NOTES ON TWO COMMON TURTLES OF EASTERN UNITED STATES

THE speckled tortoise (*Clemmys guttatus*) Schneider is one of the commonest and most conspicuously colored turtles of much of the eastern United States. Its shell or carapace is smooth, black, with a sprinkling of round, orange-yellow spots. The plastron is yellowish with darker markings. This pretty turtle is largely aquatic in its habits, but is frequently found wandering among the vegetation of wet, swampy grounds. This turtle is, without doubt, of considerable economic value, as shown by the published data of its stomach contents determined by the Zoological Division of the Pennsylvania Department of Agriculture. It is here proved that this turtle is mainly insectivorous in its feeding habits, and for this reason deserves to be protected.

Concerning the food of this species, a number of the early writers state that it captures frogs. There is little doubt but that frogs occasionally enter into its diet. I myself once watched one of these turtles pursue a small frog very actively in a brook at Oxford, Mass. At that time an excellent observer also informed me that he saw one of this same species capture a small frog.

Another interesting turtle is the wood turtle (*Clemmys insculptus*) LeConte, not infrequently met with in the eastern states. It is very largely terrestrial in its habits, and may frequently be found wandering through dry woods and fields far from any water. In New England, late in winter and in March, I have captured numbers of these turtles, near Charlton, Mass. In spring and summer it extends its wanderings into the upland fields and woods. During the period of spring fires, I have frequently found this turtle burned to death in dry woods and fields, where it had been overtaken by brush fires.

Several years ago at Oxford, Mass., I carried one of these turtles to a point in a pasture near my home, in order to observe some of its feeding habits. Set free, the turtle headed for a dry, rocky pasture, across which extended a portion of a steep cliff. It pursued a course directly toward this cliff. I followed cautiously a few feet behind, on my hands and knees, keeping immovable if the turtle turned its gaze toward me. In this manner I spent the entire afternoon observing this turtle, and learned a good deal concerning its food habits. It fed greedily on any mullein leaves (*Verbascum thapsus*) in its path, and seemed especially fond of common sorrel (*Rumex acetosella*). It climbed slowly up the grassy banks bordering the cliffs, and finally gained a spot where grew various weeds and shrubs in the loose soil and rock crevices. When several feet away, its keen eye spied some large, red wild strawberries on a certain bank. It was interesting to see how eagerly and hurriedly it scrambled toward these berries. It spent considerable time among them, reaching up and clawing down the plants in order to reach the berries which it raked off awkwardly, together with the leaves, into its jaws. Later, its course led toward a swamp.

The food of this turtle is largely of vegetable composition, although varied animal matter consisting of insects, molluscs, etc., is eaten, as shown by examinations of its stomach contents by the Pennsylvania Department of Agriculture. Feeding largely as it does on all sorts of vegetable matter—leaves, berries, etc.—it no doubt incidentally includes more or less insects and slugs which may be present at the time, especially on those lower portions of the plant accessible to it.

I have frequently found females of the wood turtle excavating holes and laying eggs in early summer, in sand beds washed in by overflows of the Maanixit River at Oxford, Mass., and in the bare, loose sandy soil of more upland situations.

As a class the habits of our turtles need considerably more attention, in order to make us better acquainted with their economic position with regard to agriculture. If it is shown that they are, as a class, beneficial as destroyers of vermin and noxious insects, etc., then they must be considered one of the natural agencies tending to promote agricultural interests just as much as the useful birds and toads, and for that reason we owe them every protection.

H. A. Allard
Bureau of Plant Industry,
Washington, D. C.

ON ARTIFICIAL PARTHENOGENESIS OF THE SEA-URCHIN EGG

From July 1 until now I have been studying artificial parthenogenesis in *Arbacia punctulata.* I succeeded in rearing the larvæ made parthenogenetic by treatment with carbonated sea-water (5 minutes) followed by hypertonic sea-water (about 30 minutes) for several weeks in Roscoff filter-aquaria. At the end of a month there were so few alive that I did not consider further attention to them worth while, owing to the possibility (though improbable) of contamination with foreign plutei when renewing the water (that was dipped up daily at the end of the wharf at high tide). I found no constant difference between parthenogenetic and fertilized larvæ.

It thus being doubtful that I could produce sexually mature adults parthenogenetically, I confined my further studies to early phases. J. Loeb considers the essential event in artificial parthenogenesis to be the production of a free-swimming embryo or larva—but why larva rather than any other stage. In natural parthenogenetic development the end result may be a maturation or segmentation stage or a larva or adult. Though only the reproductive adults are of significance to the species, all are of significance to science. It might also be remembered that Loeb's parthenogenetic *Chætopterus* "larvæ" were unicellular structures, resembling trochophores only in the possession of cilia and by an irregular redistribution of cytoplasm, and were incapable of further development.

In *Arbacia punctulata* maturation takes place in the ovary, but no segmentation occurs without fertilization or an artificial stimulus. The ovarian egg is surrounded by a thick coat of a jelly-like proteid that swells slightly and gradually dissolves in sea-water. It is practically invisible, but can be located by adding to the medium, Chinese ink, the particles of which stick to its surface. The inner surface of the jelly fits tightly against the egg. The jelly is stained by neutral red or methylene blue, which causes it to contract and pull away from the egg. Acids cause it to contract and become more dense and sticky. Tannin coagulates it into a coarsely granular yellowish mass. Alkalies cause it to dissolve more rapidly, as does also agitation. When the egg is fertilized or put in "membrane-forming" solutions a fluid is extruded which pushes the jelly out from the surface of the egg. The inner surface of the jelly is then sharply defined and is probably bounded by a thin membrane (the "fertilization-membrane") as spermatozoa wriggle freely through the jelly but can not pass its inner surface.

As membrane formation does not occur in all parthenogenetic *Arbacia* eggs it was considered of secondary importance. The next change seen in developing *Arbacia* eggs is the migration of the red pigment plastids to the surface. I first thought this due to the formation of asters, but on sectioning could find none. In the living egg these plastids take up neutral red or methylene blue before other parts of the egg, and in fixed material stain with Delafield's hæmatoxylin stronger than other parts of the cytoplasm. Parthenogenetic reagents when used in sufficient concentration cause the pigment to diffuse out of these plastids into the surrounding cytoplasm and from it into the sea-water, showing that both plastid membrane and cell plasma membrane are permeable at this time.

Loeb showed a similarity between hæmolysis and artificial membrane formation. It has long been supposed that hæmolysis is due to an increased permeability of the plasma membrane as hæmoglobin diffuses out. Ralph Lillie supposes artificial parthenogenesis and stimulation to be due to an increased permeability of the plasma membrane. This assumption is supported by my observation of the diffusing out of the pigment in the *Arbacia* egg.

Repeating the experiments of others and making new ones, I tried various types of agents that cause hæmolysis or stimulation to see whether they caused parthenogenetic development in *Arbacia.* I succeeded in causing segmentation by isotonic NaCl and by the