

Table 3 Protein amino acids (in percent) of *P. nagpurensis* (adult), juvenile, capsule wall, *S. visakhapatnamensis* (adult), plerocercoid, capsule wall, uninfected and infected liver of *C. lalia*.

Amino Acids	<i>P. nagpurensis</i>			<i>S. visakhapatnamensis</i>			Liver	
	Adult	Juvenile	Capsule wall	Adult	Plerocercoid	Capsule wall	Uninfected	Infected
1 + 2 Leucine + Iso-leucine	24.43	14.95	18.95	8.47	18.25	16.70	26.28	19.28
3. Phenylalanine	3.74	1.79	1.22	1.54	1.35	1.70	2.67	2.05
4. Valine	9.76	8.53	5.98	11.31	11.55	6.83	5.88	9.02
5. Methionine	3.36	2.16	1.22	3.03	1.46	1.59	0.94	1.40
6. Tyrosine	2.18	2.07	1.25	1.92	1.18	1.72	1.54	1.93
7. α -amino-n-butyric acid	0.32	—	—	—	0.22	—	0.31	0.18
8. Proline	2.83	1.18	2.48	1.83	2.81	0.73	2.22	1.95
9. Alanine	15.45	13.65	12.47	13.39	16.04	13.58	20.37	14.22
10. Threonine	3.94	5.59	5.17	7.67	5.60	6.16	5.24	4.83
11. Glutamic acid	4.29	12.40	11.31	16.52	10.58	10.45	2.65	11.97
12. Glycine	5.53	5.59	6.83	6.36	7.02	6.44	4.42	5.15
13. Aspartic acid	4.59	7.90	7.06	6.53	4.39	7.55	4.16	6.38
14. Arginine	4.75	6.34	6.94	5.38	6.79	9.49	3.55	4.41
15. Serine	1.17	1.57	1.02	3.25	0.96	1.42	1.23	3.40
16. Histidine	5.26	7.85	6.61	5.26	4.15	6.88	5.64	5.36
17. Ornithine	5.22	6.21	9.40	6.26	6.93	6.96	11.32	6.20
18. Lysine	0.55	0.68	0.64	0.70	0.45	0.95	0.68	1.05
19. Cystine	—	—	—	—	—	—	—	—
Unidentified	2.45	1.45	1.39	0.52	0.18	0.83	0.92	1.13
Aminoacids when classified according to their charge:-								
Non polar	59.89	42.26	42.29	39.57	51.68	41.13	58.67	48.10
Polar (neutral)	12.82	14.82	14.27	19.20	14.76	15.74	12.43	15.31
Polar (+ vely charged)	15.78	21.08	23.59	17.60	18.32	24.38	21.09	17.02
Polar (— vely charged)	8.88	20.30	18.37	23.05	14.97	18.00	6.81	18.35

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MORPHOLOGY OF THREE SPECIES OF CONCHOSTRACA USING SCANNING ELECTRON MICROSCOPE

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In taxonomic studies of Conchostraca, morphological characters have, in most instances, provided the body

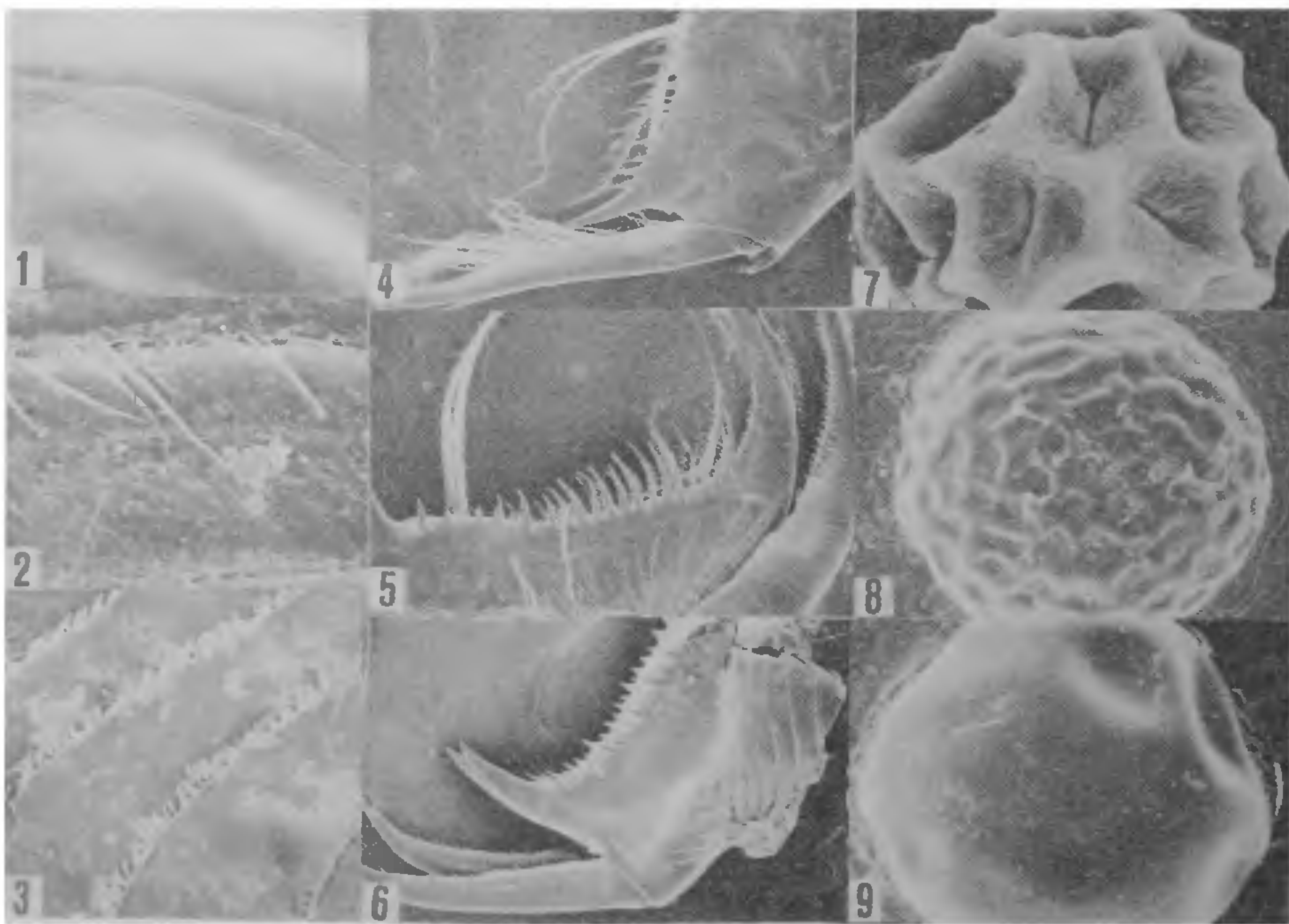
of descriptive material used in classification. Surprisingly scanning electron microscopy (SEM) has not been utilised in examining the diagnostic characters of Conchostraca as extensively as it has been done in Cladocera¹⁻⁵. The present study deals with the SEM observations of ornamentation in the carapace, arrangements of spines in telson and morphology of the eggs of three available species, *Eulimnadia michaeli* Nayar and Nair, *Caenesthriella indica* gurney and *Leptestheriella maduraiensis* Nayar and Nair from the ponds of Madurai Kamaraj University campus, Madurai.

Conchostraca are commonly found as free-living littoral 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 by suitable nets from the waters of temporary ponds were preserved in 5% and 10% formalin and 95% glycerine alcohol. The dust-

free samples were coated with silver in Hitachi-Vacuum coater HUS 5GB. The important diagnostic features were photographed using a SEM, Hitachi S 450.

The shape and texture of the shell, the number and nature of lines of growth and the margin of the shell, the spination of the telson and the structure of the egg were considered in assigning the taxon of a conchostracan species. Figures 1, 2 and 3 depict the architecture of the shell surface of the three species, *E. michaeli*, *C. indica* and *L. maduraiensis* respectively. The growth lines in the carapace of *E. michaeli* is evenly smooth and devoid of structures of any type. The growth lines of *C. indica* and *L. maduraiensis* are fringed with characteristic setae. In *C. indica* the setae are long and in *L. maduraiensis* they are short and hairy.

The trunk of Conchostraca ends in broad truncate region called telson, the ornamentation of which is



Figures 1-3. Female carapace: 1. *E. michaeli* 1000 \times ; 2. *C. indica* 1000 \times ; 3. *L. maduraiensis* 1000 \times ; 4-6. female telson; 4. *E. michaeli* 1000 \times ; 5. *C. indica* 600 \times ; 6. *L. maduraiensis* 500 \times ; 7-9. egg; 7. *E. michaeli* 1000 \times ; 8. *C. indica* 1000 \times ; 9. *L. maduraiensis* 1000 \times .

taken as a unit for classification. A comparative study illustrates that the telsons of the three species differ considerably from each other. The detailed nature of the telson has been brought to the maximum possible, by SEM (figures 4, 5 and 6). Figure 4 shows the fine structure of the telson of *E. michaeli*. The spines on the dorsal edges are dissimilar and slender which also indicates the presence of secondary spines. In the case of *C. indica* the spines are fairly strong and progressively longer from basal to the distal end. The secondary spines are more conspicuous (figure 5). The dorsal spines in the telson of *L. maduriensis* are non-identical looking like short, broad-based, conical projections (figure 6). The exact position and emergence of the bifid filament in the telsonic ragi on the concerned species have aptly been confirmed from the study using SEM.

The conchostracan egg is invariably covered with a thick shell covering, which protects the embryo from mechanical injury and to enable the embryo of these ephemeral pond phyllopod crustacean, to survive drying. It has been observed from the present study that the outer structure of the eggs of these species is interestingly distinct from each other. The surface of the egg of *E. michaeli* shows deep fissure-like pockets with prominently raised ridges (figure 7). The egg shell surface of *L. maduraiensis*, on the other hand, is almost smooth with a few feebly marked depressions (figure 9). Thus from the present study it can be suggested that the egg morphology of Conchostraca may be considered as one of the primary criteria for identification.

The three distinguishing features of the species of Conchostraca are external growth lines on the surface of carapace, the number of arrangements of spines on the telson and the morphology of the surface of the egg. It is apparent that the application of SEM to systematic studies of Conchostraca, can provide a valuable tool to the investigator, particularly if micrographs of diagnostic characters could be gathered into a reference atlas.

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REGULATION OF K^+ AND Na^+ IN *DIPLACHNE FUSCA* (LINN) P BEAUV, AN ALKALI HALOPHYTE

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PLANTS survive under salt stress by adopting processes like restricted uptake of potentially toxic ions, compartmentation of these ions within the cells and by excretion¹. The latter process is one of the most important features among some halophytes, enabling them to thrive very well under such conditions. The remaining two features are common among halophytes as well as glycophytes. Besides these, plants try to maintain younger parts relatively free from such ions by retaining them in more mature parts^{2,3}. The leaf sheath, which is an integral part in gramineae, was noted to accumulate higher concentration of sodium². However, its importance in regulating K^+ and interaction with Na^+ has not received due attention.

Diplachne fusca (Linn) P Beauv (an alkali halophyte) was grown at three levels of sodicity viz pH 9.5, 9.8 and 10.0 (ESP 52, 69 and 80 respectively) under pot culture conditions. Plants growing at pH 8.1 (ESP 7) served as control. Out of fully expanded leaves, the first four from top along with their sheaths were sampled from each level after two months of growth. Leaf sheath was separated from lamina and each was analysed separately in triplicate for Na^+ and K^+ contents by using flame photometer. It is interesting to note that each leaf sheath had higher K^+ content than its respective lamina in control plants (figure 1). The same trend was maintained at three-sodic level also in the first three leaf sheaths. On the other hand in the fourth leaf sheath, the K^+ content was relatively lower than its lamina. The first lamina and sheath had the highest and fourth, the lowest K^+ content, at each level. Contrary to this, Na^+ content was the lowest in the first lamina and sheath, and highest in the fourth (figure 2). In each case, leaf sheaths had higher Na^+ content than their respective laminae.