1972. Observations on the associates of crinoids at Waltair coast with special reference to Myzostomes. *Proceedings of the Indian National Science Academy*. 38B: 360-366.
- Zmarzly D.L., 1984. Distribution and ecology of shallow-water crinoids at Enewetak Atoll, Marshall Islands, with an annotated checklist of their symbionts. *Pacific Science*. 38(2): 105-122.