If the case should be made too long, pieces are cut off till the right length is obtained. As not only the length, but also the width of the case, is always suited to the size of the animal, it becomes interesting to inquire how the provision is made for growth in diameter; as the creature grows, each new circle added at the anterior extremity is made of rather large diameter, thus giving the whole tube a somewhat conical shape; then the smaller end is cut off, and so by repeated additions to one end and subtractions from the other, the case is always the right size, and thus one can understand how it is that a cadds which be gins life with a leafy case may, perhaps, end it with a stony one or shelly one, and that too without ever quitting its tenement. Some species do not seem to be at all particular as to the materials they use, but others are so fastidious that they will rather go unclothed (which, of course, means speedy death) than adopt the wrong material.

The cases hitherto referred to are free, and the larva drags its abode about with it as it crawls slowly along with just so much of its body projecting from the case as carries the three pairs of legs. But many, especially of the smaller species, and those that live in very rapidly running water, make cases which are attracted to stones, and consist of oval, irregular masses of fragments of stones. Some, again, live in company under a common covering of vegetable débris fastened toge her with silken threads, while others form on the surface of large stones silken canals covered with slime and mud. These latter are supposed to be, to a great extent, carnivorous, feeding on other aquatic larvæ; but the larger kinds are, as a rule, vege-table feeders, eating the leaves of various water plants, which, when adult, they devour entirely, beginning at the edge, but when young they satisfy themselves with the tender green parts between the veins of the leaf, which are more suited to their juvenile capacities than the tougher veins themselves. They will, however, take to animal food when necessary, and will even, on occasion, turn cannibals.

We have now to consider the life-history of caddis worms. The parent insect, a moth-like creature living amongst the vegetation at the edge of the pond, deposits her eggs in the water, sometimes actually descending below the surface, and attaching them to the leaves of water-plants. But it is very seldom that they have been detected doing this. Mr. McLachlan speaks of having seen females of Phryganca grandis, one of our largest species, "on a calm summer evening on the surface of the water, with wings expanded and trembling, causing a commotion on the surface like that occasioned by a drowning insect; and as they took up the position voluntarily, and were evidently in no danger of drowning," he naturally came to the conclusion that they were depositing their eggs. But, again, on the other hand, females are sometimes found with their wings soiled, as though they had had a muddy bath, and had been contaminated thereby; so that in all probability there are different methods of conveying the eggs to suitable situations. The eggs, when first extruded, are enveloped in a gelatinous mass, and before being deposited in their final resting-place are often, for some time after actual extrusion, carried by the mother attached to the end of her abdomen. When in the water the gelatinous substance swells by absorption of the liquid, and attains twice its former diameter. The eggs soon hatch, but the young larvæ remain two or three days enveloped in the jelly; then leaving their cradle, which by this time is almost in ruins, they begin life on their own account, each constructing a tube for itself, proportionate to its infantile dimensions, and each species, even at this early age, manifesting the power of selecting appropriate materials for its domic'le.

The larva (Fig. 1) has a pale, soft body, which is, no doubt, a tempting morsel to fish; and hence the necessity for the protective case. The head and front segments, however, are hard and horny, as they are the only parts exposed when the creature is crawling. The head carries a pair of stout jaws, often notched at the tips. To the three segments immediately succeeding are articulated three stout pair of legs, which have a wonderfully tenacious grip. To different parts of the body are attached in some species isolated threads, and in others bundles of the same, which rre respiratory in function, *i.e.*, they contain branches of the tracheæ, and the interchange of gasses is effected in the same way as previously described in the case of the dragon-fly larvæ. At the end of the abdomen of those that construct movable dwellings, there are two short, recurved hooks, by means of which the case is kept in position and dragged along. The larval stage is the great iceding-time; the insect takes no nourishment during pupahood, and probably

very little in its adult stage, its only business then being the reproduction of its kind. But the larvæ seem to be able to and use are advected by the state of endure prolonged fasting, and it would appear that they must pass the winter almost with food. After some months spent in the larged as differences of the second s in the larval condition, the time for pupation arrives. two ends of the case must now be closed sufficiently to guard the helpless being within from foes, but, at the same time, not so closely as to prevent the access of water for breathing Pur poses. Some species construct at each end a sort of grating of silken threads, others fix a quantity of vegetable *debris* in the same position. Some take a further precaution still. There is one called *Viewenterment* and the same position is a set of the same position. is one called Micropterna sequax, which inhabits clear running water. This insect, before pupating, elongates its case by adding stones to one end, and then sinks it vertically in the mad until it is the mud, until it is almost entirely imbedded. To do this the larva turns rounds in its case, a gymnastic fest no doubt diffcult of performance, but still rendered possible by the flexibility of its body and the dimensions of the case—and, thrusting is head and legs out at the wrong end, digs a hole and so lets itself down; this done, it resumes its ordinary position and patiently awaits its coming change. In three or four days the pupal stage is entered, and the creature is thereby much altered in appearance. It is no longer a caterpillar-like being; but all the organs of the adult insect insect appears—wings, legs, and anturna being is the section of the section and ant-nue being nearly folded down by the side of the body, each wrapped in a separate portion of the pellicle which er shrouds the whole creature. The peculiar arrangement of its limbs gives it a most amount of limbs gives it a most amusingly sanctimonious expression. is generally free in its case, though its only movements con-sist of oscillations of the body. When the time arrives, some two or three weeks after, for making its final transformation, it ruptures the grating at the larger end of its case, darts out of its miscan with a state of the state of t of its prison with great speed, swims rapidly through the water by aid of its still arrest d by aid of its still encased legs, and on its back, like a water boatman, and thus makes its way to some dry place, where its thin pupal skin splits and allows the soft imago to creep out; some, however, do not take the trouble to leave the water, but like gnats, merely float on the surface, and effect their trans to the the trans the surface of the their trans to the surface of the surface formation there, using the old pupa case as a raft on which to dry their wings.

Caddis worms are particularly careful not to expose more than the well-armed part of their body while walking, and even then, if an intruder appears, they will instantly and sharply retreat into their cases, when the only part exposed to attack is the hard head, and even this is not to be reached without entering the case. But, notwithstanding all their precautions, they not succeed in escaping the attacks of those inveterate foes of insect life, ichneumon flies, and from one species also has been bred a two-winged fly belonging to a group well known for their habits of parasitism.

Though caddises are, as a group, aquatic in the larval state, there is one species the larva of which lives in moss at the roots of trees far removed from water. Nor are the insects absolutely confined to *fresh* water. One marine species has been reported from North America, and another from New Zealand, the latter of which formed a straight tubular case of fragments of latter seaweed.

We may here notice some allied insects, the larvæ of the Ephemerida or Mayflies. These crawling things, which may easily be recognized by the three bristle-like appendages at the tail, and a number of lager and the tail, and a number of lager and the tail. tail, and a number of leafy projections at the sides do not make cases, but hurrow in the multicases, but burrow in the muddy banks of ponds and streams, and constitute what is known to anglers as "bank-bait." The burrows are tubular and often muddy banks of ponds and streams. burrows are tubular and after running straight for a little and tance, bend hack when the tance, bend back upon themselves in the form of a U, and open into the water at both cude at the form of a U_{has} no open into the water at both ends, so that the insect has no need to turn in its burrow but water at both ends. need to turn in its burrow, but can enter at one end and makes its exit at the other. Small there has the and makes its exit at the other. Small though they are, they are said to line two or three years in the bar they are, they are said to line two or three years in the larval condition, a remarkable contrast to the extreme benefit and a remarkable contrast to the extreme brevity of their adult life, which is measured by hours, or at most by determined measured by hours, or at most by days. The pupe is similar to the larva, except that it exhibits traces of wing; for and about to change into the minor of the second wing; for and about to change into the winged form, it quits the water and "shuffles off its mortal coil," alter the manner of several other insects already referred to the water of several other insects already referred to; having so done, it looks like a per lect insect, and might feily be arready to the per-vellous to relate, it has yet another change to undergo another skin to cast—before it reaches maturity. class This is remarkable as being the only instance in the whole class of insects in which a change of the transformer. insects in which a change of skin is effected after the assumption of the winged form tion of the winged form. So perfect is this last rejected the ment, when left sticking to the stalk or leaf which formed