

**SPECIES DESCRIPTION AND SHELL MORPHOMETRY OF ABALONES
HALIOTIS OVINA GMELIN, 1791 AND *HALIOTIS VARIA* LINNÉ, 1758 IN
CAM RANH BAY, SOUTH CENTRAL VIETNAM**

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ABSTRACT

Haliotis ovina Gmelin, 1791 and *Haliotis varia*, Linné, 1758 are described from Cam Ranh Bay, South Central Vietnam. *H. ovina* had 4-7 open respiratory pores, mainly 4-5 were open. *H. varia* had 4-6 open respiratory pores, mainly 4-5 were open. Morphometrics of abalones from the Western Pacific are compared with Vietnamese material.

INTRODUCTION

There are about 100 species of abalone (Gastropoda: Archaeogastropoda) distributed throughout the world's oceans. Among them 10 species have an economic value. The abalones *Haliotis ovina* Gmelin, 1791 and *Haliotis varia* Linné, 1758 are common in Cam Ranh Bay, South Central Vietnam. They are an important food source for local people. They are also exported to Hong Kong and Taiwan.

This paper is part of a series of studies on Vietnamese abalones. Here I present shell morphometry of *H. ovina* and *H. varia*.

MATERIALS AND METHODS

The animals were collected monthly during two years from January 1997 to December 1998. A total of 1842 specimens of the two species were collected.

Taxonomy and terminology of the species are based on Cernohorsky (1972), Nguyen (1980), Natewathana & Hylleberg (1986),

Springsteen (1986), Tran & Ta (1992), and Nguyen & Le (1996).

After being removed from the rocky surfaces, abalones were immediately fixed in 10% formalin. Length, width, height, and inner lip were measured with Batty sliding callipers to the nearest 0.1 mm according to the method of Ino (1952).

RESULTS

The results of this investigation are in accordance with previous studies showing that there are two species of abalone in Cam Ranh Bay:

Haliotis ovina Gmelin, 1791

Description. - Shell medium in size, ovate, 21.0-86.0 mm in length. Spire subcentral and moderately elevated. Shell surface extremely tubercular with a strongly elevated row of holes, the last 4 to 7 are open, mainly the last 5 holes. External shell colour olive-green, ornamented with white or creamy-yellow radiating streaks. Interior shell silver.

Measurements. - A total of 1170 *H. ovina* were measured. The ratio of width to length was 76.0%, height to length 21.0%, and inner lip to width 19.5% (Table 1).

Respiratory pores. - *H. ovina* from Cam Ranh Bay had 4-7 open respiratory pores, mainly 5 pores. Individuals with 4 pores constituted 34.1%, 5 pores 52.9%, 6 pores 11.1%, and 7 pores 1.7% (Fig. 1).

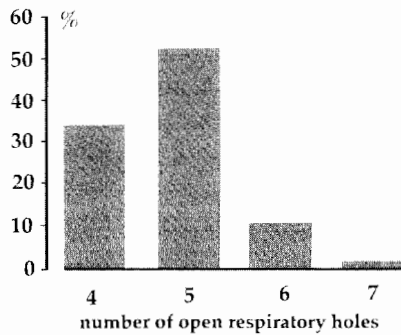


Figure 1. Occurrence of respiratory pores (%) in *H. ovina*.

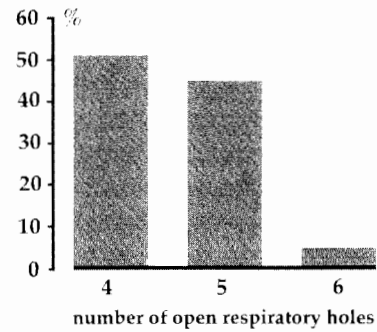


Figure 2. Occurrence of respiratory pores (%) in *H. varia*.

Table 1. Morphometrics of *H. ovina* and *H. varia* in Cam Ranh Bay, South Central Vietnam. W = width of shell. L = length of shell. H = height of shell. I = inner lip.

Species	N	Morphometrics					
		W/L x 100		H/L x 100		I/W x 100	
		Mean	S.D	Mean	S.D	Mean	S.D
<i>H. ovina</i>	1170	76.0	2.0	21.0	1.5	19.5	1.3
<i>H. varia</i>	672	67.5	1.1	23.0	1.6	17.4	1.0

Table 2. Morphometrics of *Haliotis discus hannai* and *Haliotis kamtschatkana*. W = width of shell. L = length of shell. H = height of shell. I = inner lip

Species	Length mm	N	Morphometrics				
			W/L x 100		H/L x 100		I/W x 100
			Mean	S.D	Mean	S.D	
<i>H. discus hannai</i>	50-60	57	70.0	2.1	26.5	4.8	8.2
	70-80	221	67.4	2.1	24.9	0.1	8.5
<i>H. kamtschatkana</i>	30-40	5	71.2	-	26.8	-	9.0
	50-60	13	69.2	1.8	27.3	1.7	8.9
	70-80	15	69.3	1.8	28.4	1.9	8.4

Haliotis varia Linné, 1758

Description. - Shell medium in size, 22.6 - 61 mm in length. Spire depressed. Shell surface with an elevated and tubular row of holes, the last 4 to 6 are open, mainly the last 4 holes. External shell colour reddish-brown, striped with green. The interior of the shell was nacreous.

Measurements. - A total of 672 *H. varia* were measured. The ratio of width to length was 67.5%, height to length 23.6%, and inner lip to width 17.4% (Table 1).

Respiratory pores. - *H. varia* from Cam Ranh Bay had 4-6, mainly 4 open respiratory pores. Individuals with 4 pores constituted 50.8%, 5 pores 44.7%, and 6 pores 4.3% (Fig.2).

DISCUSSION

The number of open respiratory pores is one of the criteria for determining abalone species (Cox 1962; Springsteen 1986; Cernohorsky 1972) The results of the present study agree generally with Springsteen (1986) indicating that *Haliotis ovina* and *H. varia* have 4-6 open respiratory pores. However, the number of open holes may reach 7 in *H. ovina*.

Morphometric data on the larger species *Haliotis discus hannai* from Japan and *Haliotis kamtschatkana* from Canada (Ino 1952) show that the width:length and the height:length ratios are slightly different, or overlapping, with the two Vietnamese species. However, the inner lip:width ratios are markedly different and separate the Vietnamese species from the Japanese and Canadian species (Table 2).

REFERENCES

- Cernohorsky, W.O. 1972. Marine Shells of the Pacific. Vol. II. Pacific Publications, Sydney. 415 pp.
- Cox, K. 1962. California abalones, family Haliotidae. - California. Dept. Fish and Game. - Fish. Bull 118: 1-133.
- Ino, T. 1952. Biological studies on the propagation of Japanese abalone (Genus *Haliotis*). - Bulletin of Tokai Fisheries Research Laboratory, No. 5: 1-102.
- Nateewathana, A. and J. Hylleberg. 1986. Thai species of abalone (*Haliotis* spp.) is aquaculture feasible? - Thai Fisheries Gazette, 29 (2): 117-192.
- Nguyen, C. 1980. Some valuable Molluscs in the coastal waters of Vietnam. - Collection of Marine Research Works, Vol. II (1): 153-173.
- Nguyen, V. C. & D. M. Le. 1996. Study on reproductive biology and culture of haliotids in Khanh Hoa Province. - The Scientific Report of Nha Trang Institute of Oceanography, 53 pp. (in Vietnamese).
- Springsteen, F. J. et al., 1986. Shells of the Philippines. Carfel Shell Museum, Manila, 377 pp.
- Tran, D.N. & M.D. Ta. 1992. Red Book of Vietnam: - Animal: 353-355.