**ABSTRACT**

*Ranatra fana* Montandon and *R. elongata* Fabricius are voracious feeders on the eggs and fry of fishes. They also feed on the same dietary items which form the principal food of fishes, viz., Notonecta, Corixa, Mayfly nymphs, tadpoles etc. The breeding season of carps coincides with the maximum abundance of these predatory insects. They remain clinging to the stem of aquatic plants which provide them shelter and support. A good deal of work has been done on the bionomics and behaviour of European species of *Ranatra* but very little is known about the Indian species. Studies have, therefore been undertaken on the bionomics and behaviour of *R. fana* and *R. elongata*.

Observations on the seasonal abundance of the two species of *Ranatra* are made over three years at Aligarh. Information is furnished on seasonal variation, intra and inter year fluctuation and life cycle in natural as well as in laboratory conditions. Climatic conditions play a critical role on the rise and fall of population. The timing of the oviposition, hatching and maturation may vary from year to year, depending upon the sequence of climatic events prevailing throughout the entire *Ranatra* cycle.

The average life history of males and females of *R. fana* and *R. elongata* is 31.97 and 34.00 days respectively in rainy
seasons. They have five nympal instars before attaining adult stage. Precopulation time varies from 5-10 days for males of both the species, while females are ready for copulation after 24 hours of final ecdysis. Although they may remain in copula for hours, yet mating period is very short (1-2) minutes and is repeated after the same intervening period. Pre-oviposition period of R. fesna is 10.7.90 and 8.5 days and R. elongata is 9.21, 7.0 and 8.02 days for the 1st, 2nd and 3rd generations. The period between first copulation and first egg laying ranges 2-10 days for both the species. The total number of eggs deposited by R. fesna is 90, 2, 430.0 and 39.5 eggs and by R. elongata is 225.5, 323.20 and 90 eggs in the three generations, respectively. Eggs are deposited inside the ground near the water edge keeping the respiratory horns outside the ground.

Temperature has direct effect on all the biological activities especially on the rate of development. No hatching is observed below 20°C and above 40°C. The incubation period is 10.32, 6.8, 6.2 and 6.0 days for R. fesna and 9.29, 6.12, 5.21 and 5.0 days for R. elongata at 25, 30, 35 and 37°C. Rate of development found at 25, 30 and 35°C is 54.17, 35.30 and 28.87 days for R. fesna and 55.07, 36.16 and 22.38 days for R. elongata. Percentage of nymphs reaching adult stage is 20.25, 39.42 and 32.12% in R. fesna and 25.0, 41.75 and 35.20% in R. elongata at 25, 30 and 35°C. Average life span of adult males and females is 55.4 and 59.7 days for R. fesna and 65.8 and 69.2 days for R. elongata in the first generation and 35.7 and 46.6 days in
adult 'A' of the second generation *H. feana* and 39.3 and 49.4 days in *R. elongata*. Similarly, 135.5 and 147.2 days in *R. feana* and 143.5 and 159.3 days for *R. elongata* in adult 'B' of the same generation. While the third generation lived 96.9 and 115.6 days in *R. feana* and 102 and 122.6 days in *R. elongata*. Average number of eggs/day for *H. feana* is 9.7, 14.0 and 7.2 and *R. elongata* is 7.9, 11.5 and 6.5 eggs/day in the subsequent generations.

The catching and feeding behaviour of adult *H. feana* can be demarcated from a particular precapture posture. A typical prey-capture sequence consists of the following phases: Arousal of attention; orientation of the body on the resting place, followed by orientation of the forelegs while the body remain motionless; seizure of the prey; consolidation of the grasp on the prey; exploration of the surface of prey with the rostrum; insertion of stylets and sucking; discarding of the prey. This sequence may vary due to dropping of some phases. A number of different postures of prothoracic legs have been distinguished.

Almost same, behaviour is also found in nymphal stages. In the first instar the prothoracic legs show a smaller number of postures than in the adults; more possible postures are added after each moult. The main differences between nymphs and imago are following: capture is not preceded by an orientation phase; a prey can be seized only if it is very close—the two prothoracic legs may move completely independently during a capture. Different
movements of the legs in grasping a prey have been described:
(1) Only one tibia presses down on the femur, sometimes after a
prey has actually touched the inside of a claw; (2) a horizontal
movement towards insects' plane of symmetry by one or by both
femurs, followed by closing one or both claws; (3) a more complex
movements by the forelegs in which they are either moved back
towards the head or lowered. The percentage of catching attempts
which are successful increases with the age of the insect. The
forelegs movement become more and more complex; the percentage of
successful catching attempts made after a movement of only one
prothoracic leg progressively decreases although the percentage of
successful capture after a movement of only one foreleg increases.
At the same time the percentage of successful attempts made by
both legs increases. This show that there is a gradual loss of
independence of the forelegs. The number of captures after a prey
has touched the inside of a claw decreases rapidly; such catches
are seldom found in 5th instar nymphs and in adults. Effect of
seasonal changes on the rate of ingestion is very much pronounced.
It increases upto September/October, then decreases gradually until
it becomes minimum in December and January. Again, increases
slowly at first, then rapidly during the subsequent months.

Visual or mechanical stimulation is sufficient for perceiv-
ing a prey, throughout the development period. But in normal
circumstance both the receptors combine before eliciting a strike.
These are compound eyes and sensillae on the tip of the femoral
tooth. In first instar nymphs the mechanoreceptor plays a more
important part, because without femoral receptors it can not develop. During development the relative importance of mechanoreception decreases while relative importance of visual stimuli increases.

Ranatra do not pursue prey. However, they show a high rate of successful catches, viz. 80% of attempts lead to grasping a prey. Strikes are mainly visually initiated. A linear correlation exist between average hitting distance and foreleg length (FD). Reactivity increases with increasing FD and if the distance between prey and predator is greater than the length of the foreleg, strikes become rare, i.e. it decreases with increasing distance. Unilaterally blinded, or monocular adults show a lower level of striking and hitting than binocular normals. Maximum reactive distance is lesser than normals. These results indicate an important analogy in predatory behaviour of ranatra and Mantids. The formula of Burkhardt et al. (1973) on the geometrical structure of vision has been applied for calculation of the perceptual volume.

The adults of Ranatra are heavily parasitized by water mites. A luxuriant growth of Epistyliis plicata is also found around the thorax. In extreme case it may cover the entire body of the insect, thereby causing premature deaths. There is an intricate relationship between food and enemies of Ranatra because in one form it may be food and in another enemy to it.

All the species of Ranatra are economically important because their nymphal instars prefer mosquitoes' larvae and can be used for mosquito control by releasing them in ponds, providing breeding ground for mosquitoes.