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OBSERVATIONS ON THE REPRODUCTIVE PATTERN AND FECUNDITY OF A BRACHYURAN CRAB

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THE tropical freshwater riceland crab *Oziotelphusa senex senex* has a wide distribution. Aspects of reproductive pattern and fecundity of the species are interesting.

In and around Bangalore, ovigerous females of *O. senex senex* are available only during April through July. The crab perhaps breeds only once during this part of the year. There appears to be a relation between body size and ovigericity in the female. While 2.2 cm is the minimum carapace width of an ovigerous female, 4.4 cm is the maximum. However, maximum incidence of ovigericity is noticed in females ranging between 2.6 cm and 3.9 cm carapace width (figure 1A & B).

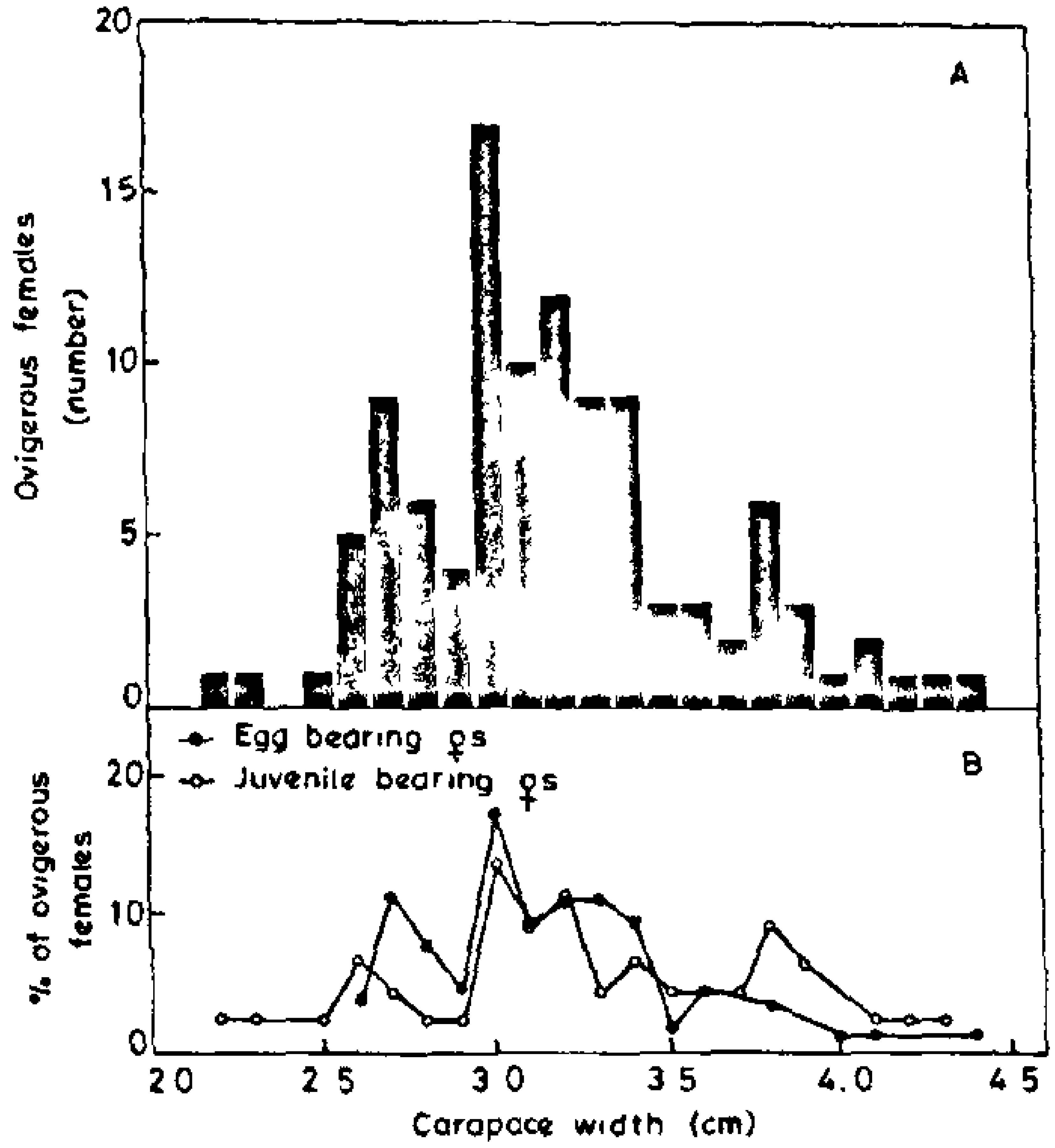


Figure 1. *Oziotelphusa senex senex*: Abundance of ovigerous females in relation to the body size of the crab (Carapace width: CW). **A.** Number of ovigerous females in relation to the size **B.** Percentage abundance of egg/juvenile bearing females in relation to the size.

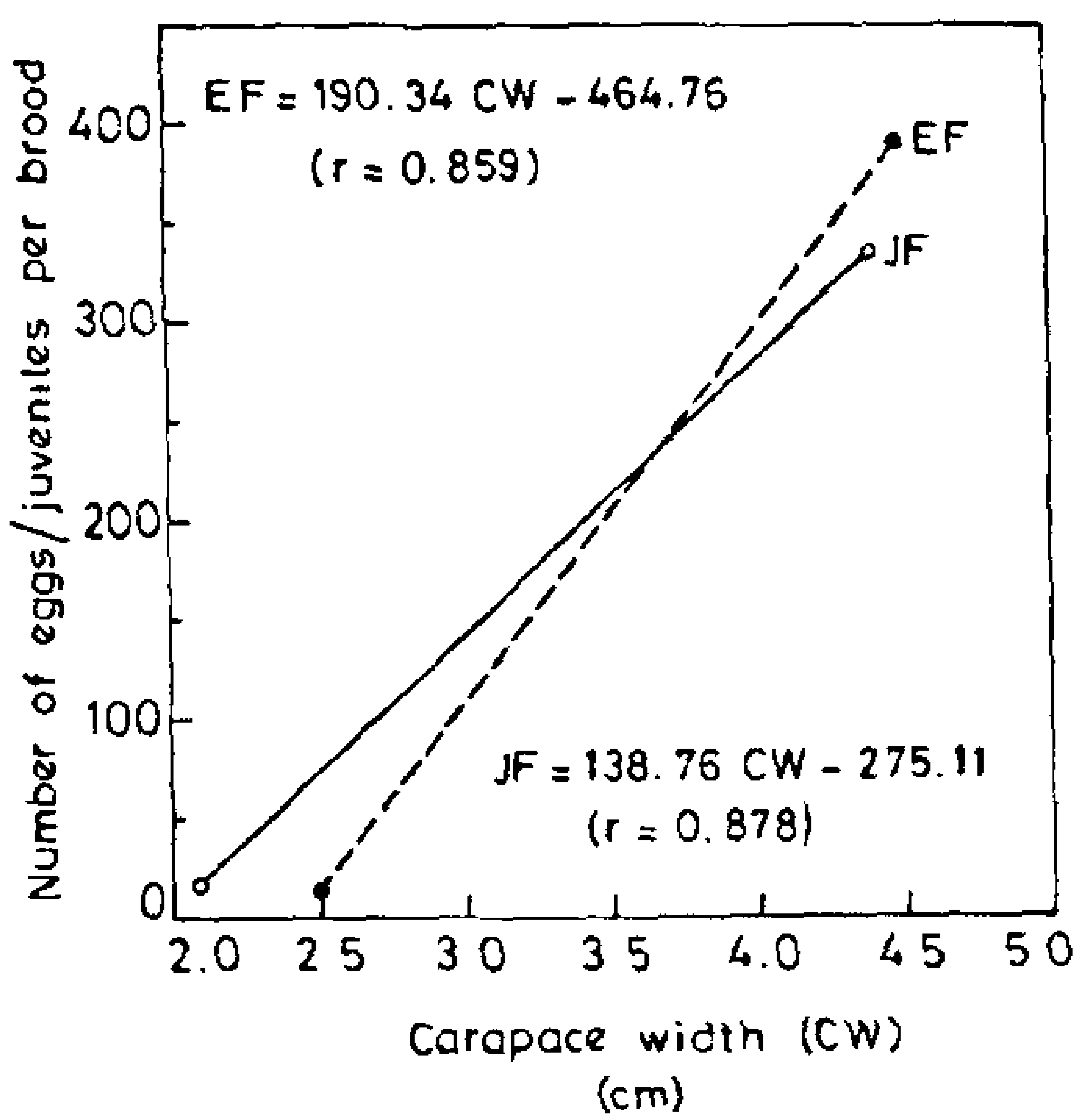
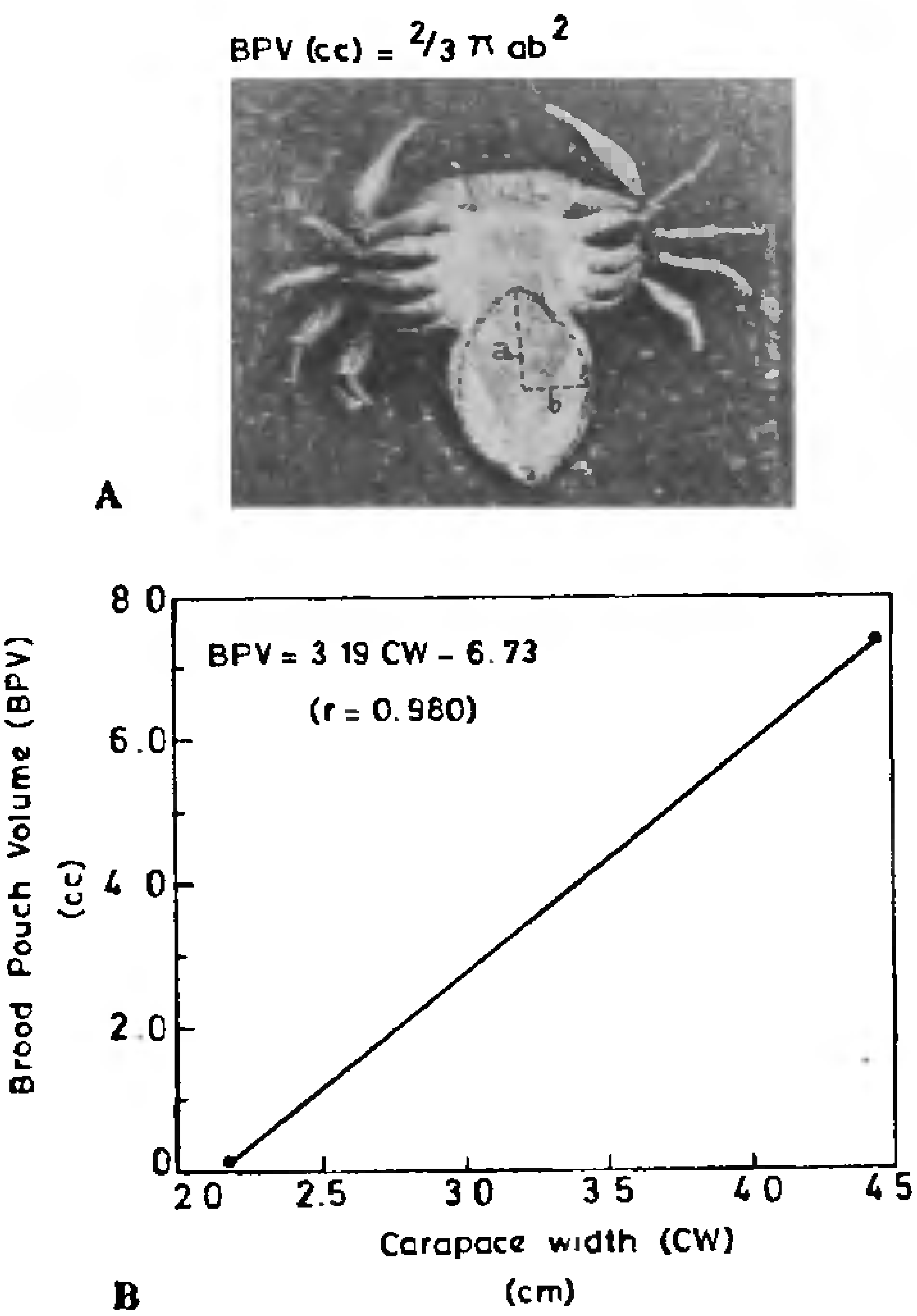


Figure 2. *Oziotelphusa senex senex*: Relationship between egg fecundity (EF) and juvenile fecundity (JF) in relation to the Carapace width (CW) of the females.

Table 1 *Oziotelphusa senex senex: Egg number per brood (Egg fecundity:* EF*) and juvenile number per brood (Juvenile fecundity:* JF*) in relation to the body size (Carapace width:* CW*) of the female.*

CW (cm)	EF Actual number of eggs per brood	JF Actual number of juveniles per brood
2.2	—	46
2.3	—	75
2.5	—	120
2.6	27 30	116 64 38
2.7	20 20 24 44 57 75 75	92 33
2.8	21 28 35 46 97	100
2.9	79 162 172	160
3.0	24 80 109 120 138 154 164 170 173 221	140 160 75 68 179 193
3.1	26 40 86 179 237 251	65 105 148 176
3.2	19 28 29 30 61 148 221	79 114 146 191 200
3.3	24 35 38 60 74 114 220	142 163
3.4	43 61 101 142 165 230	159 189 227
3.5	313	155 172
3.6	194 282 310	—
3.7	—	308 330
3.8	252 255	216 232 345 364
3.9	—	145 157 210
4.0	260	—
4.1	428	221
4.2	—	354
4.3	—	405
4.4	298	—



Only eggs or juveniles are found in the brood pouch, suggesting that all larval stages are passed within the egg. Development appears to be greatly abbreviated due perhaps to the restriction of the species to the confined freshwaters of the paddy fields and the need for rapid development during the brief period of the year when the fields are flooded.

In other freshwater natantian decapods like *Macrobrachium* spp.[1,2] and *Caridina* spp.[3,4] the eggs hatch into zoeae larvae, which are released from the brood pouch immediately after hatching. That the juveniles of *O. senex senex* (in spite of their advanced stage at hatching) are retained in the brood pouch for a considerable length of time after hatching suggests that the juveniles lack osmoregulatory abilities.

There is a correlation between the size of ovigerous females of *O. senex senex* and egg or juvenile number per brood (figure 2). However, even among females of the same size, some variation in the egg/juvenile

Figure 3. *Oziotelphusa senex senex*: Relationship between brood pouch volume (BPV) and the Carapace width (CW). **A.** Ventral view of a female with the abdomen extended. Note the formula used for the calculation of BPV. **B.** The linear relationship between BPV (cc) and CW (cm) of the females.

number per brood is noticed (table 1). The thin egg membrane and rather loose binding substance between the eggs in the brood could account for egg loss during incubation. Linear regressions between egg number or juvenile number on carapace width of *O. senex senex* are not strong, but larger females accommodate more eggs of juveniles in the brood and there is a strongly correlated linear relationship between the brood pouch volume and carapace width (figure 3A and B).

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THE SPINNING OF PUPARIUM BY LARVAE OF EUMENID AND SPHECID WASPS REARED IN GLASS TUBES

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NESTING activities and intelligence of Eumenid and Sphecid wasps have drawn the attention of a number of workers[1-10]. Surprisingly, little attention has been paid to their metamorphosis. This is probably because, the metamorphosis takes place in closed mud cells. Unless, the cells are opened and developing stages are reared in suitable containers, it becomes impossible to observe and record the progress of stages. Success of rearing them in glass tubes made it possible to follow metamorphic changes in these wasps[7]. Over a period of four years, metamorphosis of *Eumenes conica* Farb. (Emenidae), *Sceliphron coromondelicum* Lapel (Sphecidae) and *Sceliphron violeceum* Fabr. (Sphecidae) from the egg stage to adult stage is being studied in this department.

Mud cells of *E. conica* (figure 1 MC) and *S. coromondelicum* (figure 2, MC) were collected from time to time from the environs of the Zoology Department. Eggs and larvae of *S. violaceum* were collected from electrical installations. After opening these mud cells and pin-hole nests, the developing stages were recorded and placed in glass tubes (50 mm height and 10 mm diameter) (figure 3, I, II, III). The tubes were closed with cotton plugs (figure 4, CT) and kept in horizontal position in a card board box. During the studies, spinning of puparium by full grown larvae of these wasps was found to be strikingly different from those spun by larvae of the same wasps in mud cells and pin hole nests.

A. *Spinning of puparium by larvae of E. conica:*

The full grown larvae secreted silk and applied it to inner surface of glass tubes by moving to and fro in a random fashion along the length of the tubes. Some of the larvae however reached the cotton plug where application of silk secretion assumed a definite order so that the entire inner surface of the plug was covered in the form of double sheath (figure 3, I, SH), supported around nearby tube walls. In majority of the cases, the curvature of the two sheaths was parallel to each other (figure 4, A, arrow). However, in some of the remaining cases the curvature of one sheath was exactly opposite to the other (figure 4, B, arrow) giving the appearence of a bi-concave structure. In a few cases, meconium (figure 4, C, ME) of the larva was found to be partitioned from pupal chamber by the double membranous sheath (figure 4, C, SH) at the end of the tube. In none of the above described cases, was the sheath in continuation with the secretion that was applied to inner surface of the glass tube. Thus, the glass tube reared larvae of *E. conica* do not spin puparium in true sense of the term and do not enclose the developing stage completely.

In nature, when the larvae line their mud cells with silk secretion in such a way that a continuous sheath of double membrane is formed (figure 1, SH, seen partially). The colour of the sheath, irrespective of its place of application remained white, even after it aged.

B. *Spinning of puparium by larvae of S. coromondelicum:*

The full grown larvae secreted silk and applied it to the inner surface of glass tubes in such manner as to form a centrally placed column of silk fibres (figure 3, II, SC) along the axis of the tubes and then spun the main tubular puparium (figure 3, II, PU). The column and the puparium were anchored to the inner surface of the glass tubes by a number of silk fibres (figure 3, II,