

## DISTRIBUTIONAL PATTERNS OF BRACHYURAN LARVAE IN MANORA CHANNEL (KARACHI, PAKISTAN) COLLECTED DURING 1995

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**ABSTRACT:** This study gives an account of distributional patterns of brachyuran larvae in the Manora Channel from January to November 1995. The planktonic sampling was carried out during day time from surface and subsurface waters of station I and II (certain sites) at shallow depths (15'-20') using Bongo net of 300 micron mesh size.

In all 19527 larvae were obtained through fourteen sampling. These brachyuran larvae belonged to nine families and twenty four species: *Ebalia ?sagittifera*, *Philyra* sp., *Philyra ?scabriuscula* (Leucosiidae), *Schizophrys aspera* (Majidae), *Charybdis annulata*, *Charybdis* sp. (Portunidae), Xanthid sp A., B. and C. (Xanthidae), *Pilumnus ?karachiensis*, *Pilumnus* sp. (Pilumnidae), *Menippe rumphii* (Oziidae), *Pinnotheres* sp. A, and B. (Pinnotheridae), *Nasima dotilliforme*, *Serenella indica*, *Macrophthalmus (Mareotis) depressus*, *Macrophthalmus* sp., *Dotilla blanfordi*, Ocypodid sp. A., B. and C. (Ocypodidae), *Metopograpsus thukuhar* and *Clistocoeloma lanatum* (Grapsidae).

This study is based on identification, occurrence, distributional patterns along Manora Channel and percentage composition of brachyuran larvae in the area, collected during 1995.

**KEY WORDS:** Brachyuran larvae, distributional patterns, Manora Channel, Pakistan.

### INTRODUCTION

A fairly large collection of brachyuran larvae was obtained from the Manora Channel through fortnightly collection during day time in the year 1995, from surface and subsurface waters at shallow depths (15' - 20'). Planktonic larvae are difficult to identify to specific level, their correct identification can only be made possible by comparison with the laboratory reared larvae obtained directly from ovigerous female or to some extent with the help of previous work such as Gurney (1938); Atkins (1954); Chhapgar (1955); Raja Bai (1960a, b); Hashmi (1969, 1970a,b,c); Baba and Miyata (1971); Kakati and Sankolli (1975); Rice (1975, 1980); Kakati (1977); Kakati and Nayak (1979); Lim and Tan (1981); Salman (1982); Yatsuzuka and Sakai (1984); Fielder, *et al* (1984); Martin (1988); Amir (1989); Ingle (1991); Siddiqui and Tirmizi (1992); Tirmizi, *et al* (1993); Tirmizi and Kazmi (1996); Bano (1999); Siddiqui and Kazmi (2000); Ghory (2002); Ghory and Siddiqui (2000 and 2002); Ghory and Siddiqui (2006). The present study is based on the identification, occurrence, distributional patterns and percentage composition of brachyuran larvae of the area studied. The present study is also compared with the previous studies conducted by Ghory and Siddiqui (2002 and 2006) to reach to some conclusion.

## MATERIALS AND METHODS

The planktonic materials have been obtained from Manora Channel (Figure 1) (Long.  $66^{\circ} 59'E$  and Lat.  $24^{\circ} 48'N$ ) through the financial support of ONR (US Office of the Naval Research) project. The planktonic sampling were made fortnightly from the area, during day time, using Bongo net of 300 micron mesh size with horizontally attached flowmeter in a tow time of 10 minutes. These samples were collected from two different stations (I and II) at shallow depth (15'-20'). AI (surface sample); AII (subsurface sample); BI (subsurface sample); BII (surface sample). The salinity (ppt) was measured with an optical hand refractometer. The pH was measured by pH meter (PAL model TI95-26539), temperatures of air and seawater were measured by hand holding thermometer. Physical parameters are given in table 1.

Brachyuran larvae were sorted out and transferred to 70% alcohol from 5% formalin. The specimens were dissected using tungsten needles under a Ogawa Seiki binocular microscope (4 x 10 magnification). The illustrations were made with the help of Olympus BH2 microscope (magnifications 1.25 x 4, 10, 20 and 40) with Nomarski interference contrast and *camera lucida* attachment. Measurements of each stage were made with the aid of micrometer. The total length (TL) was determined from the tip of the rostrum to the mid posterior border of the telson. Measurements are given in millimeter (mm).

The larvae were deposited in the Marine Reference Collection and Resource Centre (MRC), University of Karachi. Identified larvae were also catalogued (Table 2).

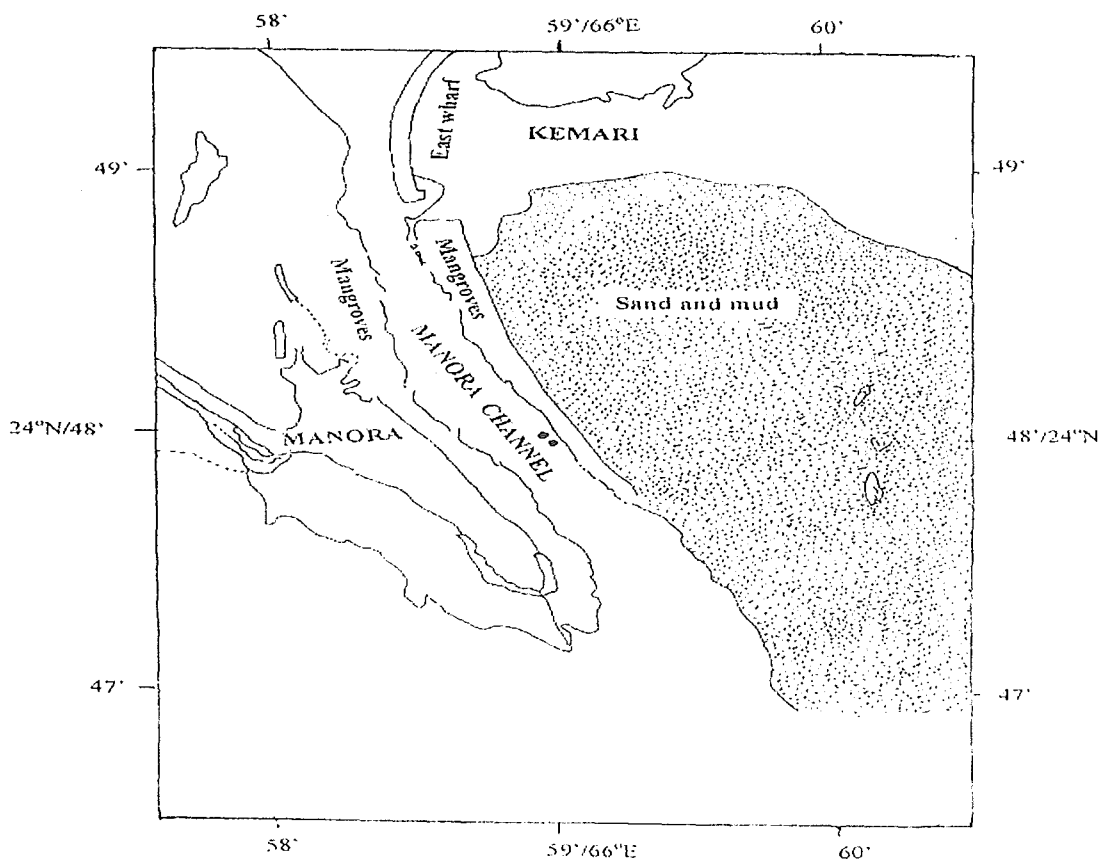


Fig. 1. Map of Manora Channel, solid circles indicate collection sites.

**Table 1: Detail of Occurrence and Numerical Counts of Brachyuran Larvae at stations I and II of Manora Channel during 1995.**

Sample No.	Date of Coll.	Sta. No.	pH	Tide (m)	Depth (ft.)	Salinity ‰	Temp. Air °C	Temp. Water °C	No. of Specimens
1	11 Jan.1995	AI	7	0.8	-	35	24	22	1080
-	"	AII	"	"	15'-20'	"	"	"	543
-	"	BI	"	"	"	"	"	"	1286
-	"	BII	"	"	-	"	"	"	994
2	29 Jan.1995	AI	"	2.6	-	"	23	21	103
-	"	AII	"	"	15'-20'	"	"	"	60
-	"	BI	"	"	"	"	"	"	13
-	"	BII	"	"	-	"	"	"	4
3	08 Feb.1995	AI	"	0.8	-	"	22	20	272
-	"	AII	"	"	15'-20'	"	"	"	189
-	"	BI	"	"	"	"	"	"	320
-	"	BII	"	"	-	"	"	"	362
4	13 Mar.1995	AI	"	"	-	"	27	25	48
-	"	AII	"	"	15'-20'	"	"	"	17
-	"	BI	"	"	"	"	"	"	327
-	"	BII	"	"	-	"	"	"	105
5	30 Mar.1995	AI	"	2.7	-	"	26	24	188
-	"	AII	"	"	15'-20'	"	"	"	147
-	"	BI	"	"	"	"	"	"	122
-	"	BII	"	"	-	"	"	"	153
6	12 Apr.1995	AI	"	2.6	-	36	24.5	23	242
-	"	AII	"	"	15'-20'	"	"	"	3080
-	"	BI	"	"	"	"	"	"	612
-	"	BII	"	"	-	"	"	"	818
7	25 Apr.1995	AI	"	2.2	-	"	30	28	257
-	"	AII	"	"	15'-20'	"	"	"	453
-	"	BI	"	"	"	"	"	"	123
-	"	BII	"	"	-	"	"	"	399

Table 1 continued.....

Sample No.	Date of Coll.	Sta. No.	pH	Tide (m)	Depth (ft.)	Salinity ‰	Temp. Air °C	Temp. Water °C	No. of Specimens
8	04 May, 1995	AI	"	2.5	-	"	31	29	35
-	"	AII	"	"	15'-20'	"	"	"	81
-	"	BI	"	"	"	"	"	"	54
-	"	BII	"	"	-	"	"	"	46
9	30 May, 1995	AI	"	"	-	"	32	"	355
-	"	AII	"	"	15'-20'	"	"	"	166
-	"	BI	7	2.5	"	35	32	29	350
-	"	BII	"	"	-	"	"	"	331
10	28 Sep. 1995	AI	"	2.7	-	"	30	28	694
-	"	AII	"	"	15'-20'	"	"	"	580
-	"	BI	"	"	"	"	"	"	460
-	"	BII	"	"	-	"	"	"	1065
11	05 Oct. 1995	AI	"	2.5	-	35	31	29	155
-	"	AII	"	"	15'-20'	"	"	"	116
-	"	BI	"	"	"	"	"	"	207
-	"	BII	"	"	-	"	"	"	115
12	22 Oct. 1995	AI	"	2.6	-	"	"	"	34
-	"	AII	"	"	15'-20'	"	"	"	29
-	"	BI	"	"	"	"	"	"	6
-	"	BII	"	"	-	"	"	"	23
13	04 Nov. 1995	AI	"	2.5	-	"	30	"	28
-	"	AII	"	"	15'-20'	"	"	"	148
-	"	BI	"	"	"	"	"	"	33
-	"	BII	"	"	-	"	"	"	28
14	25 Nov. 1995	AI	"	0.7	-	"	"	"	430
-	"	AII	"	"	15'-20'	"	"	"	558
-	"	BI	"	"	"	"	"	"	461
-	"	BII	"	"	-	"	"	"	622

## RESULTS

A total 19527 brachyuran larvae are obtained through fourteen samplings shown in the table 1. These larvae are identified through laboratory reared larvae and with the help of literature. They belong to nine families pertaining to twenty four species (Table 2). The larval stages of twenty four species are presented by their respective families are shown in Figures 2-7.

It is observed that the Ocypodidae is the most dominating family representing 9 species larvae in the study area (Manora Channel) during the year 1995. The remaining families are represented only by 1-3 species as shown in following table 2.

**Table 2: Detail of larvae collected from Manora Channel.**

Families	Species	Stages	Catalogue Nos.
Leucosiidae	<i>Ebalia ?sagittifera</i> Alcock, 1896	Zoea I and II	-
	<i>Philyra</i> sp.	Zoea I and II	-
	<i>Philyra ?scabriuscula</i> (Fabricius, 1798)	Megalopa	-
Majidae	<i>Schizophrys aspera</i> (H. Milne Edwards, 1834)	Zoea II	BRAC. 691
Portunidae	<i>Charybdis annulata</i> (Fabricius, 1798)	Zoea I	BRAC. 692
	<i>Charybdis</i> sp.	Megalopa	-
Xanthidae	Species A	Megalopa	-
	Species B	Megalopa	-
	Species C	Megalopa	-
Pilumnidae	<i>Pilumnus ?karachiensis</i> Deb, 1987	Zoea I	-
	? <i>Pilumnus</i> sp.	Zoea III	-
Oziidae	<i>Menippe rumphii</i> (Fabricius, 1798)	Zoea I	BRAC. 693
Pinnotheridae	<i>Pinnotheres</i> sp. A	Zoea II	-
	<i>Pinnotheres</i> sp. B	Zoea I	-
Ocypodidae	Species A	Zoea II	-
	Species B	Zoea III	-
	Species C	Zoea I and II	-
	<i>Nasima dotilliforme</i> (Alcock, 1900)	Zoea II	BRAC. 694
	<i>Serenella indica</i> (Alcock, 1900)	Zoea I and III	BRAC. 695
	<i>Macrophthalmus (M.) depressus</i> Rüppell, 1830	Zoea I and II	BRAC. 696
	<i>Macrophthalmus</i> sp.	Zoea I	-
	<i>Dotilla blanfordi</i> (Alcock, 1900)	Zoea I, II	BRAC. 697
	<i>Dotilla</i> sp.	Megalopa Megalopa	BRAC. 698
	Grapsidae	<i>Metopograpsus thukuhar</i> (Owen, 1839)	Zoea I
<i>Clistocoeloma lanatum</i> (Alcock, 1900)		Zoea I	BRAC. 700

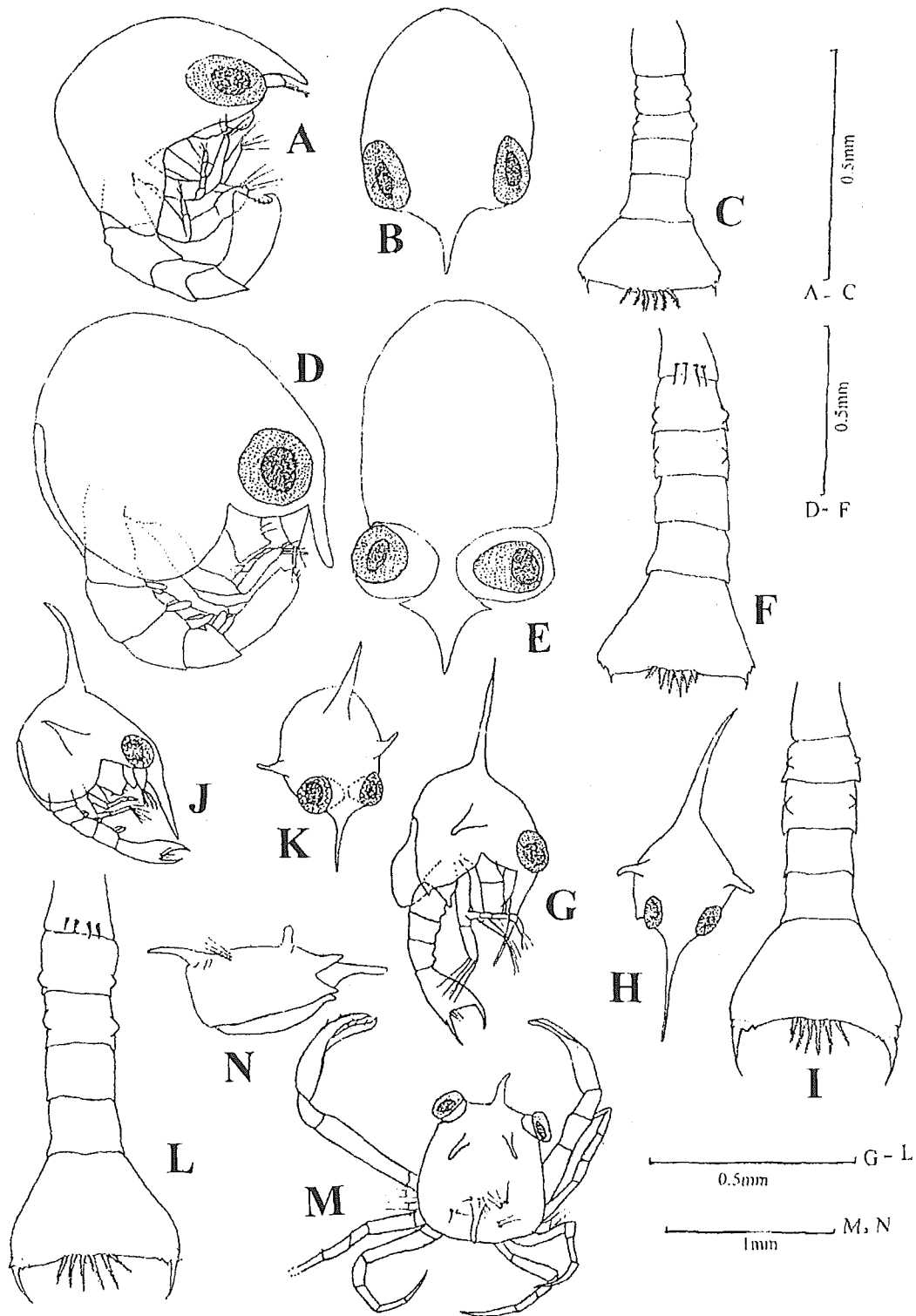


Fig 2. **Leucosiidae**. *Ebalia ?sagittifera*. Zoea I: A, lateral view; B, dorsofrontal view; C, abdomen with telson; zoea II: D, lateral view; E, dorsofrontal view; F, abdomen with telson. *Philyra* sp. Zoea I: G, lateral view; H, dorsofrontal view; I, abdomen with telson; Zoea II: J, lateral view; K, dorsofrontal view; L, abdomen with telson. *Philyra ?scabriuscula* Megalopa; M, dorsal view; N, lateral view of carapace.

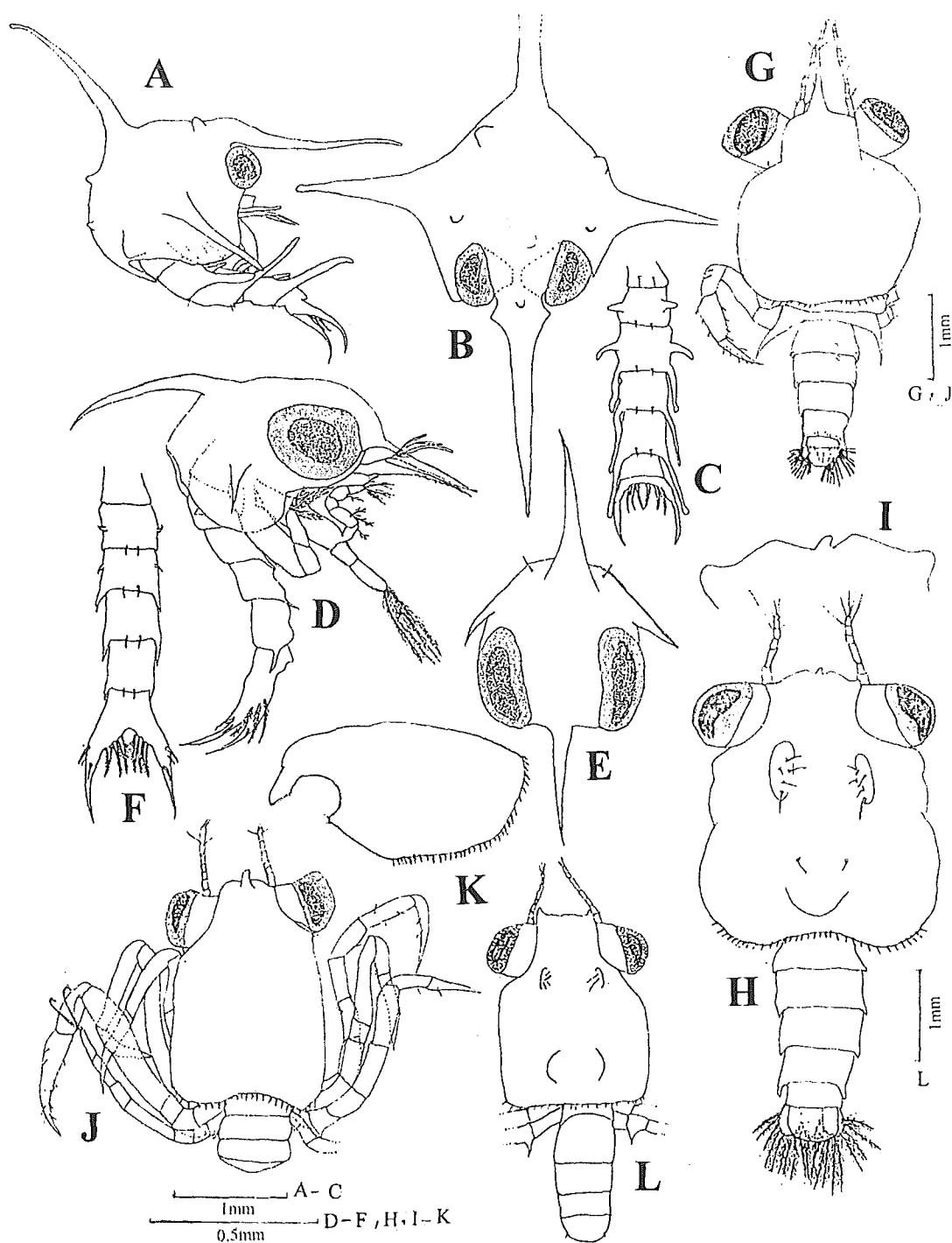


Fig. 3. **Majidae.** A-C. *Schizophrys aspera* Zoa II: A, lateral view; B, dorsofrontal view; C, abdomen with telson. **Portunidae.** D-G. *Charybdis annaulata* Zoa I; D, lateral view; E, dorsofrontal view; F, abdomen with telson. *Charybdis* sp. Megalopa; G, dorsal view. **Xanthidae.** H-L. Xanthid sp. A. Megalopa; H, dorsal view; I, frontal view of carapace. Xanthid sp. B. Megalopa; J, dorsal view; K, lateral view of carapace. Xanthid sp. C. Megalopa; L, dorsal view.

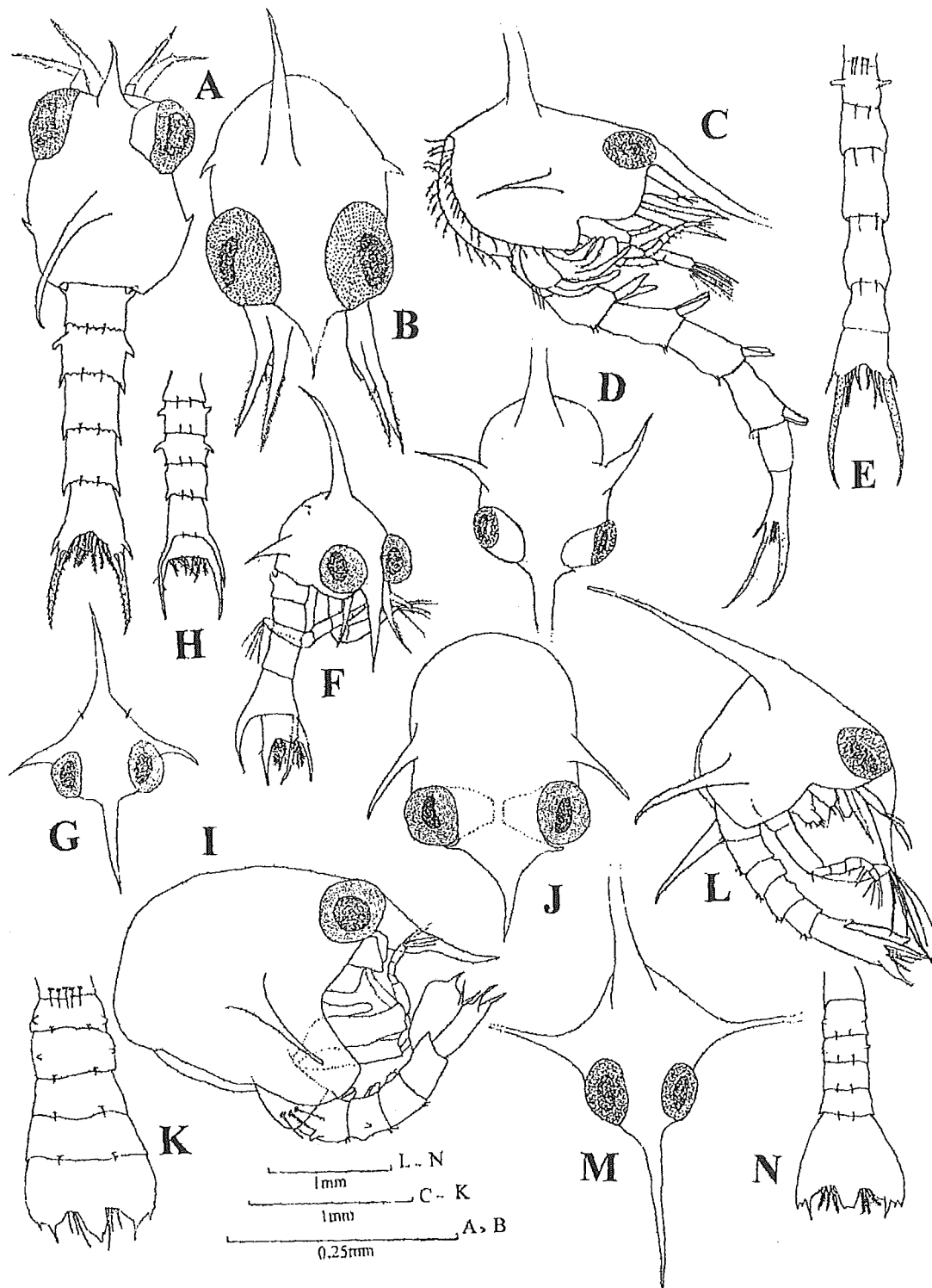


Fig. 4. **Pilumnidae** A-E. *Pilumnus* ?*karachiensis*. Zoea I: A, dorsal view; B, dorsofrontal view. ? *Pilumnus* sp. Zoea III: C, lateral view; D, dorsofrontal; E, abdomen with telson. **Oziidae**, F-H *Menippe rumphii* Zoea I: F, lateral view; G, dorsofrontal view; H, abdomen with telson. **Pinnotheriade**. I-N. *Pinnotheres* sp. A Zoea I; L, lateral view; M, dorsofrontal view; N, abdomen with telson.



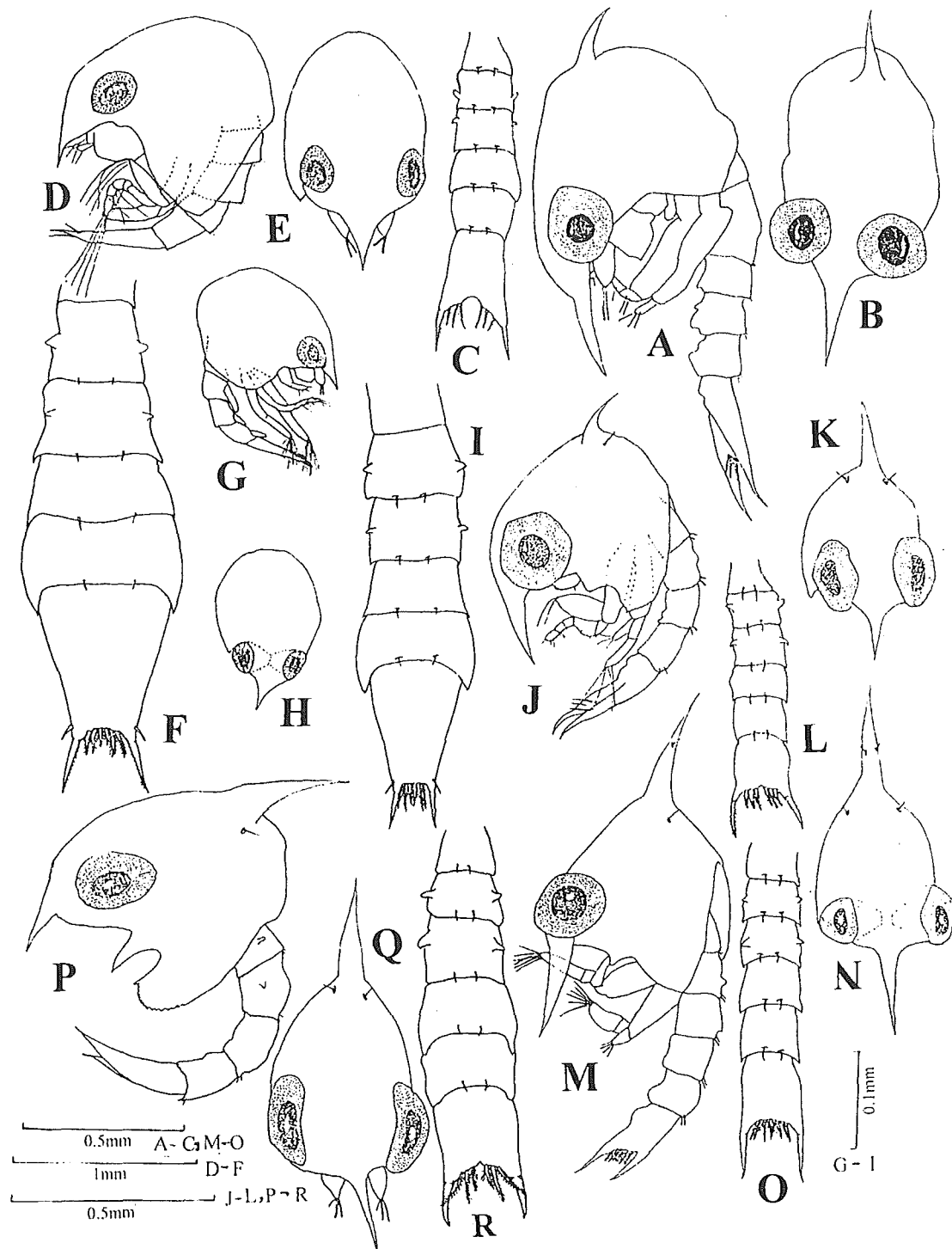


Fig. 5. **Ocypodidae**. *Nasima dotilliforme* Zoea II: A, lateral view; B, dorsofrontal view; C, abdomen with telson. *Serenella indica* Zoea I: D, lateral view; E, dorsofrontal view; F, abdomen with telson. Zoea III: G, lateral view; H, dorsofrontal view; I, abdomen with telson. *Macrophthalmus (Mareatis) depressus* Zoea I: J, lateral view; K, dorsofrontal view; L, abdomen with telson; zoea II: M, lateral view; N, dorsofrontal view; O, abdomen with telson. *Macrophthalmus* sp. Zoea I: P, lateral view; Q, dorsofrontal view; R, abdomen with telson.

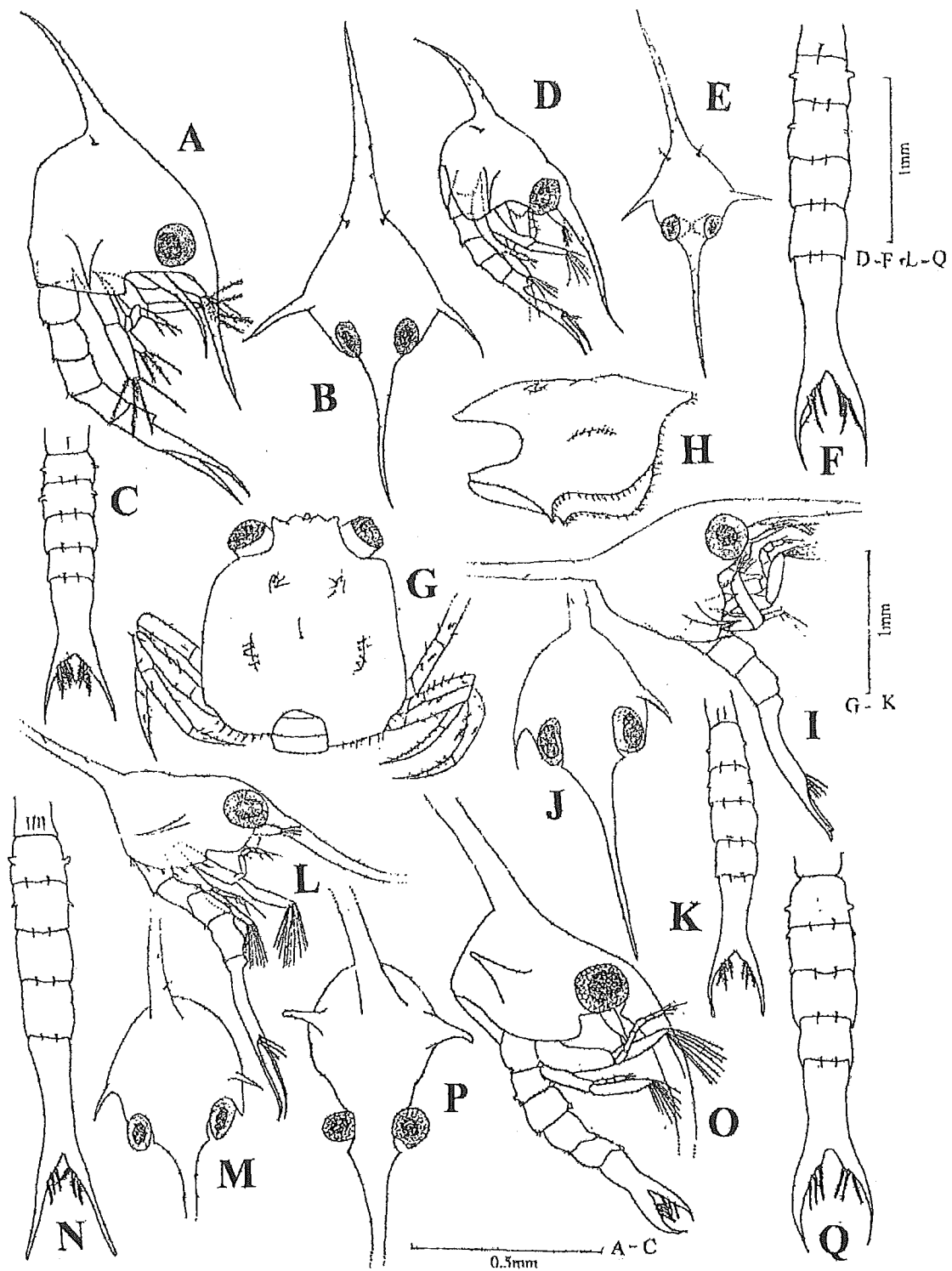


Fig. 6. **Ocypodidae**. *Dotilla blanfordi* Zoea I: A, lateral view; B, dorsofrontal view; C, abdomen with telson; Zoea II: D, lateral view; E, dorsofrontal view; F, abdomen with telson; Megalopa; G, dorsal view; H, lateral view of carapace, Ocypodid sp. A., Zoea II: I, lateral view; J, dorsofrontal view; K, abdomen with telson; Zoea III: L, lateral view; M, dorsofrontal view; N, abdomen with telson. Ocypodid sp. B., Zoea II: O, lateral view; P., dorsofrontal view; Q., abdomen with telson.

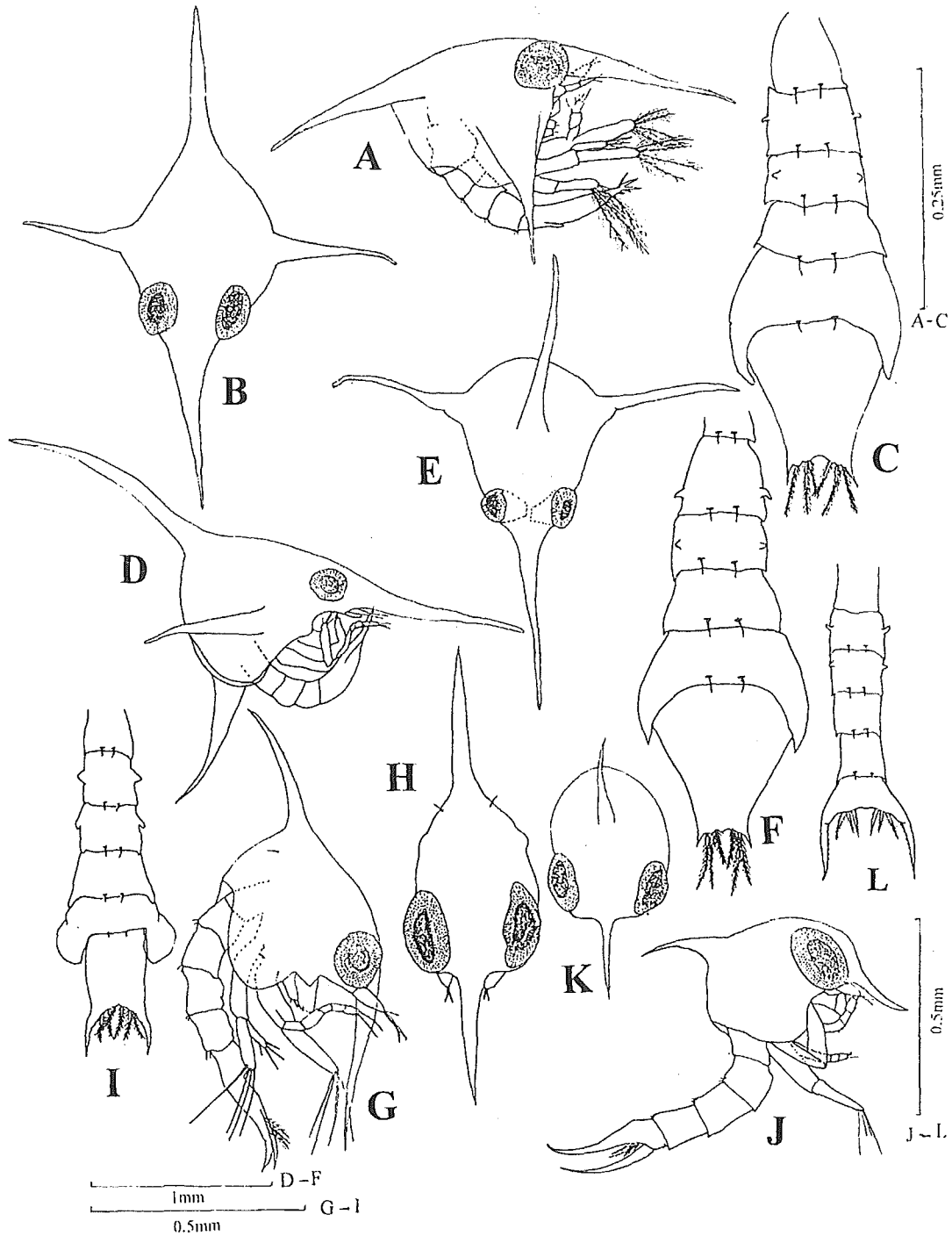
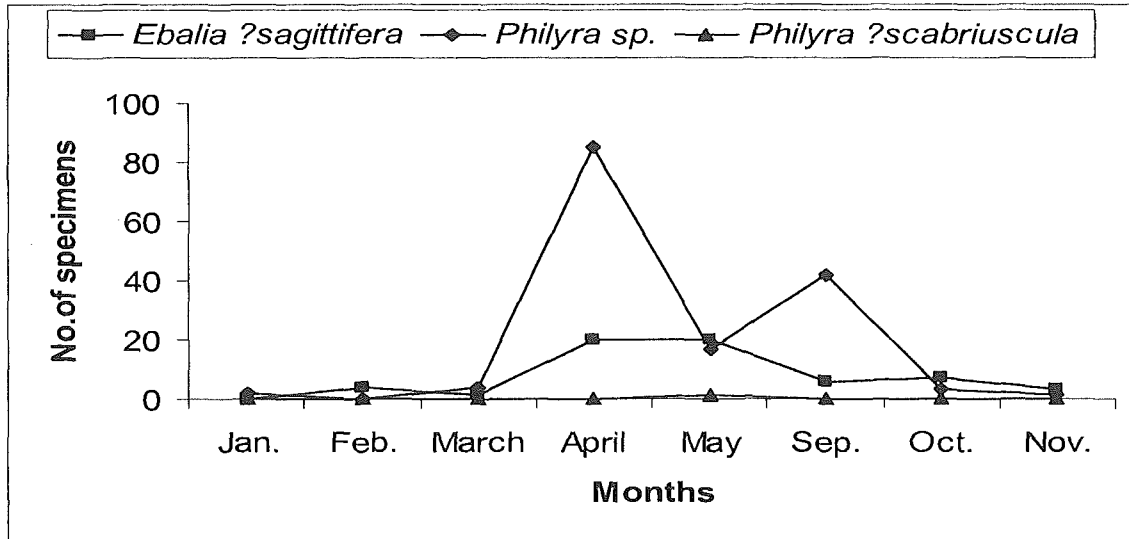


Fig. 7. **Ocypodidae**. A-F. Ocypodid sp. C. Zoa I: A, lateral view; B, dorsofrontal view; C, abdomen with telson; Zoa II: D, lateral view; E, dorsofrontal view; F, abdomen with telson. **Grapsidae**. G-L. *Metopograpsus thukuhar* Zoa I: G, lateral view; H, dorsofrontal view; I, abdomen with telson. *Clistocoeloma lanatum* Zoa I: J, lateral view; K, dorsofrontal view; L, abdomen with telson.

### MONTHLY VARIATION

Monthly variations in numbers of brachyuran larvae of the species composition are shown in Figures 8-12. Percentage composition of different brachyuran larvae is shown in Figure 16.

A.



B.

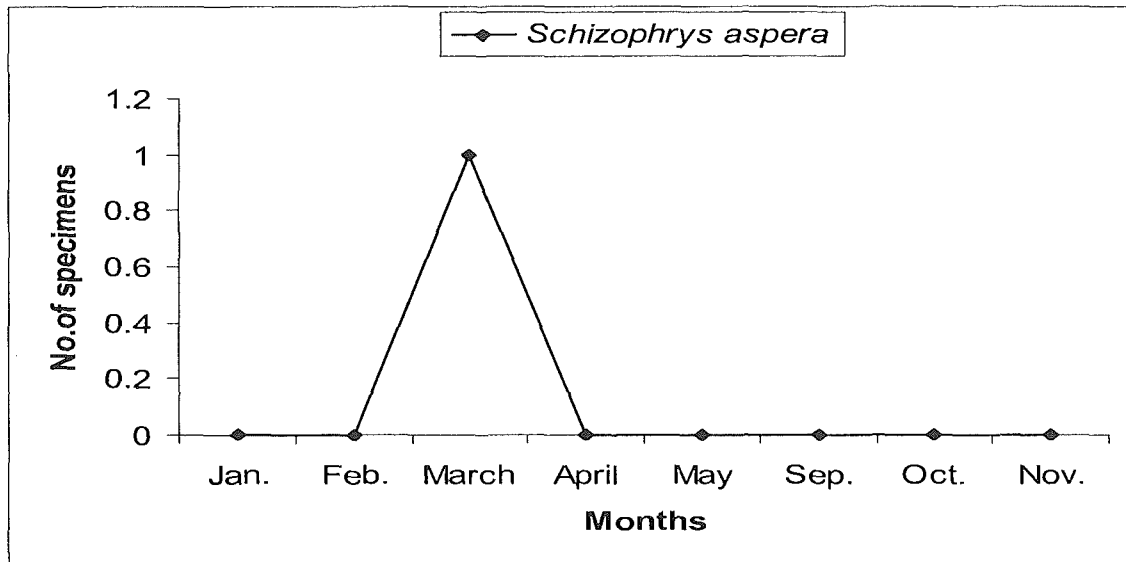


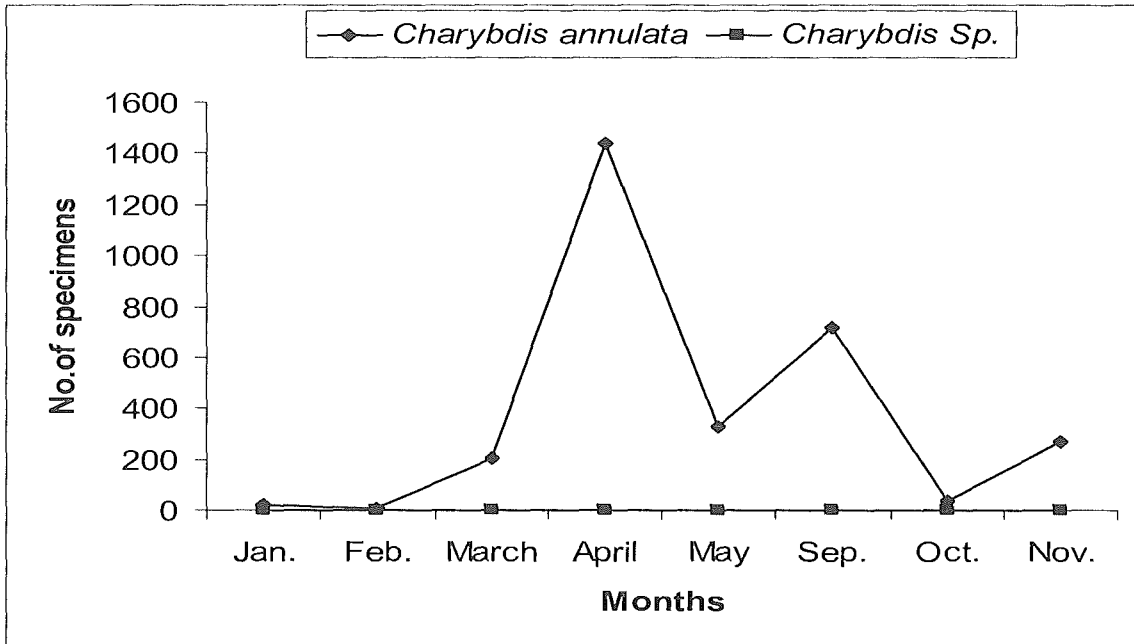
Fig. 8. Monthly variations in number of species composition of brachyuran larvae:

- (A). *Ebalia ? sagittifera*, *Philyra sp.*, *Philyra ?scabriuscula*;  
 (B). *Schizophrys aspera* during January - November, 1995.

The larvae of *Macrophthalmus (Mareotis) depressus* were collected in abundance represented by 33.92 % of the total species larvae, *Dotilla blanfordi*; *Pilumnus ?karachiensis*; *Charybdis annulata* were the next dominating species represented by 19.86%, 17.35% and 15.68 % respectively. The remaining species occurred in the following order: *Clistocoeloma lanatum*; , *Serenella indica*; *Metopograpsus thukuhar*; *Ebalia ?sagittifera*; *Philyra sp.*; *Menippe rumphii*; *Pinnotheres sp.*; *Ocypodid sp. A.*, *B.* and *C.*; *Philyra ?scabriuscula*;

*Schizophrys aspera*; *Charybdis* sp.; Xanthid sp A., B. and C.; *Pilumnus* sp.; *Pinnotheres* sp. A and B; *Nasima dotilliforme*; , *Macrophthalmus* sp. represented by 3.58% - .005%.

A.



B.

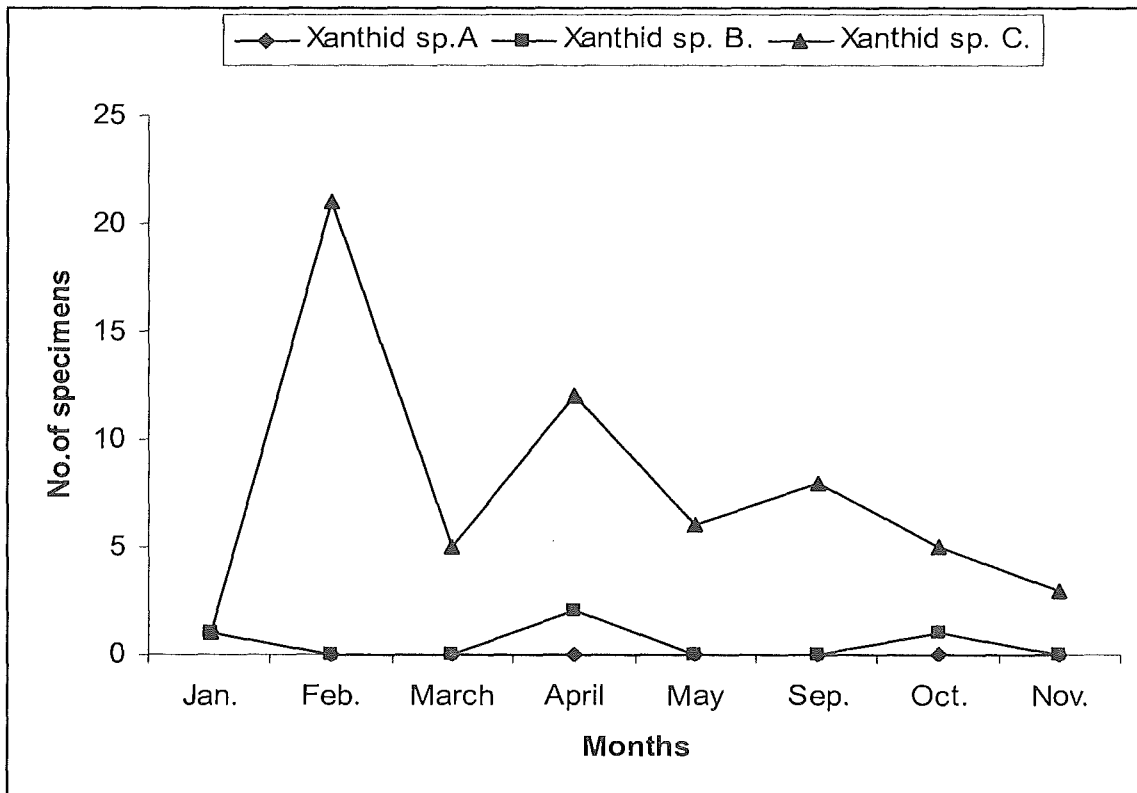
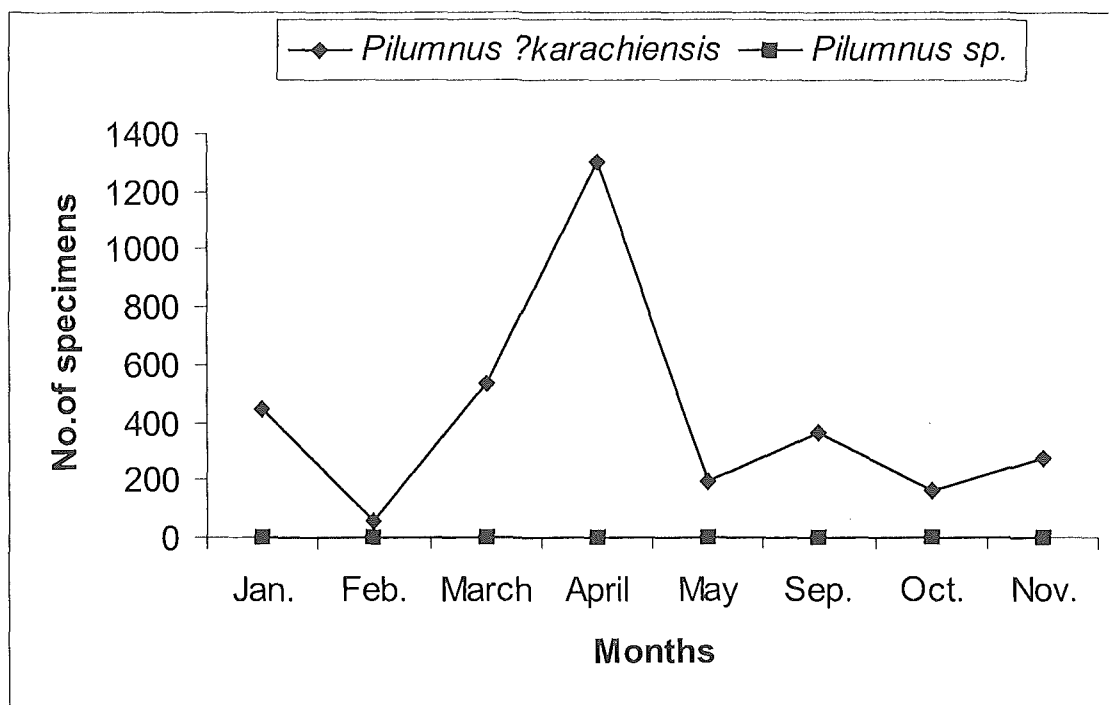


Fig. 9. Monthly variations in number of species composition of brachyuran larvae: (A). *Charybdis annulata*, *Charybdis* sp. (B). Xanthid sp.A., B. and C., during January-November, 1995.

A.



B.

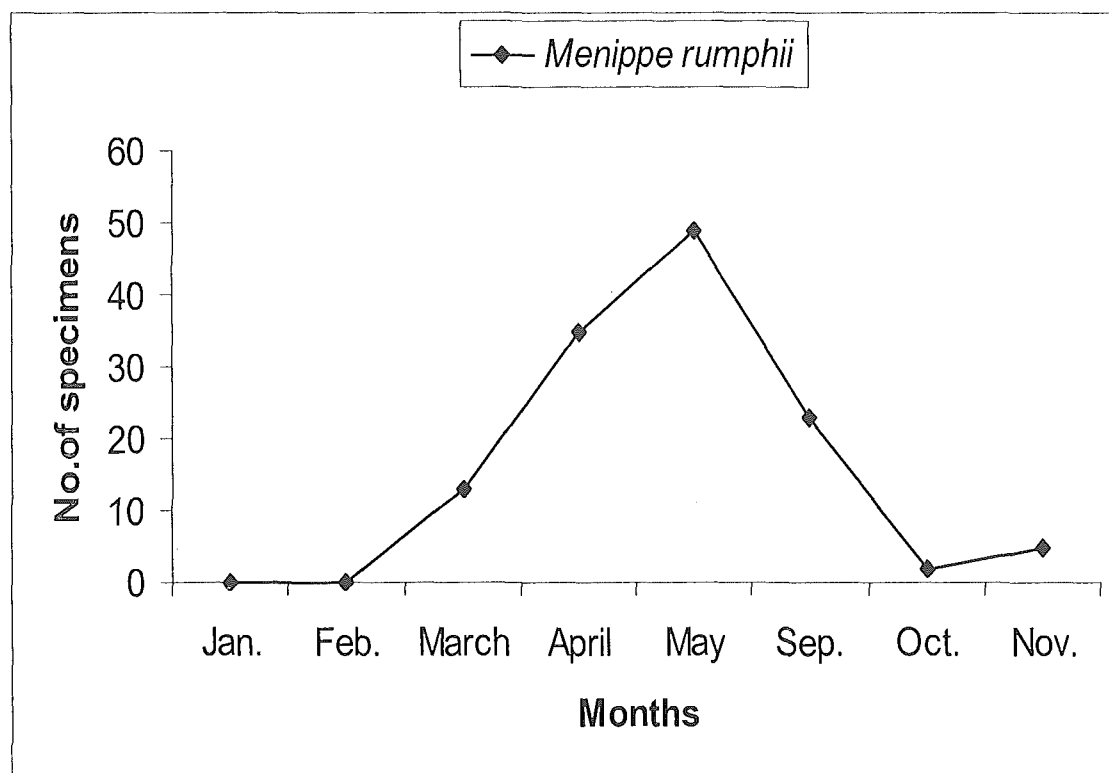
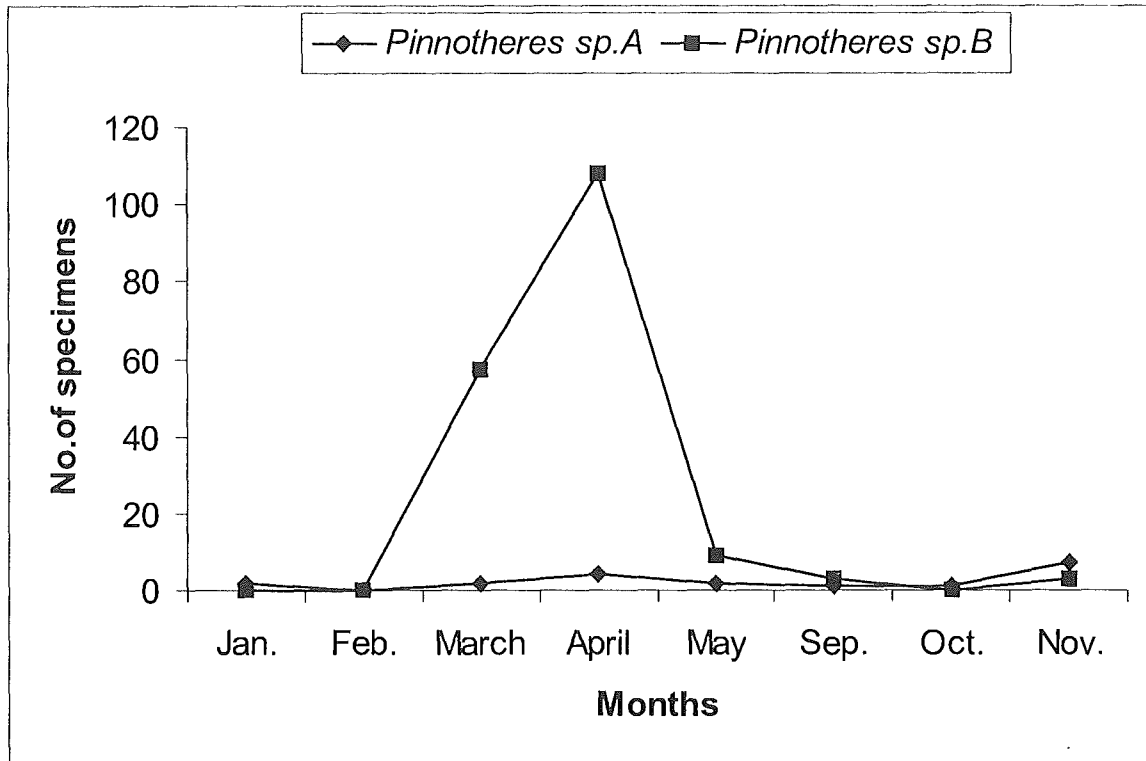


Fig. 10. Monthly variations in number of species composition of brachyuran larvae. (A). *Pilumnus ?karachiensis*, *Pilumnus sp* (B). *Menippe rumphii* during January - November, 1995.

A.



B.

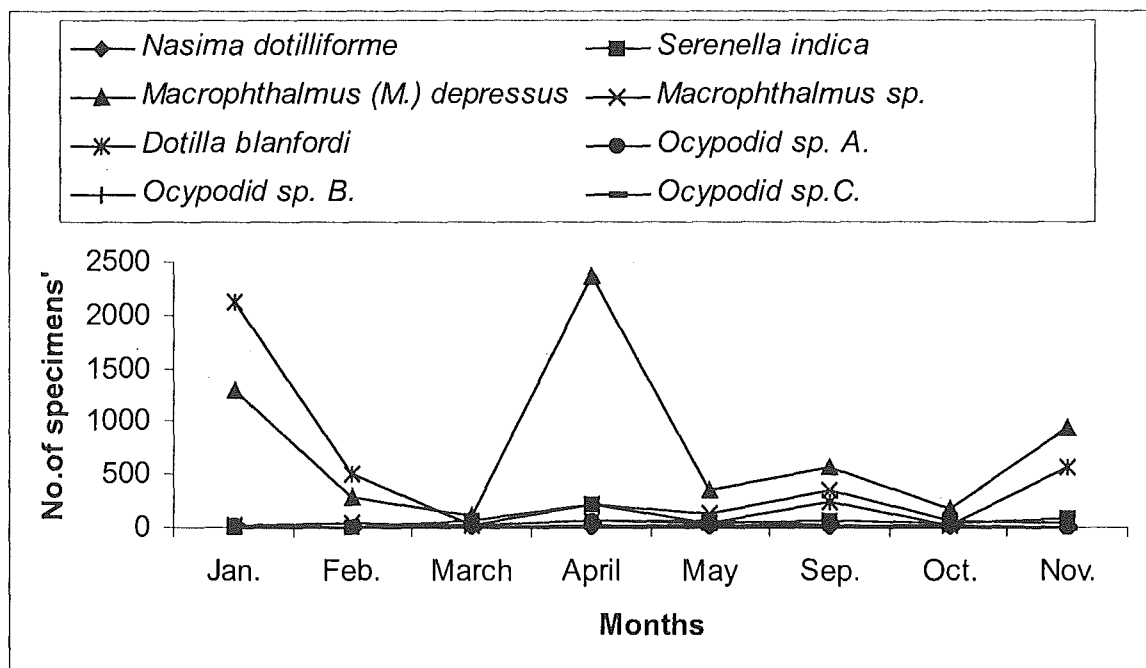


Fig. 11. Monthly variations in number of species composition of brachyuran larvae: (A). *Pinnotheres* sp. A and B, (B). *Nasima dotilliforme*, *Serenella indica*, *Macrophthalmus (M.) depressus*, *Macrophthalmus* sp., *Dotilla blanfordi*, and *Ocypodid* sp. A, B. and C, during January - November, 1995.

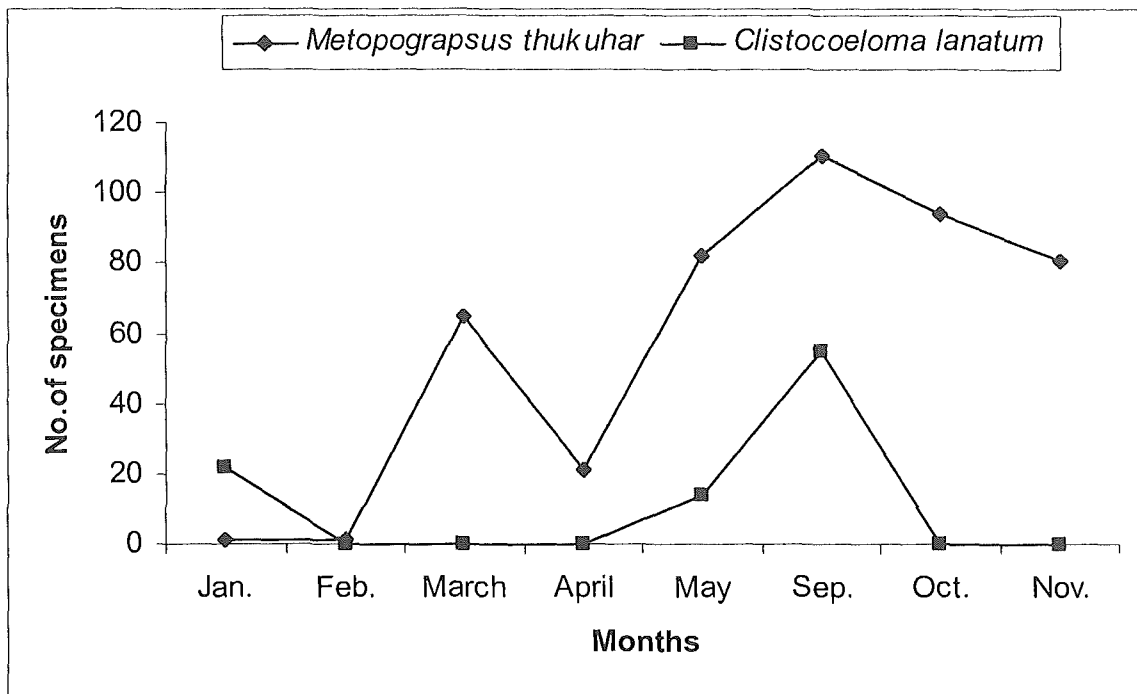


Fig.12. Monthly variations in number of species composition of brachyuran larvae: *Metopograpsus thukuhar* and *Clistocoeloma lanatum* during January - November, 1995.

**DISTRIBUTION**

Distribution of brachyuran larvae from the Manora Channel is compared with the material of northern Arabian Sea, studied by Tirmizi *et al* (1993). There are only four species: *Serenella indica*; *Dotilla blanfordi*; *Ebalia ?sagittifera*; and *Philyra* sp. common in both studies. *Ebalia ?sagittifera* and *Philyra* sp. have shown a wide range of distribution as they were reported from offshore water of Baluchistan coast as shown in Figure 13. *Serenella indica* and *Dotilla blanfordi* are restricted to Sindh coast.

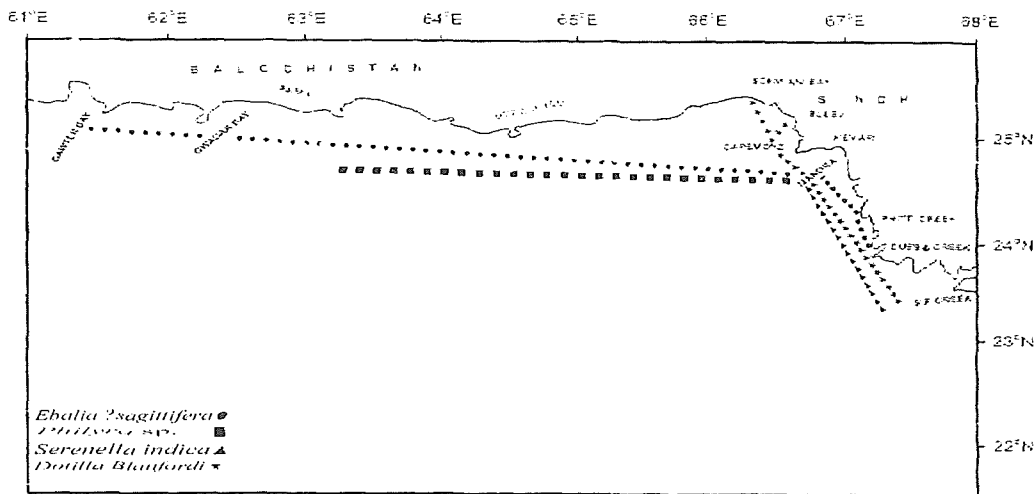


Fig. 13. Distribution of brachyuran larvae collected from Manora Channel.



## DISCUSSION

In the 1993 the sampling was conducted from August to December reported by Ghory and Siddiqui, (2002) and in 1994, the samples were collected throughout the year except August and September as discussed by Ghory and Siddiqui (2006), whereas in 1995 (present study) the samples were obtained from January to November except June – August.

By comparing the analyses of these three years, it is revealed that the larvae of 9 families are present in the Manora Channel. According to larval data most of the species have their peak of abundance in the month of April (Figs. 8A, 9A, 10A, 11A & B) and next peak of abundance in the month of September (Figs. 8A, 9A & B, 10A, 11B, 12). And other few species have their peak of abundance in February, March and May (Figs. 8B, 9B, 10B & 12). It is observed that the larvae of *Charybdis annulata*, (except in 1993 see Fig. 14), *Pilumnus ?karachiensis*, *Dotilla blanfordi*, *Metapograpus thukuhar* and *Clistocoeloma lanatum* are significant (Figs. 15,16), as compared to the 16 other species found in the area. The larvae of *Macrophthalmus (Mareotis) depressus* which are also not obtained in 1993 they are most abundant in the year 1995 (Fig.16), with respect to other dominating species.

The present study on the brachyuran larvae demonstrates that the Manora Channel is rich in the larval population of the species of family Portunidae, Pilumnidae, Ocypodidae and Grapsidae, although this area contains wide variety of other families.

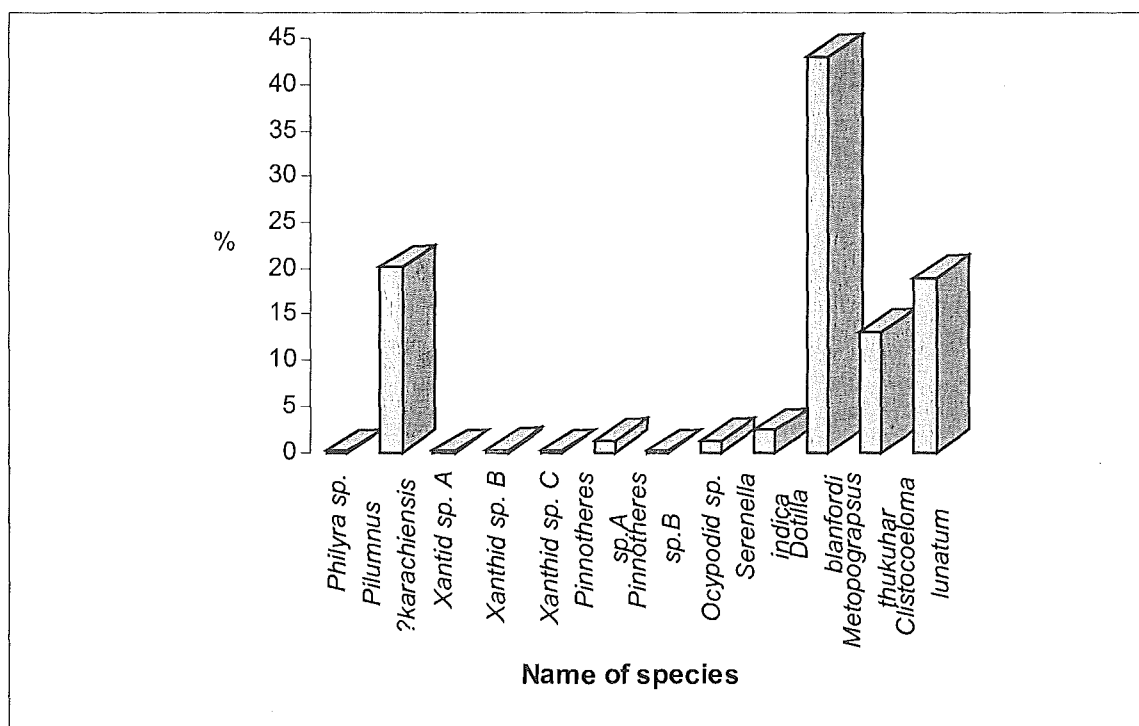


Fig. 14. Percentage composition of Brachyuran larvae collected during 1993 in the Manora Channel (After Ghory and Siddiqui, 2002).

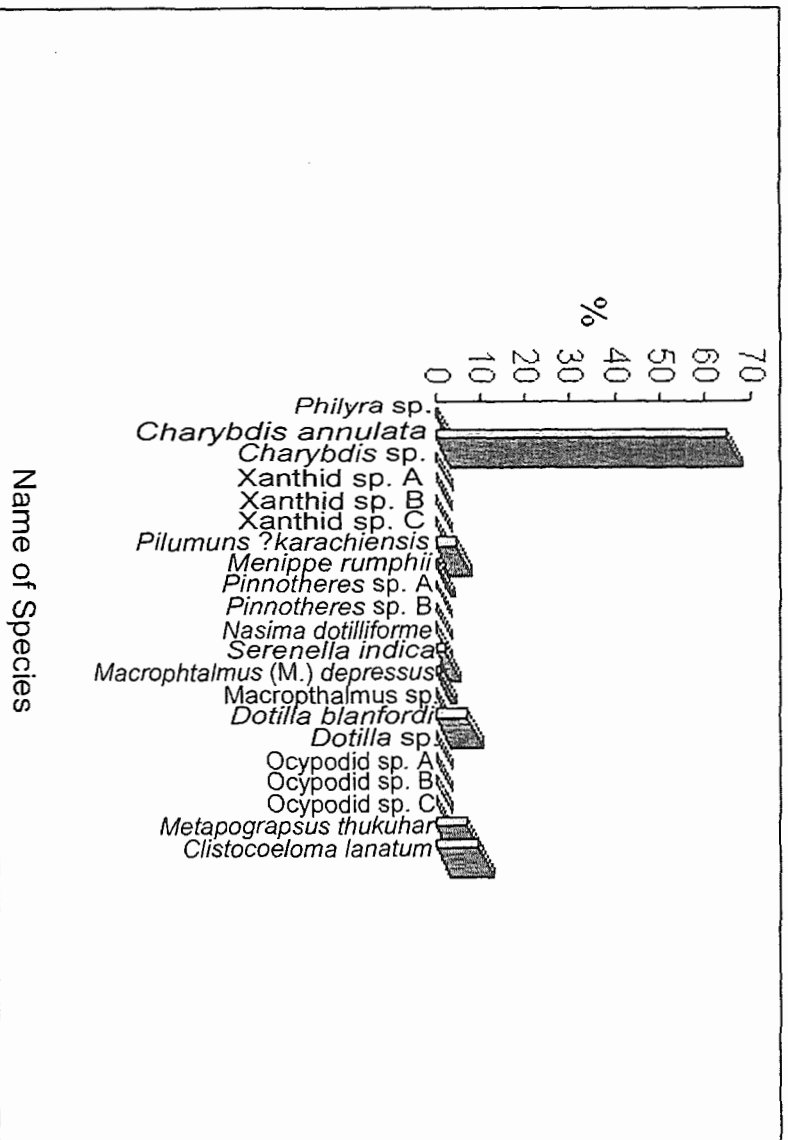


Fig. 15. Percentage composition of Brachyuran larvae collected during 1994 in the Manora Channel (After Ghory and Siddiqui, 2006).

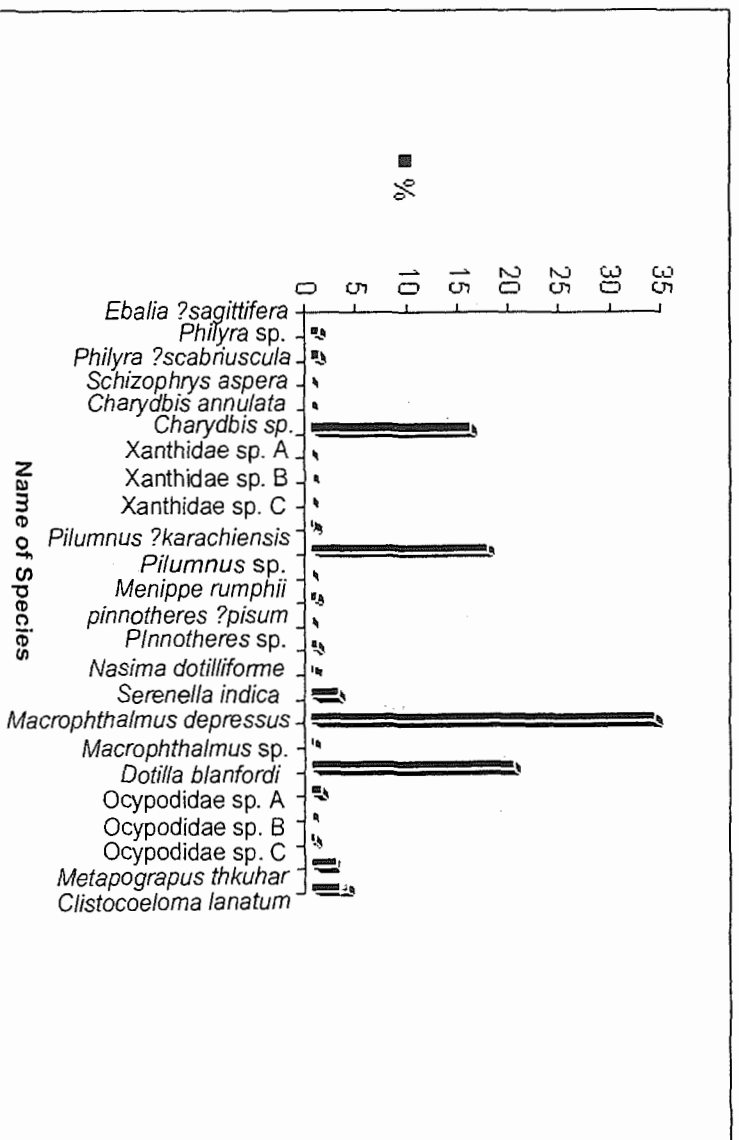


Fig. 16. Percentage composition of brachyuran larvae collected during 1995 in the Manora Channel

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