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Short Communication

Studies on the morphology of postabdomen of Cladocera and Conchostraca (Crustacea) using scanning electron micrographs

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Abstract

Postabdomen of Cladocera and telson of Conchostraca has been playing an important role in the identification of many closely related species of their respective groups. In the present study, 10 species of Cladocera and 3 species of Conchostraca are selected to study the morphological characters of postabdomen and telson, respectively, using scanning electron micrographs. The study shows a few important morphological characters which are not visible in the light microscopic observations and suggested that the micrographs can provide a valuable tool to the investigator, particularly if micrographs of diagnostic characters such as postabdomen of Cladocera and telson of Conchostraca should be gathered into a reference atlas.

Key words: Postabdomen of Cladocera, telson of Conchostraca, SEM morphology.

1. Introduction

The taxonomy of the Cladocera and Conchostraca has been based almost entirely upon adult carapace shape and appendage structures. Postabdominal morphology has played an important role in identification of closely related species both in Cladocera and Conchostraca. Recently, scanning electron microscopy (SEM) has been utilized in describing species of Cladocera and Conchostraca[1–6]. The present study deals with the SEM observations of the morphology of postabdomen of 10 species of Cladocera and 3 species of Conchostraca collected from Madurai, Tamil Nadu (Lat: 9° 53′N; Long: 78° 2′E).

2. Material and methods

Cladocera and Conchostraca are commonly found as free-living animals in lakes, ponds and vernal pools. They are more frequently collected in temporary rain water

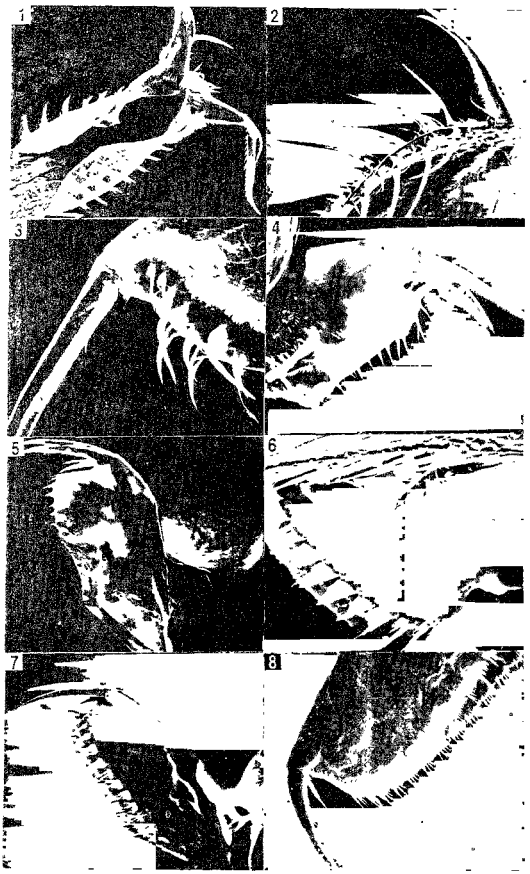
pools, small ditches and puddles, swamps and quarry pools. The samples collected using suitable plankton nets from freshwater habitats were preserved in 5% formalin. The adult specimens were separated and the postabdomen dissected and dehydrated using acetone. The dust-free samples were coated with silver in a vaccum evaporator HUS 5GB. The important diagnostic features were photographed using an SEM, Hitachi S450 under 10KV.

3. Results and discussion

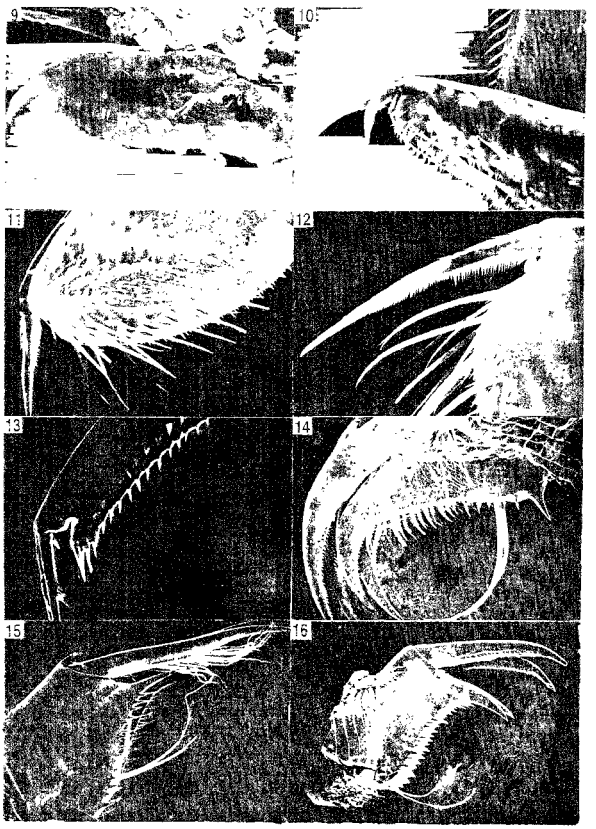
The true abdomen in Cladocera and Conchostraca is supressed but there is a large postabdomen in the case of the former group and telson in the case of the latter at the posterior end of the body. It is generally curved antero-ventrally and serves to push against obstacles, and clear away excess food from the mouth region. The post-abdomen and telson bear the anus and also assist locomotion in addition to clearing the unwanted waste.

The postabdomen has been the single structure mostly employed in cladoceran taxonomy, especially in certain families. Its shape, number and arrangement of anal spines and the number and location of lateral setae are of taxonomic value. The postabdomen terminates in a pair of claws and also bears two long abdominal setae. The size and number of basal spines, the number of spinules making up the pecten and their arrangement and the general shape and structure of the claws are of taxonomic importance.

Thomas[7] synonamised *Pseudosida szalayi* with *P. bidentata* and suggested that the projection in the dorsal side of the postabdomen of *P. bidentata* could be seen clearly in specimens well preserved in formalin. Figure 1 provides this diagnostic morphological character. Figures 2–3 show the postabdomen and claw pectens of *Ilyocryptus spinifer*. The presence of larger spines just below the base of the claw is an important characteristic feature of *I. spinifer*. This is lacking in *I. sordisus*. The study on the postabdomen of *Chydorus ventricosus*[8] has reduced the confusion on the identity of this species. Michael and Hann[8] synonamised *Chydorus bremi* with *C. ventricosus* by careful examination. Figure 4 shows the marginal denticles and distinct preanal corner which is an important characteristic feature for the identification of this species. *Alona monacantha* Sars, 1901 is first described from Brazil and is available throughout the tropical belt. The materials collected from India and Malaysia show variation in the number of denticles present in the postero-ventral corner[9–10]. Smirnov[11] placed the specimens which have 3 denticles under the name *A. monacantha tridentata*. The postabdomen of *A. monacantha* (Fig. 5) in the present study shows a rounded anal margin and distinct preanal corner. Further study is required to confirm the identity of these two species. *Alona karua* King, 1853 has been now placed under the genus *Biapertura*[11]. The presence of 10–11 group of long lateral spines on the postabdomen is the characteristic feature of this species (Fig. 6). Smirnov[11] synonamised *A. diaphana* King, 1852 from Australia and *A. punctata* Daday from Sri Lanka with *A. davidai* Richard, 1895 which is originally described from Haiti. Michael and Sharma[12] described two species *A. davidai davidai* and *A. davidai punctata* from India.



FIGS 1–8. Scanning electron micrographs of female postabdomen of Cladocera, 1. *Pseudosida bidentata*, 750×, 2–3. *Ilyocryptus spinifer*, 750×, 1500×, 4. *Chydorus ventricosus*, 1500×; 5. *Alona monacantha*, 1250×; 6. *Biapertura karua*, 2000×; 7–8. *Alona davidi punctata*, 600×, 900×.



FIGS 9–13 Scanning electron micrographs of female postabdomen of Cladocera, 9–10. *Grabtoleberis testudunaria* female and male, 1250×, 1400×; 11–12. *Leydigia ciliata*, 900 × 1250 ×; 13. *Euryalona orientalis*, 900×. FIGS 14–16. Scanning electron micrographs of female telson of Conchostraca. 14. *Caenesthriella indica* 600×; 15. *Eulimnadia michaeli*, 1000×, 16. *Leptestheriella maduraiensis*, 500×.

Figures 7–8 show the postabdomen of *A. davidai punctata* collected from Madurai, Tamil Nadu. Further study is going on by the present author on the SEM morphology of these two species. *Grabtoleberis testudinaria* (Fischer, 1851) is a very rare species occurring in and around India, and it has a distinct postabdominal morphology. Figure 9 shows the female postabdomen and Fig. 10 that of the male of the same species. *Leydigia ciliata* Gauthier is a littoral chydorid cladoceran found in the reddish-brown turbid ponds of southern Tamil Nadu. Figures 11–12 show the postabdomen and claw of *L. ciliata*. The presence of pectens on the claw is a diagnostic feature which differentiates this species from the closely related *L. acanthocercoides* (Fischer) with no pectens on the claw[11]. *Euryalona orientalis* (Daday, 1898) is a common species occurring throughout India, Sri Lanka and South East Asia. Rajapaksa and Fernando[13] synonamised *E. occidentalis* with *E. orientalis* due to several morphological similarities between them. Figure 13 shows the postabdomen of *E. orientalis* collected from Tamil Nadu found to be similar to the description given by Rajapaksa and Fernando[13].

The trunk of the conchostaracans terminates in a broad and truncate telson. The typical telson terminates in a pair of elongated ventral spines or cercopods. These spines or telson claws, are variously spined or are smooth in the different groups. The dorsal surface of the telson possesses two lateral ridges surmounted by a series of spines on each ridge. The form of the telson, number of pairs of dorsal spines and the form of the terminal spines are used as taxonomic characters.

Figure 14 shows the fine structure of the telson of *Caenesthriella indica* Gurney in which the spines are strong and longer from basal to the distal end and the secondary spines are very conspicuous. All the three species studied (Figs 14–16) show a great deal of variation in their telson morphology. However, the morphology of the carapace of the three species studied shows very little variation under the light microscopy. From the micrographs it is clear that the spines on the telson of *Eulimnadia michaeli* (Fig. 15) show the presence of secondary spines which is very prominent in *C. indica* and is lacking in *Leptestheriella maduraiensis*.

From the present study it is apparent that the application of SEM to systematic studies of Cladocera and Conchostraca can provide a valuable tool to the investigator, particularly if micrographs of diagnostic characters should be gathered into a reference atlas.

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