Review

HOW WELL-KNOWN IS THE CEPHALASPIDEAN FAUNA (MOLLUSCA: OPISTHOBRANCHIA) IN THE INDO-PACIFIC REGION?

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ABSTRACT

The gastropod group Cephalaspidea contains about 700 recent species worldwide. The status of the research on the group, indicated as the number of described species, in the tropical Indo-Pacific region is compared with other areas. The number of species are 118 in the Indo-Pacific, 168 in Japan, and 58 in Europe. The figures reflect the fact that much work remains to be done, and that numerous species still have to be described in this region.

INTRODUCTION

The gastropod group Cephalaspidea (Opisthobranchia) has a worldwide distribution. It contains about 700 recent species. However, the group is little studied compared with many other gastropods. The status of the research on the group, indicated as the number of described species in the Indo-Pacific region, is compared with other areas.

MATERIAL AND METHODS

The accumulated number of species of cephalaspideans described since 1758 were plotted for three areas, Europe (58 spp.), Japan (168 spp.) and the Indo-Pacific (118 spp.), based on data from Goto & Poppe (1996).

RESULTS AND DISCUSSION

Fig. 1. shows that most species from Europe were described between 1758 and 1900. Those described after 1900 are mainly small species seldom collected. Thus, we probably know the cephalaspidean fauna in European waters comparatively well.

The border of Japan was closed until the 1850's, so very little information leaked out from this area until then. This is why no species were described there during the first almost hundred years. However, Japanese scientists became very active soon after that, and numerous species were described, mainly by a few persons. T. Habe has from 1946 and until now described 49 species, and A. Adams described 46 species in the 1850-60's. The work of those two scientists is reflected as a steeper slope of the graph during these periods.

The graph covering the Indo-Pacific region includes species from the Red Sea, Indian Ocean and all the tropical Pacific Ocean except Japan and the Americas. The tropical Indo-Pacific region has probably the highest biodiversity of marine molluscs in the world (Kilburn 1997). Gosliner & Draheim (1996) reported 3,400 opisthobranch species (including more than 1,000 undescribed species) from the Indo-Pacific. They also report that 52 % of the collected opisthobranch species (646 spp.) from Papua New Guinean waters were undescribed. Most of the species (22 spp.) from the Indo-Pacific region described after the second world war, has been described by a single person, T. Habe. I therefore do not believe that my graph gives a true description of the distribution of species, but reflects the fact that much work remain to be done, and that numerous species still have to be described in this region.

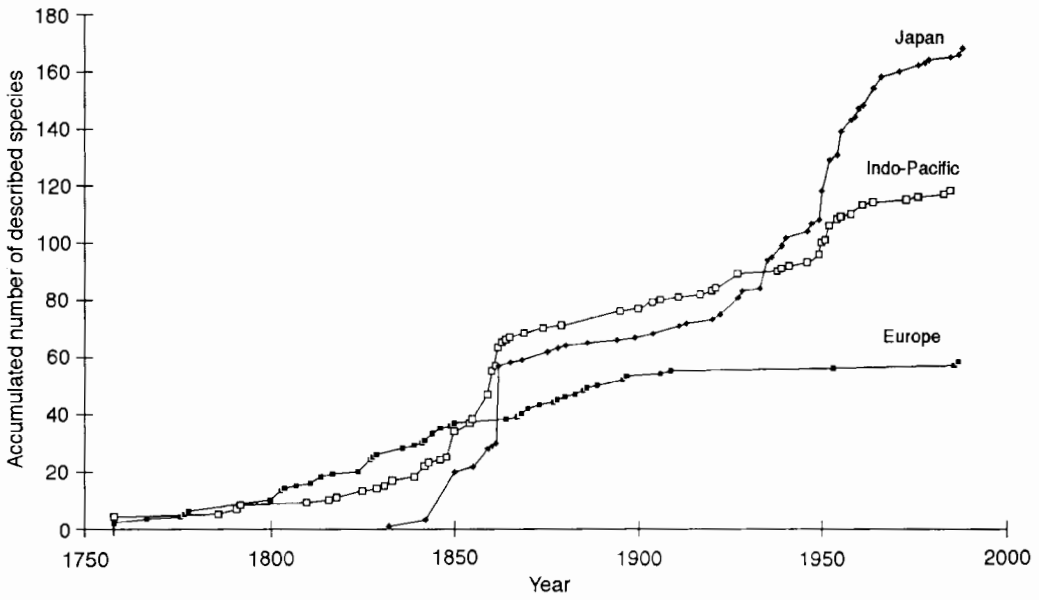

Figure 1. The accumulated numbers of cephalaspideans described from Europe, Japan, and the Indo-Pacific region. Data from Goto & Poppe (1996).

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Review

STATUS OF THE IDENTIFICATION OF LARVAE OF BIVALVE MOLLUSCS IN INDONESIA

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ABSTRACT

Proper identification of larvae of bivalve molluscs is important for biodiversity studies, and for the environmental studies in general. But, in Indonesia, the experience is limited. Studies on larval identification of bivalve species are very rare. Morphological characters of tropical bivalve larvae seem comparable to those of related species of temperate waters, though not always. Hence it is imperative to have work on the identification of tropical bivalve larvae initiated.

INTRODUCTION

Meroplankton samples from Ancol waters, Jakarta Bay contained 15 % molluscan larvae, 3 % of which were larvae of green mussel Perna viridis. (Sutomo & Romimohtarto 1988). Gastropod larvae dominated followed by bivalve larvae. In estuarine areas such as Jobokuto, Jepara, Central Java, meroplankton samples can contain 60 % molluscan larvae, and half of these would be bivalve larvae. Roberts *et al.* (1982) listed 111 species in 29 families of bivalve species from Jakarta Bay. Matsukuma (1984) recorded 112 species of 26 families from Eastern Caroline and Marshall Island, Western Pacific. These regions were potentially rich in bivalve species, typically from coral reef and mangrove ecosystems. Ockelmann (1994) distinguished 8 species of oyster larvae in plankton samples from the Andaman Sea, Thailand.

Studies on the identification of bivalve larvae build on a long tradition developed in the temperate region. Rees (1950) described and classified larvae of 77 species from North Atlantic plankton samples. Rees's (1950) work was based on characters of the shell: shape, texture, and hinge structure (soft parts were not included). He was uncertain of some species identified by the 'indirect' approach and suggested confirmation through larval rearing of known parents in the laboratory. Loosanoff & Davis (1963) developed a more comprehensive description of larval shells based on culture of larvae. Through careful measurement of developing larvae from egg to late umbonal stage, Loosanoff *et al.* (1966) found that the length-height relationship of larvae of 20 species of bivalve mollusc were constant. Besides Rees's terminology, Loosanoff *et al.* (1966) put emphasis on length-height relationship of prodissoconch shell throughout larval development and umbonal shapes. Chanley & Andrews (1971) described and compiled larvae of 23 bivalve species occurring in Virginia (about half of the species in the region). They also emphasised the shell measurements and considered not to include hinge structure in the terminology because of the difficulties of routine valve separation and observation.

Panggabean (1989, 1994) reared larvae of *Crassostrea gigas* and *Mytilus edulis* from the temperate region, and *Perna viridis* (Panggabean 1996) from Indonesian waters. The early development to straight-hinge larvae of *Perna viridis* was two times faster than its relative *Mytilus edulis*. Culture of tropical species may be advantageous since spawning of most of the species occurs all year round (Kastoro 1975, 1978) and larval development is fast. In comparison, the tem-