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The Morphological Features of Isopod, *Corallana nodosa* Schioedte & Meinert, 1879 as Seen Under Scanning Electron Microscopy

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Abstract: A total of 10 isopods consist of adults and juveniles stages (ranging from 3 to 8 mm) were examined under scanning electron microscope (SEM). Results showed that the cephalon consists of the first segment of the thorax fused to the head, two pairs of antenna with a large and well-developed pair of compound eye and a mouth. Both antennae were well developed with peduncle and flagellum clearly differentiated. The molar process of mandible is greatly reduced and the mandibular incisor narrow. The maxillule is generally hooked or with one or two terminal spines while maxilla is short and tiny. The maxilliped palp was observed with two to five articles and has sparse setae. Pereopods IIII are weakly prehensile and pereopods IVVII ambulatory. The abdomen consists of five pleonites plus pleotelson. Each of the pleonite has a pair of biramous pleopods while the pleotelson consists of biramous uropods. The species was identified as *Corallana nodosa* Schioedte & Meinert, 1879, agreeing well with the original description.

Keywords: morphology, Isopoda, SEM, freshwater fish, *Corallana nodosa*

Abstrak: Sebanyak 10 isopoda dari peringkat dewasa dan juvenil (saiz berjulat 3 hingga 8 mm) telah diperiksa di bawah mikroskop elektron (SEM). Keputusan kajian menunjukkan bahawa cephalon terdiri daripada segmen dada yang pertama bergabung dengan kepala, dua pasang antena dengan sepasang mata majmuk yang besar dan mulut. Kedua antena berkembang dengan baik dan flagela yang dapat dibezakan dengann jelasnya. Proses molar mendibel didapati berkurangan dan kehadiran mandibular yang sempit. Maxillule didapati bercangkuk deangan satu atau dua duri terminal dengan maxila ayng kecil dan halus. Pelapah maxilliped mempunyai dua hingga lima helaian dan bersetae. Pereopod I-III mempunyai pemegang yang lemah dan pereopod IV-VII jenis berjalan. Abdomennya terdiri daripada lima pleonite dengan pleotelson. Setiap pleonite mempunyai sepasang pleopods biramous sementara pleotelson terdiri daripada uropods biramous. Spesies ini dikenalpasti sebagai Corallana nodosa Schioedte & Meinert, 1879, bertepatan dengan desrikpi awal.

Introduction

Isopods are commonly seen on teleosts in tropical and subtropical water, attached to the body surface, in the month or on the gill. Approximately 5500 species isopod are reported from marine and 950 freshwater species with a wide distribution over highly varied habitats (Poore, 2002 and Wilson, 2008). Out of that, approximately 565 isopod species were reported as being parasitic on fish (Kabata, 1970). The Cymothoidae are exclusively parasitic on fish. Ectoparasitic isopods can cause serious problems in aquaculture systems for both fish and crustaceans. Some parasitic isopods normally feed on host blood and are capable of leading either free or parasitic existences (Kabata, 1985), such as the species of Aegidae and Corallanidae (Delaney, 1989; Bruce *et al.*, 2002; Bruce, 2009). After feeding on the fish, the isopod will drop off the host and stay in the substratum. Fish infected with isopods show changes in behaviour such as swimming against the netting materials, lethargy and corkscrew swimming motion at the advanced stages of the infestation (Chinabut, 2002). Sites of infection normally show isopod inflicted injuries, pale gills, sloughing of scales and hemorrhagic areas on the skin.

In South East Asian fish, only five genera of fish-parasitic Isopoda have been reported by Kabata (1985). The families Aegidae and Corallanidae commonly parasitize fish (Delaney, 1989; Ho and Tonguthai, 1992). *Alitropus typus (Aegidae)* was reported as causing mortality in cage-cultured tilapia in ponds, small reservoirs and sandpits (Rosario *et al.*, 1996; Chinabut, 2002; McAndrew, 2002). Corallanid isopods are mostly free living and parasitize fishes in marine and brackish waters (Ravichandran *et al.*, 2009). Species of *Corallana* isopods are known from marine and brackish water environments in Indo-West Pacific (Bruce, 1982; Jones *et al.*, 1983). Kelwalrmani (1973) reported the infection of the corallanid isopod, *Tachaea spongilliocola* Stebbing, 1907 on the freshwater prawn, *Macrobrachium malcolmsonii*

which has a known marine and freshwater distribution. Delaney (1989) noted that *Corallana* sp was found on cyprinid fish *Puntius javanicus* which inhabits the coastal zone along the Gulf of Thailand. Ho and Tonguthai (1992) also reported that *Corallana grandiventra* occurs on *Pangasianodon gigas* (the giant Mekong catfish) and *Tilapia nilogica,* both of which are freshwater fish that had been collected from Chiang Khong and Bangkok respectively. According to them, *C. grandiventra* isolated from fishes obtained in inland water showed that it can survive in freshwater habitat. The isopod *Corallana nodosa* Schioedte & Meinert, 1879 known as estuarine species but has not been reported in freshwater fish in this region. We examines their morphology under the scanning electron microscope (SEM) in order to gather more information of this species.

Materials and methods

Morphological study under the SEM were carried on ten isopods. It was fixed in McDowell solution for 524 hours before washing in 0.2 M sodium cacodylate buffer (3x) and post-fixed in 2% aqueous osmium tetroxide for 20 minutes (McDowell and Trump, 1976). They were processed using Hexamethyldisilazane to prepare soft insect tissues for scanning electron microscopy following Nation (1983). Observation was made under LeoSupra 50VP Field emission SEM equipped with Oxford INCA400 energy dispersive x-ray microanalysis system at magnifications of 25 x 10Kx.

Results and Discussion

Observation under the SEM showed that all of the features described are a generalized isopod morphology. The eyes are contiguous anterodorsally and extending from anterior margin to posterior margin of head (Figure 1). The cephalon part consists of the first segment of the thorax fused to the head, two pairs of antenna (antenna and antennule) with a large and well-developed pair of compound eye and a mouth. The antennule was shorter and inserted on isopod cephalon anteriorly and dorsally to antenna which was longer (Figure 2). Both antennas were well developed with peduncle and flagellum clearly differentiated. The antennule consists of three segmented peduncle followed by many-segmented flagellum. The same morphology was observed at antenna with five segmented peduncle and followed by many-segmented flagellum. The mouthpart consists of four sets of jaws. The four sets of jaws were mandibles, maxillae 1, maxillae 2 and maxillipeds (Figure 3). Molar process of mandible greatly reduced and the mandibular incisor narrow. Maxillules were generally hooked or with one or two terminal spines while maxilla was short and tiny. Maxilliped palp was observed with two to five articles and it has sparse setae. No endite was seen on the maxilliped. The thorax comprises of seven segments known as pereonite and can be seen dorsally. Each pereon consists of a pair of uniramous legs known as pereopods. The pereopods I-III were weakly prehensile (dactyli longer than propodi) and pereopods IV-VII were ambulatory (Figure 4). The abdomen part consists of six segments known as pleonites and the sixth segment known as pleotelson. Each of the pleonite has a pair of biramous pleopods while the pleotelson consists of fin-like plate and biramous uropods (Figure 5).

The species was identified as *Corallana nodosa* Schioedte & Meinert, 1879, agreeing well with the original description and data subsequent in subsequent records (Bruce, 1982; Delaney, 1989). All these features were characteristic of *Corallana nodosa* (classification follow a Brandt & Poore 2003). The genus *Corallana* (and family) is well-known to inhabit estuaries, mangroves and freshwater habitats in the Indo-West Pacific. Six species of *Corallana* are known to occur in estuaries, and these are therefore in freshwater at low tide or the upper reaches of the stream. The genus *Tachaea* primarily a freshwater genus (only one marine species). Therefore, while there are few documented records of *Corallana* from pure freshwater, the occurrence is so remarkable, but is definitely worth reporting.

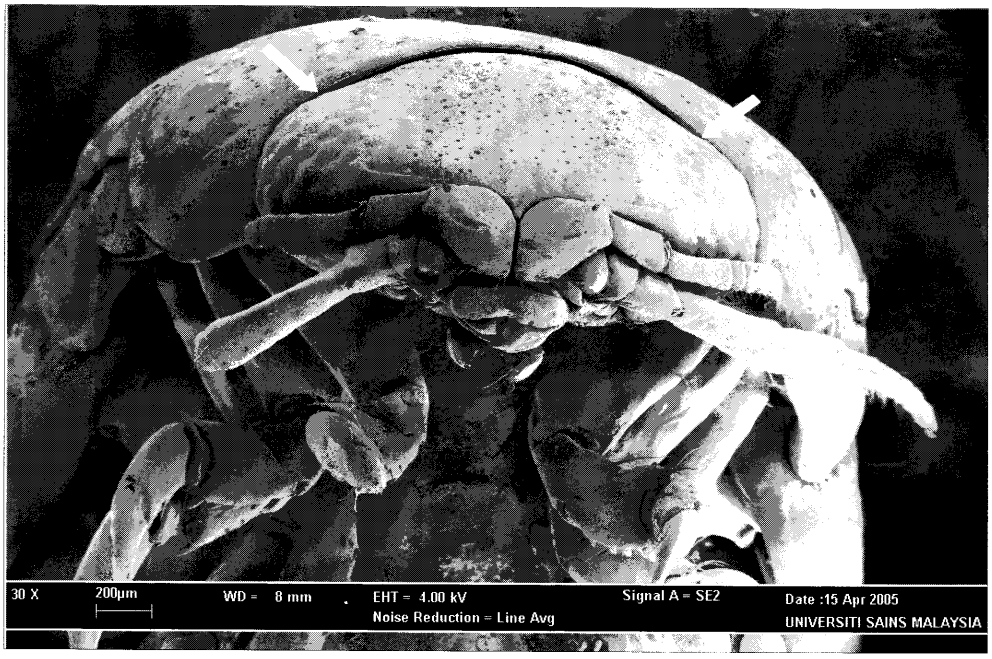

Figure 1: The cephalon region under SEM showing the compound eyes (white arrows). Magnification: 30x

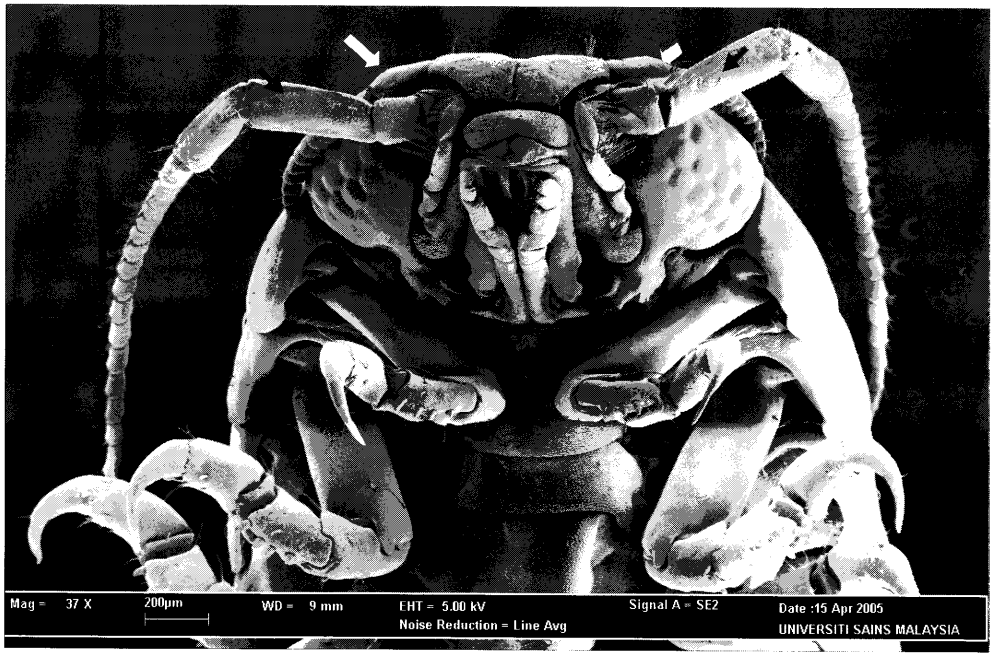

Figure 2: The cephalon under SEM showing antennules (white arrows) and antennae (black arrows). Magnification: 37x

Figure 3: Mouthpart of isopod showing the maxilliped (black arrow), maxillule (white arrow) and mandible (open arrow) under SEM at magnification of 100x

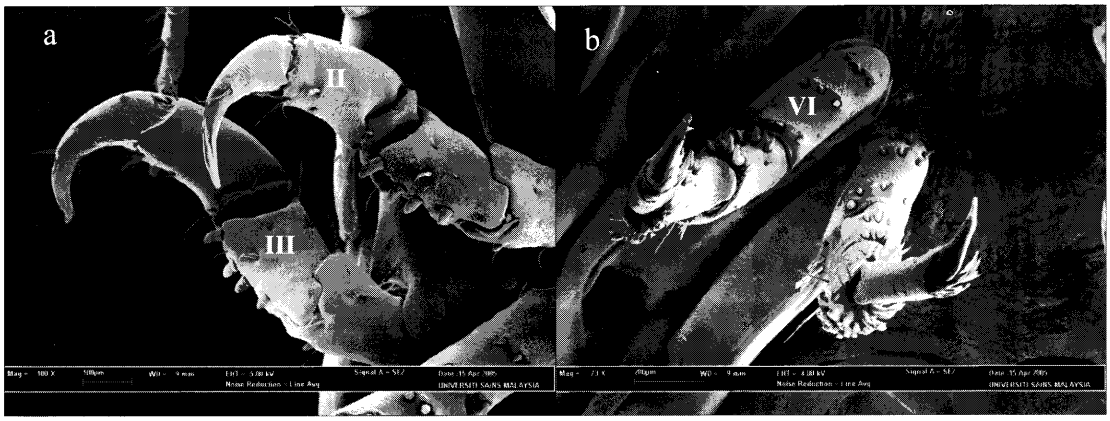

Figure 4: Pereopods (a). Weakly prehensile pereopods II and III. Magnification: 100x; (b). Ambulatory pereopods VI and VII. Magnification: 73x

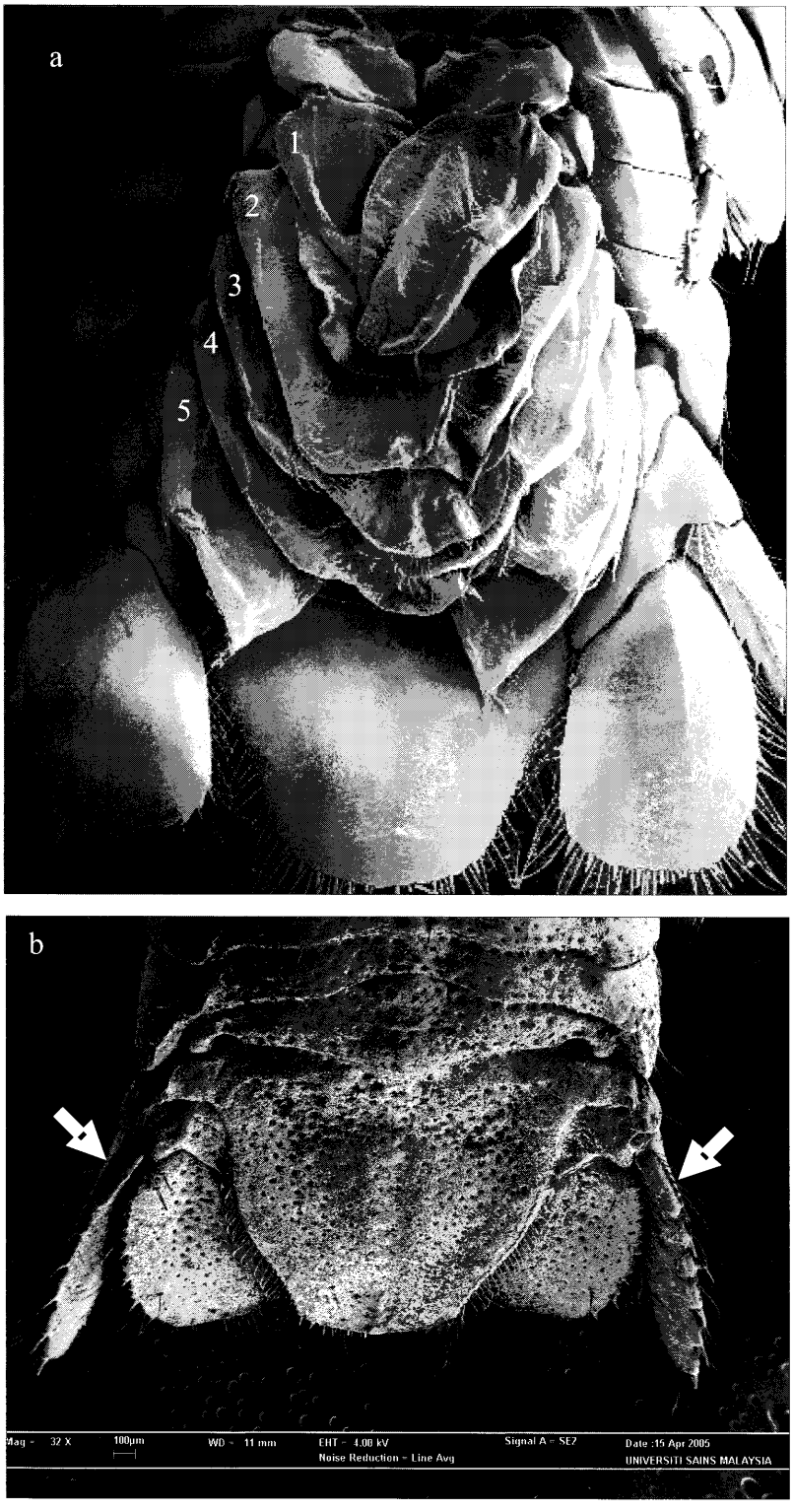

Figure 5: Posterior pleon and pleotelson. (a). Ventral view of pleon with five pairs of pleopods. Magnification: 18x; (b). Dorsal view of the pleotelson(*) with biramous uropods (arrow). Magnification: 32x

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