a single spine as an outgrowth of the anterior middle edge of the carapace (Fig. 1 a). But in the present case it was found that the anterior half of the rostrum was bifurcated into two spines (Fig. 1 b).

The larva was obtained from the brood of *P. semisulcatus* collected from the sea off Tuticorin by the Institute's *M. V. Cadalmin IV* on 23rd August 1982. The mother prawn which measured a total length of 145 mm was kept in a spawning tank in the field laboratory at Karapad. It spawned in the same night at 2240 hours. The nauplii obtained from the brood were counted on 25th by random sampling and were found to be 21,440 numbers. Which was very low when compared to the numbers obtained from different broods of the same species. When observed on 26th and 27th the larvae were in Protozoea I stage. They were fed with mixed phytoplankton, which was cultured under open sunlight. It was on 28th that the larva in Protozoea II stage was observed with bifurcated rostrum. The larva was isolated from the normal ones and transferred to an one-litre beaker for the purpose of further observation. After isolation the larva was fed with *Isochrisis galbana*. When observed on 29th the larva was ative and the gut was full. However, on 30th (*i.e.* seven days after hatching out from the egg) the larva died. During the course of the experiment the ambient temperature ranged between 28°C and 29°C and the salinity between 33.31 and 35.53‰.

Such an abnormality in the early larval stages of prawns has not been reported by previous workers. However, Deshmukh and Vidyasagar (1968) reported that the rostrum of an adult prawn *Parapenaeopsis stylifera* collected from the sea off Veraval was bifurcated.

The authors are thankful to Shri K. Nagappan Nayar for his keen interest in this investigation.

*Central Marine Fisheries Research Institute, Cochin-682 014.*

M. RAJAMANI*
M. MANICKARAJA*

* *Present address* : Tuticorin Research Centre of CMFR Institute, 90 North Beach Road, Tuticorin-628 001.

REFERENCES

DESHMUKH, V. M. AND K. VIDYASAGAR 1968. *J. mar. biol. Ass. India,* **10** (2) : 391.

DEVARAJAN, K., J. SUNNY NAYAGAM, V. SELVARAJ AND N. N. PILLAI 1978. *CMFRI Bulletin,* **28** : 22 -30.

THOMAS, M. M. 1974. *Indian J. Fish.,* **21** (1) : 152-163.

_____ 1980. *Ibid.,* **27** (1 & 2) : 130-139.

## ELECTROPHORETIC STUDIES ON MUSCLE PROTEINS OF SOME PRAWNS FROM PORTO NOVO

ABSTRACT

Elevan species of prawns belonging to six genera (*Penaeus, Metapenaeus, Parapenaeopsis, Metapenaeopsis, Solenocera* and *Macrobrachium*) were electrophoretically studied for the muscle myogen protein patterns. The results have been discussed in the light of their genetic affinity and species relationships.

*Introduction*

The muscle myogen patterns are widely used as a tool in taxonomical studies. According to O'Rourke (1974) taxonomical problems can be tackled by experimental approach when difficulties arise in the classical taxonomy. A number of workers have shown that myogen patterns prove a high degree of species specificity in fishes (Thompson, 1960; Giles, 1962; Tsuyuki and Roberts, 1963, 1965; Tsuyiki *et al.*, 1965 a, b, 1966, 1967, 1968; Uthe *et al.*, 1966; Cowie, 1968; Jones and Mackie, 1970) and their relative independance from sexual, physiological and ecological factors (Tsuyuki *et al.*, 1965). Although studies on muscle myogen patterns have been common in fishes in the recent years, comparatively little is known in invertebrates and especially in prawns excepting the works of Lim and Lee (1970). Presently it is attempted to study the possibility of applying protein specificity for taxonomical purposes and to discuss its value to the existing taxonomical information based on morphology.

*Materials and methods*

Elevan species of prawns (10 penaeid prawns and 1 nonpenaeid prawn) belonging to 6 different genera have been selected (*Penaeus indicus, P. monodon, P. merguiensis, P. semisculcatus, Metapenaeus monoceros, M. dobsoni, Parapenaeopsis stylifera, P. maxillipedo, Solenocera crassicornis, Metapenaeopsis stridulans* and *Macrobrachium idella*). The animals were brought to the laboratory in living condition and subjected to electrophoretic study.

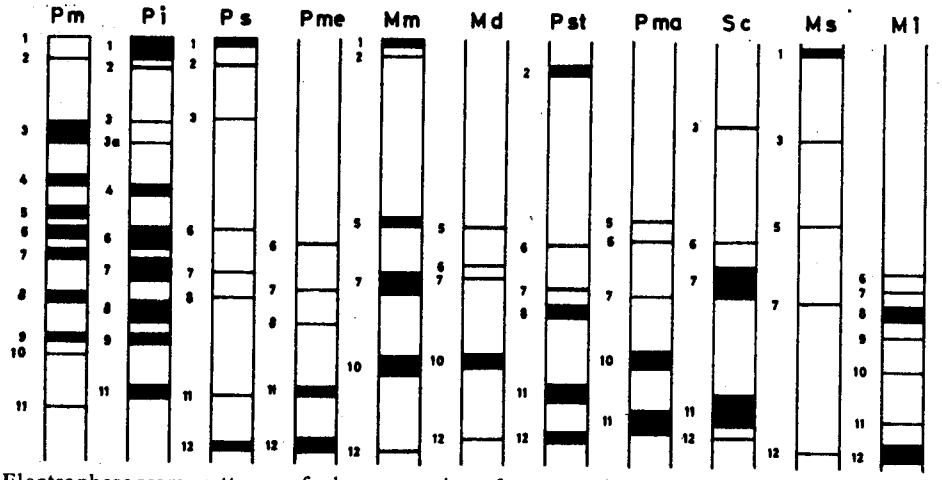


Fig. 1. Electropherogram patterns of elevan species of prawns. Pm. *Penaeus monodon*, Pi. *P. indicus*, Ps. *P. semisulcatus*, Pme. *P. merguiensis*, Mm. *Metapenaeus monoceros*, Md. *M. dobsoni*, Pst. *Parapenaeopsis stylifera*, Pma. *P. maxillipedo*, Sc. *Solenocera crassicornis*, Ms. *Metapenaeopsis stridulans* and Mi. *Macrobarachium idella.*

Three layer polyacrylamide gel disc electrophoresis of Davis (1964) was employed with the chemical formulations described in Canalco (1968) Bulletin. The muscle was homogenised (1 ml of distilled water to 30 mg of tissue) with a hand homogeniser. The extract was centrifuged for 15 min at 3000 rpm and the supernatant liquid containing water soluble proteins were subjected to electrophoretic analysis.

The separating gel was standard 7% polyacrylamide gel. A current of 3 MA/tube was applied through a DC power supply unit. Protein fractionation was completed within 45 minutes.

The separated protein fractions were stained with 0.25% Coomassie brilliant blue in 10% TCA. The gels were then destained and stored in 7% acetic acid. Relative mobility (Rm) values of protein fractions were calculated taking the distance between origin and front as 100 units. Using the Rm values protein fractions were arranged lineraly to elucidate their number.

*Results*

The muscle myogen patterns of 11 species of prawns investigated are presented in Fig. 1. Protein fractions having almost the same Rm values were considered as common fractions between species of the same genera. The differences between the species could be explained in terms of mobility and number of fractions and their staining intensity. Based upon the number of fractions and their Rm value interrelationships between species of the genera *Penaeus, Metapenaeus, Parapenaeopsis, Metapenaeopsis* and *Solenocera* are noted.

Fractions 6, 7, 8, 11 are common in all the four species of the genus *Penaeus*, showing their generic affinity. *P. monodon* is found to be more advanced based on more number of fractions (11). The presence of fraction 12 and the absence of fraction 1, 2, 3, 4 and 9 in *P. merguiensis*, show the difference between the closely related species *P. indicus* coming under the subgenus *Fenneropenaeus*. Similarly the presence of fraction 12 and the absence of fractions 4, 5, 9 and 10 in *P. semisulcatus* show the difference between the closely related species of *P. monodon* coming under the subgenus *Panaeus*. Close relationship between *P. indicus* and *P. monodon* is indicated (Fig. 1). Fractions, 1, 2, 3 are characteristic to the species of the subgenus *Fenneropenaeus*.

Fractions 5, 7, 10, 12 are common in *Metapenaeus monoceros* and *M. dobsoni* showing their generic affinity and the presence of fractions 1 and 2 in *M. monoceros* and their absence in *M. dobsoni* are species specific. Fraction 6 is specific to *M. dobsoni*. There is also variations between these two species in the thickness of the protein fractions which is well reflected in Rm values.

Similarly fractions 6, 7 and 11 are common in *Parapenaeopsis stylifera* and *P. maxillipedo*, reflecting their generic affinity. Fractions 2, 8 and 12 and fractions 5 and 10 are specific to *P. stylifera* and *P. maxillipedo* respectively. Fraction 7 of *Solenocera crassicornis* is establishing its relationship with other species of the genera *Penaeus, Meterpenaeus* and *Parapenaeopsis* indicating its generic affinity which are coming under the same family Penaeidae. Similar case is met with *Metapenaeopsis stridulans* showing its generic affinity to other genera of the family Penaeidae by the presence of the fraction 7.

Absence of fractions 1 to 5 are specific to the family palaemonidae and showing some relation between species of the family Penaeidae by the presence of fractions 6 to 12.

*Discussion*

Systematics has taken up its new turn in these years in adapting some chaemo-taxonomical methods for pinpointing the species. It was realised that generic variations are found both in morphological features of animal and chemical components of it. Among the major chemical components the proteins

are found to vary from species to species. This is because the synthesis of protein largely depends upon the genetic coding which differs obviously from species to species.

The 11 species of prawns investigated in the present study belonging to 6 genera show muscle myogen patterns which are specific. Similarities between prawn belonging to the same subfamily are very evident by the presence of the fraction 7. But the concentration of these fraction differ considerably revealing the species difference apart from some of the fractions which are specific to those species of prawns. The species belonging to the subfamily Solenocerinae is found to have the common fraction (Fraction 7) with that of the subfamily Penaeinae with which may perhaps be considered as characteristic to the family Penaeidae. Similarly the species belonging to family Palaemonidae found to differ from species belonging to the family Penaeidae. The Palaemonid prawns have got only fast moving protein fractions when compared to the panaeid prawns. The genus *Penaeus* is found to be more advanced when compared to other genera as it is found to have more number of fractions. Protein fractions have no variations between the sexes and in preservation (Lim and Lee, 1970).

Generic relationship among the species are shown by the overall similarities and differences in their muscle myogen patterns. This is not unexpected one, since protein synthesis in living forms are controlled by genetic systems and their expressions lead to the structural variation, the products of which are a means of measuring the genetic difference that could be added along with the systematic data.

Hence, the present study clearly shows that the myogens are species specific and these patterns are 'finger prints' for identification purposes (Lim and Lee, 1970). These patterns along with the glyco and lipoproteins can be utilized meaningfully for chaemotaxonomical studies in conjunction with other approaches (Kannupandi and Paulpandian, 1975).

*CAS in Marine Biology,*
*Parangipettai-608 502.*

K. SRIRAMAN*
N. RAMANATHAN
J. GODFRED

* Tamil Nadu State Fisheries, Muthupet-614 704.

REFERENCES

ANON. 1968. CANALCO BULLETIN. Canal Industrial Corporation 5635, Fisher Lane, Rockville, Maryland, U.S.A.

COWIE, W. P. 1968. *J. Sci. Fd. Agric.*, **19** : 226-229.

DAVIS, B. J. 1964. *Ann. N.Y. Acad. Sci.*, **121** : 404-429.

GILES, B. G. 1962. *J. Sci. Fd. Agric.*, **13** : 264-268.

JONES, B. W. AND I. M. MACKIE 1970. *Comp. Biochem. Physiol.*, **32** : 267-273.

KANNUPANDI, T. AND AL. PAUL PANDIAN 1975. *Bull. Dept. Marine Sci. Univ. Cochin*, **7** (3) : 609-622.

LIM, T. K. AND S. S. LEE 1970. *Marine Biology*, **5** : 83-88.

O'ROURKE, F. J. 1974. Fish. *In* : C. A. Wright [Ed.] *Biochemical and Immunological Taxonomy of Animals.* Academic Press, London, pp. 243-302.

THOMPSON, P. R. 1960. *J. Assoc. Offic. Agr. Chemists.*, **43** : 763-764.

TSUYUKI, H. AND E. ROBERTS 1963. *J. Fish. Res. Bd. Canada*, **20** (1) : 101-104.

——— AND ——— 1965. *Ibid.*, **22** (3) : 767-773.

———, E. ROBERTS AND W. E. VANSTONE 1965 a. *Ibid.*, **22** (1) : 203-213.

———, ———, ——— AND J. R. MARKET 1965 b. *Ibid.*, **22** (1) : 215-217.

———, J. F. UTHE, E. ROBERTS AND L. W. CLARKE 1966. *Ibid.*, **23** (10) : 1599-1606.

———, E. ROBERTS, R. H. KERR, J. F. UTHE AND L. W. CLARKE 1967. *Ibid.*, **24** (2) : 299-304.

———, ———, R. H. LOWES, W. HADAWAY AND S. J. WESTRHEIM 1968. *Ibid.*, **25** (11) : 2477-2501.

UTHE, J. F., E. ROBERTS, L. W. CLARKE AND H. TSUYUKI 1966. *Ibid.*, **23** : 1663-1671.

# *LEIOGNATHUS ELONGATUS* (GUNTHER) (LEIOGNATHIDAE : PISCES) A NEW RECORD FROM INDIAN SEAS

ABSTRACT

This short communication reports the new record of *Leiognathus elongatus* (Gunther) from Madras waters with description, raising the species of silverbellies to 21 known from the Indian Seas.

## *Introduction*

The fishes of the family Leiognathidae popularly know as Silverbellies and Ponyfish constitute an important fishery round the year along the south Indian Coast.

Day (1878) recorded 14 species from Indian Seas. Weber and de Beaufort (1931) reported 16 species from the Indo-Australian Archipelago. From Sri Lanka, Munro (1955) reported 12 species. Tiews *et al.* (1965) recorded 17 species from Philippines. Hille (1968) gave an illustrated key to the species of the family from Thailand. In the systematic review of this family, James (1975) reported 17 species occurring in Indian waters. Rani Singh and Talwar (1978) reported a new species *Leiognathus indicus*. Jones (1985) revised the Australian species and listed the occurrence of 15 species. Shen and Lin (1985) listed 12 species from Taiwan. Jayabalan (1985) reported another new species *Gazza shettyi*. Recently James and Badrudeen (1990) reported a new species *Leiognathus striatus* from the Gulf of Mannar.

During the course of the study on the biology and fishery of these fishes from Madras, the authors collected several specimens of *Leiognathus elongatus* (Gunther) hitherto not reported from the Indian Seas. The occurrence of this species is reported in this paper with description of the same. With this species the number of silverbelly species known from the Indian Seas becomes 21.

### *Leiognathus elongatus* (Gunther)

*Material :* Fifty specimens ranging from 49 to 65 mm Standard length (61-77 mm total length) collected from trawl catches at Kasimedu landing centre in Madras on 14.7.1986. Three specimens were deposited in the Reference Collection Museum of the Central Marine Fisheries Research Institute (No. F.98/596).