

A BALL OF GARTERSNAKES.—At the suggestion of Dr. A. H. Wright, I shall try to describe a "ball" of gartersnakes I saw on April 18, 1954. I have learned something of the habits of these snakes since then, so their actions are more understandable to me now than when I observed them.

At noon, I walked along the foot of a steep wooded bank that had a northerly exposure. The ground cover was a mixture of hemlock needles and dry leaves; there were occasional patches of sunlight near the foot of the slope. As I passed an open spot, I heard a steady rustling noise in the leaves, and looked up to see several gartersnakes writhing actively in a patch of sunny ground above me. My approach to within 10 feet of the snakes disturbed them only momentarily; they resumed their activities a few seconds after I stopped moving. The snakes were quite tangled up, and I could not understand the meaning of this strange behavior; they were not biting or strangling one another, and none made any attempt to leave the group when they occasionally broke free from one another. At this time there were four or five snakes.

As I stood watching this performance, I heard rustlings in the leaves and noted a number of snakes approaching from all directions. These snakes had evidently halted at my approach and were resuming their course after I had stood still for some time. Now I could see snakes approaching from as far away as 20 to 25 feet in several directions, all of them heading straight for the group of the entangled four or five. The day was bright, clear, and cool, but very warm in the sun, and there was a quite continuous breeze. Several snakes were coming from straight up wind.

As a snake arrived at the "ball," it paused for a moment and then entered into the writhing mass. In the course of about 10 or 15 minutes the group had enlarged to some 15 or 20 snakes.

After a while I did discern a pattern to the behavior. The heads and a short section of the bodies of most of the snakes were generally parallel and extended out from one side of the mass. A new arrival, when first coming upon them, would hesitate, apparently look over the tangle, and then would work its way into the group, and very shortly another head would appear alongside the others. I do not mean to imply that the heads and upper bodies were closely or strictly grouped, but there was a tendency toward this organization. The tail ends of the snakes were in a hopelessly tangled mass of violent action.

The movement of the snakes caused them to slip gradually down the hillside for several feet; at one point the whole mass rolled down as a ball for 4 or 5 feet, with hardly a noticeable break in the tempo of the action. This brought the snakes very close to

me, and it was at this time that I noticed the rough organization of the individuals within the ball.

All at once one of the larger snakes having, as I remember, a thicker but not so brightly colored body as the others, left the mass and quickly moved 3 or 4 feet away; it was followed by a couple of smaller ones. The organization and tempo of the main ball of snakes immediately fell off and a number of them commenced to wander away, apparently aimlessly. The two pursuers of the heavier snake approached it hesitantly and then brought themselves parallel to it and pressed their bodies against it at about the mid-point, as if they were trying to upset it or press underneath it. Again their heads were roughly together, their bodies arched, probably to facilitate the pressing as noted, and their tails writhing and tangling in complete disorder.

As soon as the two snakes started their antics with the one which had escaped, most of the other snakes converged on them and again the whole group massed together as they had been before; however, several of the snakes wandered off, apparently having lost interest.

Within another 5 minutes the group again was broken up by the exit of a large snake (it may have been the same one as before). I then ceased my observation as I had already delayed three-quarters of an hour for a Sunday dinner with my family.—
J. B. GARDNER, *Seymour, Connecticut.*

REPRODUCTION AND DEVELOPMENT IN THE NORTHERN DIAMONDBACK TERRAPIN, *MALACLEMYS TERRAPIN TERRAPIN.*—During the summer of 1953, the opportunity arose for observing the nest and parts of the embryonic development of the northern diamondback terrapin, *Malaclemys terrapin terrapin* Schoepf. Carr (1952, Handbook of turtles: 167-8) pointed out the abundance of information on the biology of captive diamondbacks and the extreme paucity of natural history data on the reptile in its natural environment. In a similar vein, McCauley (1945, The reptiles of Maryland and the District of Columbia: 165) indicated the lack of known details in the life cycle of the northern diamondback.

On June 9, 1953, a female *Malaclemys terrapin terrapin* was discovered in the act of depositing eggs, approximately 4 miles west of Yorktown, Virginia, along the Colonial Parkway. The nest had been scooped out of sand heavily laden with shell fragments. This soil in which the nest was dug had apparently been brought in to provide a fill for the highway across what was previously a low, tidal marsh area. Vegetation in the immediate area is quite sparse and a typical salt marsh, with tidal creek, is located approximately 60 feet from the nesting site. The terrapin was found at 9:00 AM. Although the air and water temperature were not

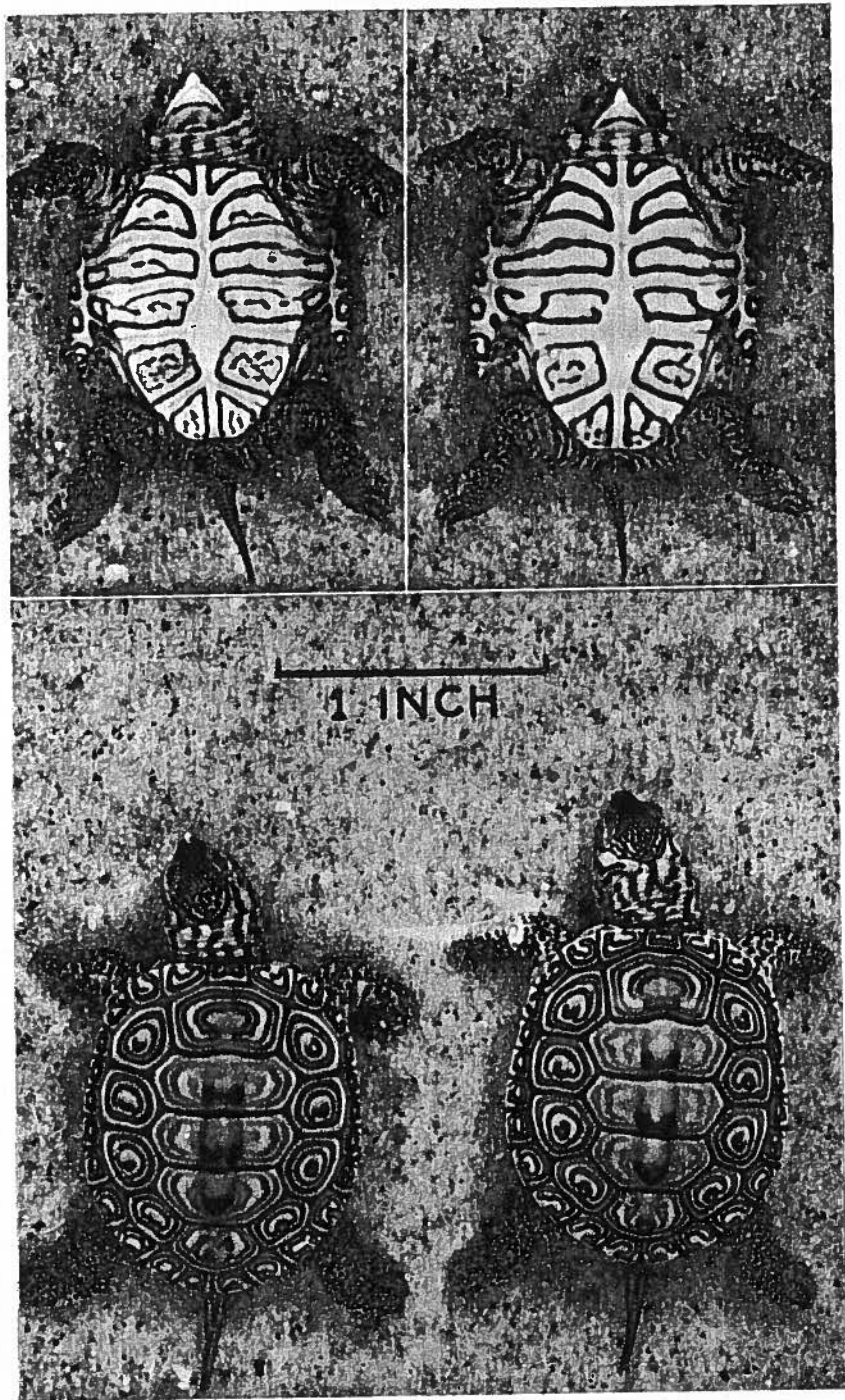


PHOTO BY BOB BAILEY, VIRGINIA FISHERIES LABORATORY
Four hatchlings of *Malaclemys terrapin terrapin*, 4 days old.

ascertained at the immediate locality, the Virginia Fisheries Laboratory, approximately 5 miles east, reported the air temperature as 90° F. and that of the water as 78°.

The topsoil of sand and shell fragments in which the nest was excavated was hot and dry at the surface, although it was rather moist at an approximate depth of 5 inches. The nest was roughly triangular as viewed from above, being about 4 inches long on one side and 3 on each of the other two. A parapet, approximately 1½ inches high, had been thrown up around the two shorter sides. The terrapin, facing outward, occupied the widest side of the opening. At the time of discovery the eggs had already been laid and had been covered with sand; the depth from the top of the parapet to the sand cover was 4½ inches.

When first approached, the terrapin made no attempt to leave the nest. After approximately 10 minutes, photographing was begun, and, as might be expected, she began moving toward the marsh. She was replaced in her original position for photographing, after which she was removed for morphological study.

Examination of the nest revealed that one egg was buried at approximately 6¾ inches, two at 7, and four at about 7½ inches below the surface. One of the eggs was accidentally broken; the other six were placed in a container, and covered with some of the local soil. The soil was kept at room temperature and was dampened occasionally. The elongate ovoid eggs of this clutch were not measured, but McCauley (*op. cit.*) reported 12 that averaged 31.1 by 21.2 mm.

One egg was sacrificed on June 12, 34 days after being laid. This egg contained an embryo with the following dimensions: carapace 11 mm. long, 8.25 mm. wide and 4.75 mm. high; head 7.5 mm. long; eye 3.5 mm. in diameter.

Four of the remaining five eggs hatched on August 16, the 69th day. The first individual broke the surface of the soil near noon and within 2 hours three more hatchlings were recovered. The young were kept alive until August 20, on which date they were photographed, preserved and measured. Measurements (in mm.) of the four-day-old terrapins are, respectively: carapace length—27.0, 27.0, 28.5, 27.0; carapace width—27.0, 27.0, 28.5, 27.0; plastron length—28.0, 26.0, 28.0, 26.0; plastron width (from point of articulation of pectoral, abdominal, and marginal laminae on either side)—23.5, 23.0, 24.0, 24.0. These measurements compare closely with those of two hatchlings reported by McCauley (*op. cit.*) as follows: carapace length—30.5 and 31.0; plastron length—26.5 and 26.0.

The carapace of the mother was 190 mm. long, 153 mm. wide. The plastron was 175 mm. by 134

mm. Markings on the head were atypical in that they tended toward lengthwise dark lines rather than the more characteristic spotting. The hatchlings showed similar markings (Plate I).—GEORGE K. REID, JR., *Department of Wildlife Management, A. and M. College of Texas, College Station, Texas.*

RANGE EXTENSION OF *GASTROPHRYNE CAROLINENSIS*.—Blair (1952, COPEIA, (2): 115) reported *Gastrophryne carolinensis* one mile west of Salina, Mayes County, Oklahoma. It was felt at that time that this collecting station probably marked the western edge of the range of this species in northeastern Oklahoma. It has since become apparent, with the taking of specimens 7 miles west of Inola, Wagoner County, and 5 miles northeast of Tulsa, Tulsa County, that this eastern woodland form follows heavily wooded floodplains westward into the prairie.—ALBERT P. BLAIR AND HAROLD E. LAUGHLIN, *Department of Zoology, University of Tulsa, Tulsa 4, Oklahoma.*

APOSEMATIC BEHAVIOR IN THE SALAMANDER *AMBYSTOMA TIGRINUM MELANOSTICTUM*.—The recent note of A. Stanley Rand (1954, COPEIA, (3): 223-4) on tail-waving activity in *Ambystoma jeffersonianum* has induced me to report the following observations on similar behavior in *Ambystoma tigrinum melanostictum*.

Between 10:00 PM and 1:30 AM, July 28, 1951, during a light rain, following a day of continued rain, I was traveling the paved highways in the Jackson Hole region of Wyoming in search of amphibians. Many tiger salamanders were moving across the roads, especially in the areas bordered by sagebrush flats. When captured on the road, some individuals exhibited what I believe to be aposematic behavior.

When first observed, a crawling salamander which I was approaching suddenly stopped, spread and arched its hind legs, raised its tail almost to the vertical and then waved it back and forth. When placed back on the road after capture, it repeated the tail-waving behavior, but after continued prodding, it ceased this activity and quickly started to crawl away. Later, I noticed that at least five of twelve salamanders observed also exhibited this response of tail-waving, on approach or after slight prodding.

The effect of this tail-waving is quite spectacular. While the bulk of the salamander is held motionless near the substrate, the raised tail, with its black and yellow blotched pattern, waving continuously, could very well serve to frighten away a small predator and perhaps startle a large one for a period long enough to permit escape.—CHARLES C. CARPENTER, *Department of Zoology, University of Oklahoma, Norman, Oklahoma.*