

were females. The tiny being (Fig. 2) measures no more than $\frac{1}{16}$ of an inch in length. It has no nervures in its wings, the hinder pair of which are so narrow as to be scarcely more than linear in shape, and both pairs are fringed round the edges with hairs. It belongs to a group which, like the ichneumon flies, are parasitic

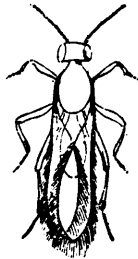


Fig. 2.—*Polynema natans*.

upon other insects, but many of the smaller species attack their hosts, not when the latter are in the larval condition, but actually while they are in the egg, the contents of a single egg being sufficient to furnish nutriment to the grub of the parasite during the whole of its brief larval career, and sometimes even one egg is the home of several parasites. The present insect, which was named by Sir John Lubbock *Polynema natans*, may, therefore, with much probability be presumed to have been in quest of the larva or eggs of some aquatic creature in which to deposit its own brood. It would seem, however, that this can hardly be the sole cause of the entry of these insects into the water, inasmuch as the males were found swimming as well as the females. The wings did not seem particularly effective as swimming organs, the progress of the insects being but slow, and in a series of jerks; sometimes, too, the swimming was abandoned in favour of crawling over the aquatic plants. Marvellous as it may seem that a creature should use as swimming-organs delicate membranous wings, apparently adapted only for aerial flight, the marvel becomes greater when it is remembered that the little diver is not in any way structurally adapted for an aquatic life, except it be by the fringes round the wings, but these it has in common with other members of the same group which never enter the water at all. There is no flattening of the legs, no tapering of the form in front, no arrangement to provide for subaqueous respiration. The breathing is conducted in the ordinary way by means of spiracles, and all the time the insect is under water, it has, so to speak, to hold its breath, just as one of the higher animals would have to do under similar circumstances. At first thought it would seem, therefore, that the tiny creature, in obeying its maternal instincts, incurs some risk of drowning, but it must be remembered that insects do not require a renewal of air anything like so frequently as the higher animals, and in the present instance the power of endurance seems to be much greater even than usual. Sir John Lubbock found that one of his insects could endure submersion for twelve hours without inconvenience, but that after fourteen hours it was to all appearance dead; however, on being transferred to a dry spot, it revived, and, after a time, became as lively as ever, so much so, in fact, that, notwithstanding its uncomfortable experience of temporary drowning, it did not hesitate, when an opportunity was again afforded, again to enter the water. Professor Westwood has suggested, however, in explanation of this power of enduring prolonged submersion, that the fringe round the wings may carry down

entangled in its hairs a small quantity of air, sufficient for the wants of the insect during the time it would naturally remain below.

Curiously enough, a second aquatic species, a trifle larger than the other, and much less common, was discovered on the same occasion and by the same observer. It swam, however, not by aid of its wings, which were kept still, but by a rowing motion of the legs, and thus progressed more rapidly than its relative.

Ichneumon flies have recently been bred from the pupae of a Gyrinus, or whirligig beetle, which, as will be remembered, is, in its larval state, subaqueous. It is not known, however, at what period in the history of the Gyrinus the ichneumon eggs are inserted in the body of the host, though, judging from analogy, it would seem probable that it is the larva that is thus victimised, and in that case either the ichneumon must dive, or the larva must be attacked during its temporary exposure on the aquatic plant on which it forms its cocoon; still, however, the eggs may be deposited in the pupa through the walls of the cocoon, the ichneumons possessing ovipositors long and powerful enough for the purpose.

Certain caddis flies, or water moths as they are sometimes called, and dragon flies have also been known voluntarily to submerge themselves in order to deposit their eggs in appropriate positions.

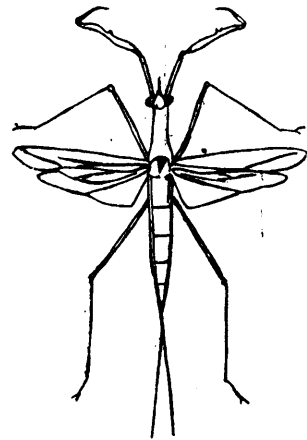


Fig. 1 — *Ranatra linearis* (reduced).

Leaving now the middle depths, which have detained us so long, and continuing our descent, we reach the bottom of the pond. The bottom of a pond can hardly be considered a particularly attractive abode, at least so far as appearances are concerned, and if one remembers its usual composition it will appear even less desirable as a home. Here is collected a fine mud, composed of the remains of all sorts of rubbish that is continually being rained down from the watery heights above. It is, as it were, the dust-bid, the cesspool, and the cemetery of the pond. Dust blown in from time to time by high winds, fragments of plants broken from aquatic vegetation, dead

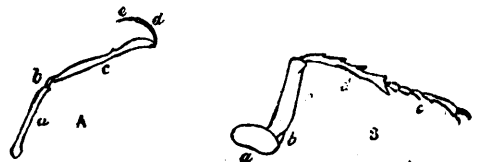


Fig. 2.—(A) Fore-leg of *Ranatra*; (B) Leg of Stag-beetle.
a. Coxa; b. Trochanter; c. Femur; d. Tibia; e. Tarsus.