STRUCTURE OF THE CAPSULE GLAND OF *CHICOREUS CAPUCINUS* (LAMARCK, 1822) AND *CHICOREUS RAMOSUS* (LINNAEUS, 1758)

Charatsee Aungtonya
Phuket Marine Biological Center, P.O. Box 60, Phuket 83000, Thailand

ABSTRACT

A histological study was carried out on the capsule gland of two muricid species, *Chicoreus capucinus* and *C. ramosus* during their spawning period. The glandular areas, right lobe, and ventral channel were examined, but only the ventral channel can separate the two species. The ventral channel is simple in *C. capucinus* and looped in *C. ramosus*.

INTRODUCTION

The reproductive characters of muricids are known to have diagnostic value in separating species (Thorson 1940; Knudsen 1950; D'Asaro 1986, 1988, 1991; Middelfart 1992a, 1993, 1996). The morphology of bursa copulatrix, albumen gland, penis, and penial vas deferens have been used for cladistic analysis among members of muricids (Kool 1993), but little is known about the structure of the capsule gland which occupies most of the right part of the mantle (Fretter 1941; Middelfart 1992b, c). It is divided into right and left glandular lobes which consist of a variety of lobes and folds (Fretter 1941). In the stenoglossan Prosobranchia the capsule gland play an essential part in encapsulation of the egg capsule (Fretter 1941; Middelfart 1993). Fretter (1941) was the first to describe the structure of capsule glands in two species of Muricidae; *Ocenebra erinacea* L., 1758 and *Nucella lapillus* L., 1758.

This study aims at describing the glandular areas, structure of the right lobe, and structure of the ventral channel of *Chicoreus capucinus* and *C. ramosus*. These features are compared with a view to investigate their diagnostic value in muricids.

MATERIALS AND METHODS

I collected *Chicoreus capucinus* from the mangrove of Nam-Bor Bay during the spawning period in June 1995. Specimens of *Chicoreus ramosus* were collected by seagypsies from the west coast of Thailand (the Andaman Sea) in November 1993. The capsule glands (3.20-5.15 mm width) of 20 female *C. capucinus*, and the glands (12.40-14.05 mm width) of 5 female *C. ramosus* were removed and fixed in 10 % formalin. Colour and texture of fresh capsule glands were recorded in *C. capucinus*, only. A histological study of these glands was conducted at the Life History Laboratory, Coastal Aquaculture Division. The proximal 5 mm of gland tissues were embedded in paraffin, sectioned transversally at 8 µm, stained with Mayer's haematoxylin and eosin Y, and examined under stereo- and compound microscopes.

RESULTS

As the gonad ripened during the spawning period, the gland of *C. capucinus* became enlarged. Externally the gland appeared as a white opaque mass.

Of the total material of *C. capucinus*, 14 specimens had three glandular areas (Fig. 1, a), while 6 specimens had only two glandular areas (Fig. 2, a). In *C. ramosus* three glandular areas were observed in all samples but the anteroventral gland was placed on the right lobe (Fig. 2, c).

In 10 specimens of *C. capucinus*, the right lobe of the capsule gland was divided by the anteroventral lobe (Fig. 1, a, b) while that in *C. ramosus* was not subdivided.

The ventral channels of *C. capucinus* and *C. ramosus* develop between the longitudinal

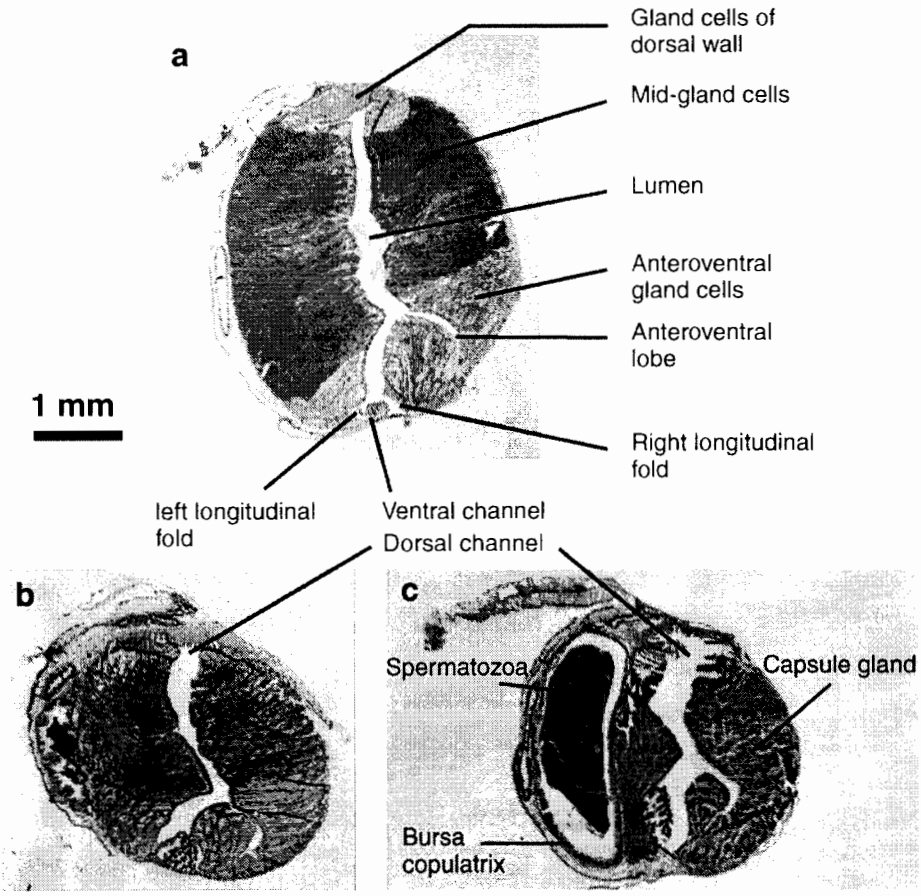

Figure 1. Series of transverse sections to the anterior border of the capsule gland of *C. capucinus*. (a) Anteroventral lobe placed on the right lobe. (b) Dorsal slit. (c) The capsule gland greatly reduced in size. A mass of spermatozoa occupy the lumen of bursa copulatrix.

folds (Fig. 2, b, c). It is a consequential formation as the left longitudinal fold extends straight into the lumen of the capsule gland. The left longitudinal fold in *C. capucinus* separates the ventral channel from the lumen of the capsule gland and a dorsal wall is formed. The ventral channel is simple. The left ventral longitudinal fold in *C. ramosus* bends backward when it reaches the right longitudinal fold, and thus thus appears as a looped channel. It is much more developed than that of *C. capucinus*.

The ventral epithelia of the channels of both species rest upon a smooth muscle layer. The channels are ciliated throughout. The lumen was lined with a columnar ciliated epithelium. In both species the widths of lumen correspond to the size of eggs in the egg capsules. The widths (measured at the middle of the lumen) of the capsule gland of *C. capucinus* and *C. ramosus* ranged from 170-200 mm and 270-520 mm respectively. The reported egg diameters of *C. capucinus* and *C. ramosus* were 183±8 mm (Middelfart 1996) and 270-540 mm (Bussarawit & Ruangchua 1991) respectively.

DISCUSSION

The main characters in the genus *Chicoreus* are extremely variable and make classification difficult (Houart 1992; Middelfart 1993). *Chicoreus capucinus* was previously as-

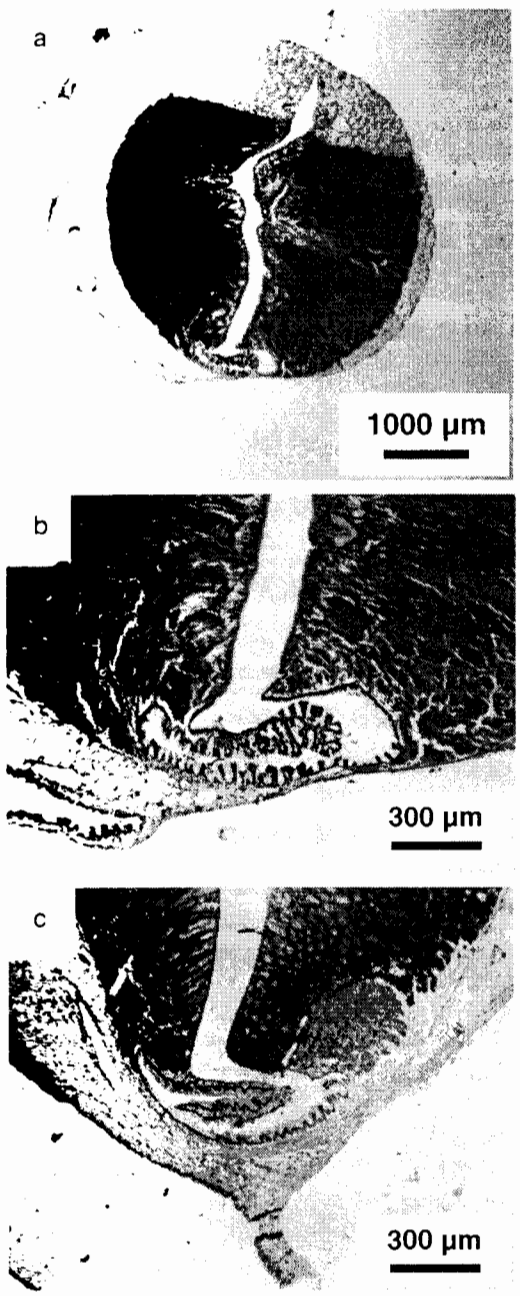

Figure 2. Transverse sections through the mid region of the capsule gland. (a) *C. capucinus*. Glandular areas are indicate. (b) *C. capucinus*. Mass of spermatozoa attached to epithelium of the ventral channel. (c) - *C. ramosus*. The right lobe is not subdivided and anteroventral gland cells are placed on the right lobe.

signed in the genus *Naquetia* (Vokes 1964; Radwin & D'Attilio 1976), but is now placed in the genus *Chicoreus* (subgenus *Rhizoporimurex* Houart, 1992). *Chicoreus ramosus* is placed in the subgenus *Chicoreus* (Houart 1992).

Among the features of the capsule gland, I found that the ventral channel is the only diagnostic feature. It is a simple channel in *C. capucinus* and looped in *C. ramosus*.

Comparison of the ventral channel between the two *Chicoreus* species and the two muricids, *Nucella lapillus* and *Ocenebra erinacea* (illustrated by Fretter 1941), reveals that the channel of the two *Chicoreus* species are more similar to *N. lapillus* than to that of *O. erinacea*.

The ventral channel in *N. lapillus* develops between the longitudinal folds, and is quite similar to that of *C. ramosus*. The left longitudinal fold is more developed than the right one, over which it bends. The ventral channel of *N. lapillus* seems to be completely separated from the lumen of the capsule gland.

In *O. erinacea* the ventral channel is subdivided into two regions by a third longitudinal fold of tissue (accessory longitudinal fold), which is placed between the longitudinal folds. The channel lies beneath the left longitudinal fold, and appears as a looped channel between the left longitudinal fold and an accessory longitudinal fold. It is a simple channel between the accessory longitudinal fold and the right longitudinal fold.

It is concluded that the four species of muricids can be distinguished by the structure of the ventral channel. Study on this structure among the muricids is therefore of interest. It might be useful as an additional character in phylogenetic analysis of the family.

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