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IMMIGRATION OF *METAPENAEUS STEBBINGI, M. AFFINIS* AND *M. MONOCEROS* JUVENILES IN THE CREEKS AND BACKWATERS NEAR KARACHI

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Immigration of *Metapenaeus* juveniles were studied in Korangi Creek, Bhambore, Sandspit and Hab Delta near Karachi for one year during 1979. Peak abundances in the three species *M. affinis, M. stebbingi* and *M. monoceros* were recorded in the second half of the year, which indicate spawning in spring and early summer. The juveniles were caught at 3-17 mm C. L. and abundant at 5-10 mm. Larger >8 mm were frequent during winter and smaller <8 mm during spring and summer. *M. stebbingi* appeared to dominate at the four localities, where salinities remain high for most part of the year with a decrease during July-September due to rain and flooding. The juveniles enter the localities at 3 mm minimum C. L., stay for 3-4 months and grow, then migrate to deeper shelf at 12-17 mm C. L. for further growth maturation and spawning.

Key words: Immigration, Migrate, Cohort, Spawn, Recruitment.

Introduction

Metapenaeus stebbingi, M. affinis and *M. monoceros* contribute significantly to the local shrimp fishery near Karachi city. Earlier studies indicate postlarval development of the above three species [6, 7] and genital organ development in *M. affinis* [8, 12] indicated abundance of *M. stebbingi* juveniles in areas where high salinity prevails where as those of *M. affinis* in areas of high salinity variations. Similarly Gunter [4] and Gunter *et al.* [5] reported salinity as the main factor in controlling distribution of penaeid juveniles. Other studies suggested preference for different vegetation types i.e., *M. endeavouri* for seagrass and *M. ensis* for both seagrass and mud-mangrove bank [15]. In the present study, four localities, all mud-mangrove banks were chosen for recording immigration and life cycle of the above three speies.

Material and Methods

Monthly sampling for juveniles of the three species was conducted south of Karachi in Korangi Creek and Bhambore and towards north at Sandspit and the delta of Hab River (Fig. 1). A beam trawl with a metal frame mouth 108 cm wide and 28 cm high, fitted with a net bag 250 cm in length having 3 mm meshes, was used for sampling at flood tides during the day for 1979 period. The net was towed by two persons at 0.5-1.5 m depth for a distance of 100 m. On each visit to the localities, three to four successive samples, covering an area of 300-400 m^2, were taken. Temperature was recorded using the bucket and thermometer (°C); and salinity through inductive salinometer. The juveniles were indentified and measured under wild M5 stereo-microscope using an ocular micrometer. The carapace length (C.L.) were measured from the base of the rostrum to the dorsal posterior margin and total length (T. L.) from tip of the rostrum to the tip of the telson. In a separate experiment postlarvae of the above species were reared in the laboratory [6-8] to develop diagnostic characters and to know growth rate. Mean growth rate (Fig. 2) was 0.5 mm/day in *M. affinis* and *M. monoceros* and 0.46 mm in *M. stebbingi*. The growth rates were helpfull in deducing the age of the juveniles when caught and the diagnostic characters were used to develop a key (Hassan; in press). Abundances of the juveniles were calculated per 100 m^2. Localities: Korangi Creek is situated (24°. 44', 24°. 48' latitude and 67°. 05', 67° . 12' longitude) about 12 km from Karachi. It is 3-7 fathom deep in the middle opening to shallow 0-3 fathom shelf into the Arabian sea. The area is sandy-cum-muddy, associated with mangroves.

Bhambore (Fig. 1) is situated 72 km southwest of Karachi and about 30 km from the open Arabian sea from where water enters the system through Gharo-Phitti Creeks of which

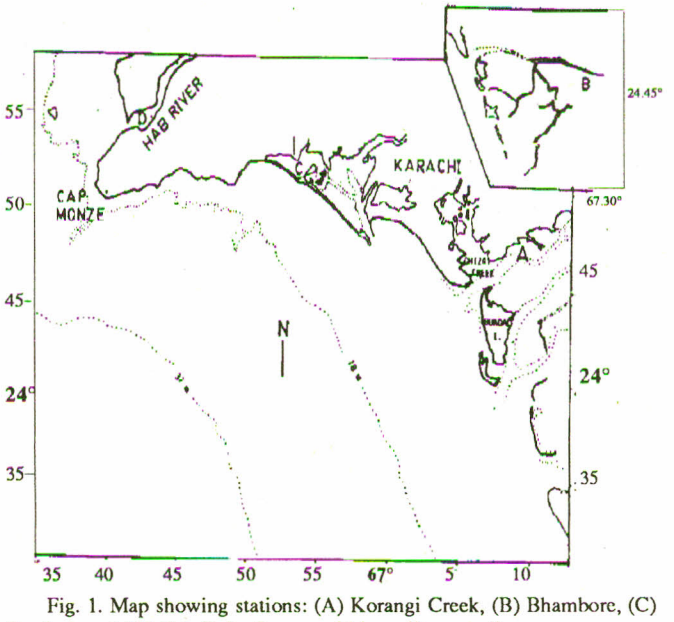

Fig. 1. Map showing stations: (A) Korangi Creek, (B) Bhambore, (C) Sandspit and (D) Hab Delta for penaeid juveniles sampling.

Korangi is also a part. It is sandy-cum-muddy and associated with very soft mud and mangroves. Sampling made 100 m west of Bahmbore in a wide channel joining it with Gharo Creek.

The backwaters of Sandspit (Fig. 1) are part of the Manora Channel (24° .50' latitude 66° . 56' longitude). The mud flats are covered with mangroves which are thickest here probably due to freshwater drain from Lyari River. Hab Delta locally known as Sonari, is located between Cap Monze and Gadani (24 ° .54' latitude, 66° .43' longitude) about 40 km northwest of Karachi. Nominal freshwater drain occurs into the Arabian sea through the river during monsoon rains. The locality is associated with soft mud and mangroves and bear edible oyster beds.

Results and Discussion

Temperature. During 1979, at the four localities (Fig. 3) lowest temperature (16-18°) were recorded in winter (Dec.-Jan.). These increased in the following spring (Feb.-April) and summer (May-Oct.) to reach a maximum of 30-33° surface temperature.

Salinity. At the four localities, surface salinities (Fig. 4) were generally high during winter and spring (37-39%) due to prolong dry season. Lower salinities (29-30%) in summer were caused by southwest monsoon rains and in winter due to occasional northeast monsoon.

Metapenaeus stebbingi Nobili. *M. Stebbingi* were caught round the year in Korangi Creek with a peak from July to Sept. and secondary peaks during Feb.-March and Nov. (early winter), a July peak in Hab Delta and a Nov. peak at Sandspit (Fig. 5,6). In general larger 10-14 mm C. L. individuals were abundant during winter and smaller 3-9 mm during spring and summer. (Fig. 6). Recruitment generally occurred during late summer (July-Oct.) and early winter (Nov.-Dec.). The species spawn throughout the year with a peak during May-July.

Metapenaeus affinis. Peak of abundance in this species occur during summer at the four localities, with highest in Korangi Creek and lowest at Sandspit. Larger 8-12 mm were more frequent during winter (Jan.-Feb.), and late summer (Sept.-Oct.), and smaller 3-7 mm during spring (April) and

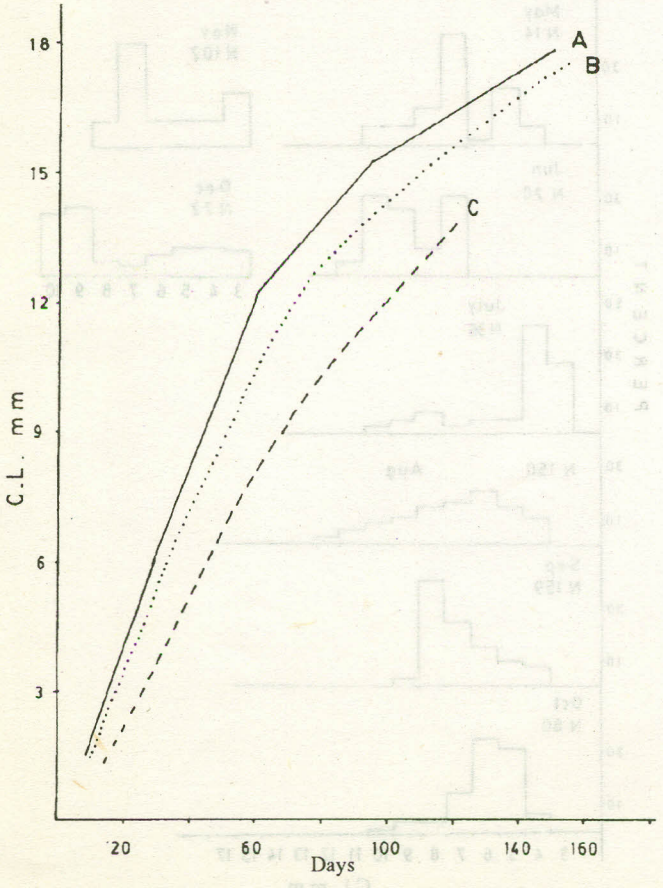

Fig. 2. Mean growth in *M. stebbingi*, *M. affinis* and *M. monoceros* juveniles reared in the laboratory.

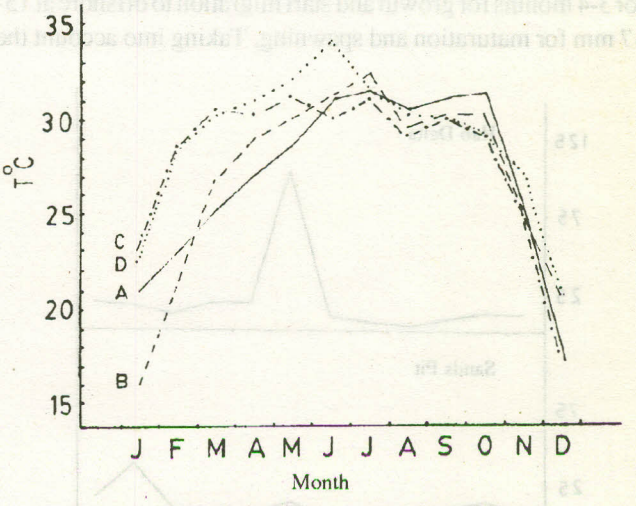

Fig. 3. Monthly variation in temperature (°C) during 1979.

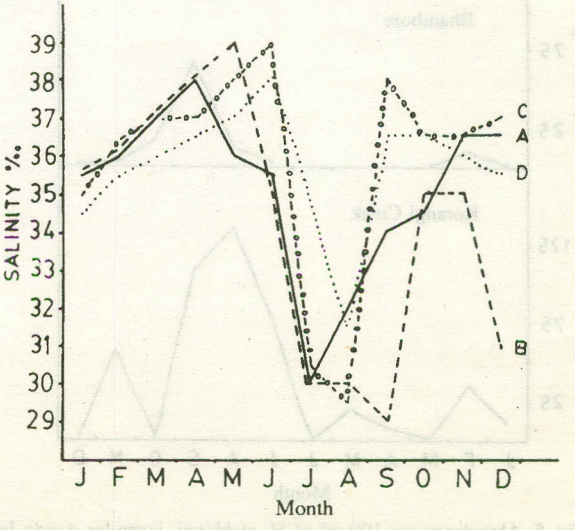

Fig. 4. Monthly variation in salinity (o/oo) during 1979.

summer. The species spawns throughout the year with peaks during Feb.-March and recruitment generally occurring from April-July (Figs. 7,8).

Metapenaeus monoceros. Juveniles were present in the study area in smaller numbers than other species at the four localities, and only during April-Oct., with a peak during May-June. The species spawns from January-July with recruitment occurring during summer (Figs. 7,8).

Little information is available about *M. stebbingi* in the literature as it is not commercially important in any part of the world [14]. It contributes substantially to the fishery in Pakistani waters [9] and common in estuaries, creeks and inshore waters of Pakistan [17]. Juveniles and subadults are abundant in areas where high salinity prevails, like Korangi Creek and Mekran Coasts [12] and is insignificant in areas of high salinity variations (0-40%) as in Indus Delta [10, 11]. Postlarvae immigrate in these localities at 3-4 mm C.L. stay for 3-4 months for growth and start migration to offshore at 15-17 mm for maturation and spawning. Taking into account the growth rate (Fig. 2) apparently it spawn throughout the year with a peak during May-July.

M. affinis was abundant throughout the coast of Pakistan in shallower 7-26 m shelf [3, 17]. Juveniles are less abundant in areas where high salinity prevails (30-36‰) but recorded in large numbers further south in the Indus Delta where there are great variations in salinity 0-40‰, [12], Juveniles enter the localities at 3-4 mm C. L. stay for 3-4 months and grow to 12-15 mm then leave the backwaters and creeks for further growth, maturity and spawning.

M. monoceros are typically abundant off the coast of Pakistan [3, 17]. It seems that juveniles prefer low salinities as George [2] reported abundances in low saline estuaries and paddy-fields in India. *M. brevicornis*, the fourth species of the genus, is rare in the study area.

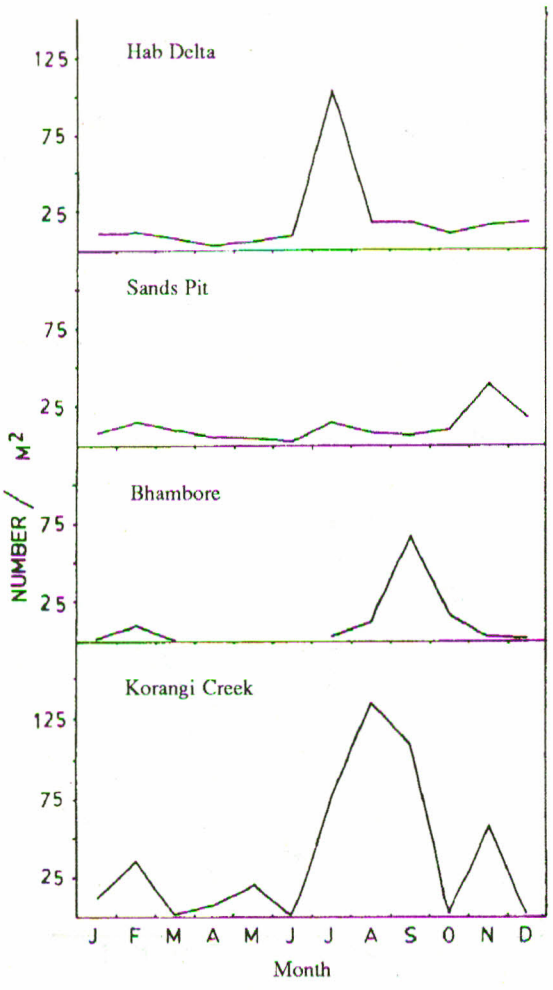

Fig. 5. Abundance per 100 m² of *M. stebbingi* juveniles during Jan.-Dec., 1979 at the four localities.

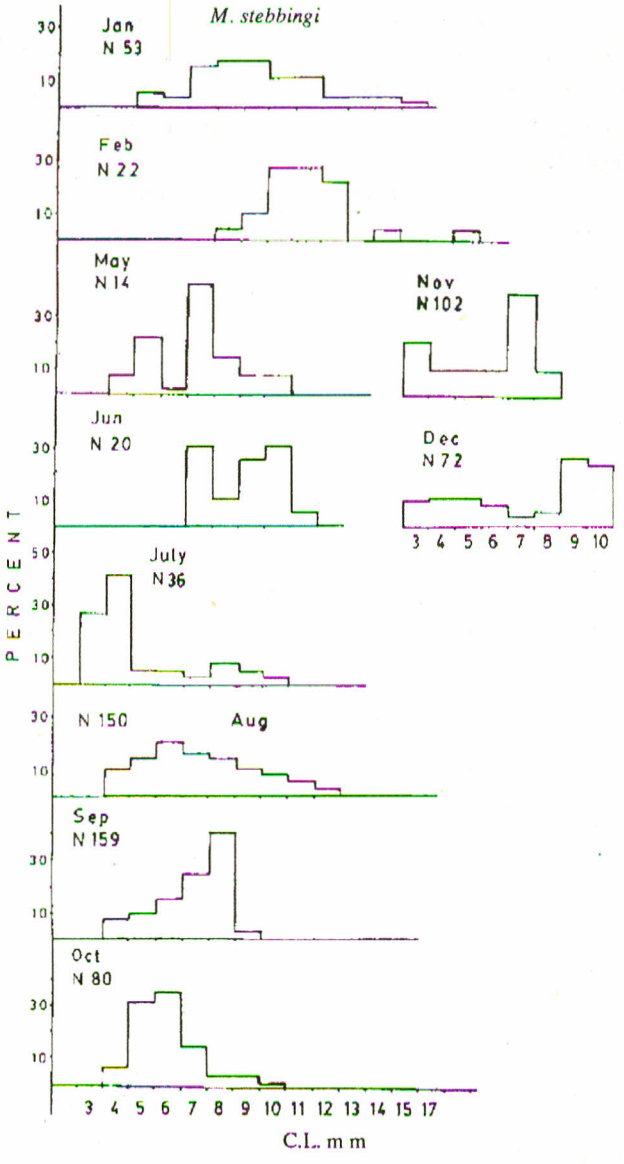

Fig. 6. Size frequency of *M. stebbingi* juveniles during 1979.

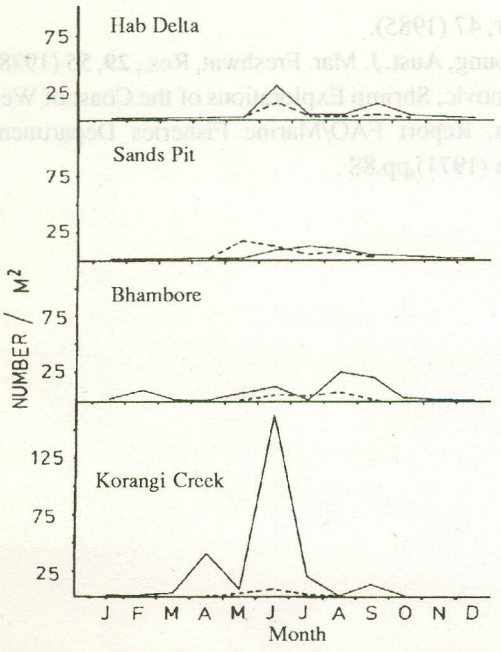

Fig. 7. Abundance per 100m² of *M. affinis* (solid lines) and *M. monoceros* juveniles (broken lines) during 1979.

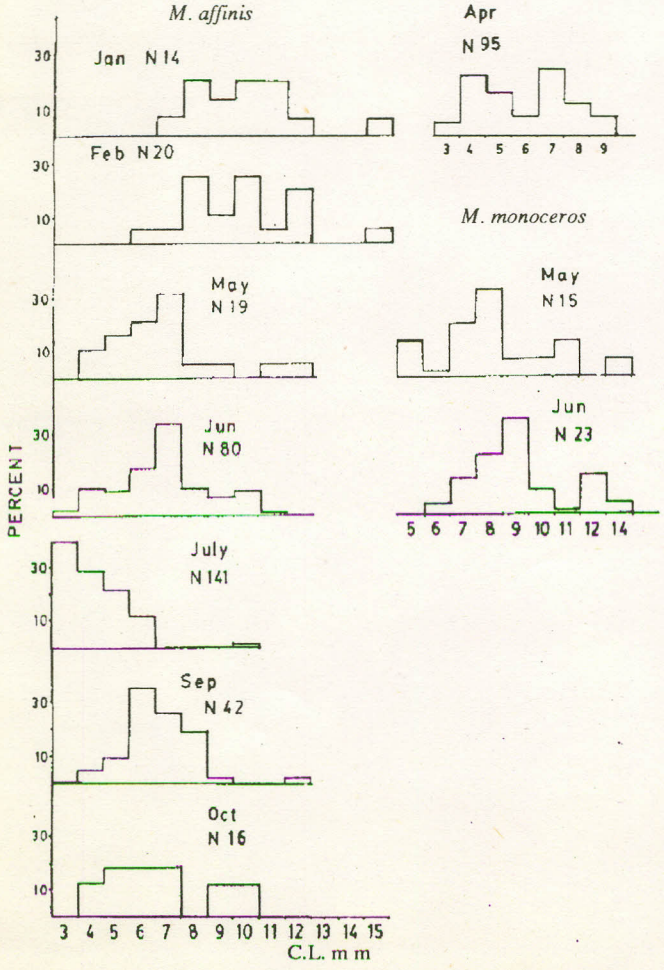

Fig. 8. Size frequency distribution of *M. affinis* and *M. monoceros* juveniles during 1979.

A temporal partitioning is apparent between *M. affinis*, *M. monoceros* and *M. stebbingi* related to spawning cycles. In the former two the spawning is in spring and in the latter summer. This is similar to *M. endeavouri* and *M. dalli* in Dugong River (Coles and Long, 1985) and to *M. bennetae* and *M. macleayi* in Moreton Bay [16].

LIFE CYCLE

Metapenaeus spawn at sea and enter the creek and backwaters when 15-20 days old and 1 mm C.L. They continue to move to and fro with tidal currents and generally settle at one month old and 3 mm C. L. [9,12,16]. Juveniles grow for about 4 months before migrating back to sea at 12-16 mm. Subadults spend about a month in the deeper waters of the same locality, or shallower shelf, and attain 20 mm. They continue to grow and mature as they spread into deeper waters and spawn when 7 month old (20-30 mm). However, the bulk of the cohort spawn at 30-35 mm C.L. when 10-12 month old.

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