## 1908-9.] THE HABITS OF PLETHODON CINEREUS ERVTHRONOTUS.

drical form of body (the proportion of length to greatest breadth being fourteen to one) in an animal so small, along with the necessity for producing eggs containing a large amount of yolk are doubtless factors determining the small number of eggs; another will be mentioned later.

The necessity for the large amount of yolk in the egg arises from the purely terrestrial development of the larva. Aquatic larvæ have at command the minute and abundant fresh-water plankton as food supply and are thus at an early age rendered independent of the nourishment provided in the yolk. The insect life that constitutes the early food of the terrestrial Plethodon is of larger size than much of the plankton and much less abundant. Consequently the animal on leaving the egg must be able to wait for food through comparatively long intervals and also to capture food of larger size than an aquatic larva need do. Both of these things demand an advanced development that can only occur when a considerable quantity of yolk is provided.

Each egg is surrounded by a series of mucous spheres as is customary in Urodeles. In their natural condition the number of these is rather difficult to determine but after soaking a few minutes in water they swell somewhat and the following is plainly seen:-an innermost sphere very close to the surface of the egg; a second enclosing this but separated from it by a greater interval than that between the innermost sphere and the egg; occasionally this sphere is represented by two, one of them fitted very closely around the other. The outermost sphere-usually the third-fuses with the outermost spheres of neighboring eggs at all points of contact. On its surface are threads and bands of a milky white mucus which seems tougher than the rest, which is transparent; these are especially numerous between eggs and at the upper part of the bunch where several uniting form the stalk by which the cluster is suspended. This mode of attachment is probably derived from one originally like that of Desmognathus (Wilder '99) in which each egg of the cluster is independent of all the rest and has its own cord joining it to the common stalk. The tension of the envelopes, especially the innermost, is needed to preserve the spherical shape of the egg. These envelopes are very tough; a weak hypochlorite solution will soften them so that they can be removed but when their support is gone the egg, even in water, flattens until the vertical diameter is little more than half the transverse. In the younger stages it is therefore necessary to fix and harden the egg first and remove the membranes later, they should be removed as soon as possible for if left around the egg the latter will in time disintegrate. The method devised by Morgan ('91) has proved the most satisfactory. As development proceeds the amount of fluid between the egg and

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