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FOOD HABITS OF THE WESTERN PAINTED TURTLE,
CHRYSEMYS MARGINATA BELLII GRAY

EMERY G. FRITSCH

INTRODUCTION

This investigation summarizes an attempt to obtain conclusive evidence as to food habits of one of our very common turtles, *Chrysemys marginata bellii* (Gray). In the literature of the food habits of turtles little data is recorded in regard to *Chrysemys marginata bellii*, although there is much scattered information concerning other species of this genus. The food habits of many of our turtles on the other hand have been briefly reviewed by Ditmars (1), Babcock (2), Morgan (3), Ruthven (4), and Surface (5). Surface has studied the food habits of several species of turtles and his data seem to be the most complete. Pope (6) has recently reviewed most of the available data on food and food habits of turtles in his interesting popular treatise: "Turtles of the United States and Canada."

The writer acknowledges with gratitude the guidance and assistance of Dr. P. L. Risley, who suggested that this problem be undertaken.

MATERIALS AND METHODS

The common Painted Terrapin or Western Painted Turtle is probably one of the best known of any of the Chelonians. The painted turtles belong to the genus *Chrysemys*. The majority of the species inhabit North America and several species not found in the United States may be found in Central America and Mexico.

Much difficulty has been encountered in the identification of members of this genus. General descriptions of *Chrysemys* have been given by numerous writers and only recently has some of the confusion and uncertainty as to the general taxonomic relations between species and subspecies been clarified. Bishop and Schmidt (7) give a detailed account of the taxonomy of the turtles under consideration. The turtles used in this study are *Chrysemys marginata bellii* (Gray), found west of the Mississippi, and a highly variable intergrading group between *C. m. bellii* and *C. m. marginata* found in northern Illinois. The former (Western Paint-

ed Turtles) were collected in large numbers in the region about the Iowa Lakeside Laboratory, West Lake Okoboji, Dickinson County, Iowa. The subspecies intergrades were obtained in a slough formed by Kilbuck Creek, located seven miles south of Rockford, Winnebago County, Illinois.

Collections were made daily from June 15 to September 1, 1937, and then weekly until November 15, and again from March 1 to June 15, 1938. Immediately upon return to the laboratory the animals were decapitated and the stomachs and intestines removed. The contents were examined microscopically in an attempt to identify the materials, and several simple experiments were conducted in the laboratory in regard to their food habits.

DATA AND OBSERVATIONS

The results of an examination of the stomach and intestinal contents of 150 specimens of *Chrysemys marginata bellii* are tabulated in Table I. The data indicates that the natural diet of this species consists primarily of aquatic vegetation and aquatic insect larvae. *Cladophora*, *Ceratophyllum*, and *Myriophyllum* are the principal aquatic plants consumed, and constitute the bulk of the food contents of the stomach and intestine in the majority of the individuals examined. Animals, such as snails, crustacea and crayfish, were found to occur in only a relatively few individuals when compared with those showing vegetation and insect larva. With regard to insects, this species apparently feeds mainly on aquatic insect larva since surface insects were found only in occasional individuals. *C. marginata bellii* should not be considered as a predatory species because the stomach contents rarely include remains of vertebrate animals. Only one of the 150 individuals examined contained fish; this was an exception and, as the table indicates, not the general rule as is so commonly believed by many people.

Several simple feeding experiments were conducted. Four large (160 mm. carapace length) males and females of *Chrysemys marginata bellii* were placed in a large aquarium to which was added water to a depth of about six inches. Several rocks were placed in the aquarium so that the turtles would have something to climb upon. No vegetation was placed in the aquarium. The turtles were not fed for a week. Then several small fish (1-2-3 inches in length), several tadpoles of different stages, and several adult frogs were added to the aquarium. A careful check was made daily and at no time during a six weeks period did the turtles

Table I—Analysis of the stomach and intestinal contents of 150 specimens of *Chrysemys marginata bellii* (Gray)

	Number of turtles	Percent of total number
<i>Vegetation</i>		
Cladophora.....	71	47.3
Ceratophyllum.....	61	46.7
Algae (undetermined).....	58	38.7
Myriophyllum.....	58	38.7
Oscillatoria.....	53	34.0
Spirogyra.....	47	31.3
Lemna minor.....	46	30.7
Potamogeton.....	38	25.3
Elodea buds.....	37	24.7
Seeds (undetermined).....	26	17.3
<i>Animal Matter</i>		
Mollusca (snails).....	40	26.7
Crustacea (undetermined).....	20	13.3
Cambarus (Crayfish).....	14	9.4
<i>Insects</i>		
Dragonfly (nymphs).....	83	55.3
Midge.....	71	47.3
Diptera (larva).....	46	36.6
Damsel fly (nymph).....	41	27.3
Diptera (flies-Metopiidae).....	33	22.0
Undetermined insects.....	28	18.7
Damsel fly (adult).....	26	17.3
Undetermined beetles.....	24	16.0
Mayfly (nymphs).....	22	14.7
Dragonfly (adults).....	18	12.0
Lepidoptera (moths).....	4	2.7
Orthoptera (grasshoppers).....	2	1.4
<i>Vertebrata (vertebrates)</i>		
Pisces (undetermined).....	1	.7
<i>Parasites</i>		
Spiroxya contorta.....	92	61.3

attack or devour any of the fish, tadpoles, or frogs. During this period the turtles did not receive any other food. The writer placed himself many times in an advantageous position to observe the turtles and at no time were they ever observed trying to capture or annoy the other live animals in the tank. After a six weeks period the turtles were offered fresh bits of liver. The meat was placed on the rocks which protruded about four to five inches out of the water. Shortly after placing the meat on the rocks the turtles would climb up and grab the meat with their mouth and drag it under the water, using their forelegs to tear it apart before swallowing it. In several instances they were observed taking food away from each other.

Several experiments were tried using a different water depth.

The object was to determine if this species of *Chrysemys* could swallow out of water. I found that the turtles would not swallow their food unless there was sufficient water to submerge the animals. This is in agreement with Morgan (3) regarding the species *Chrysemys picta*, who states: "They eat almost anything which they find under water but seem quite unable to swallow if they are out of it." Babcock (2) says, also concerning *Chrysemys picta*: "It apparently cannot swallow unless the head is under water and I have often watched individuals come up on the shore, pick up pieces of wheat or cracked corn (left there for ducks), return hurriedly to shallow water where they would submerge their heads and shake them vigorously as if swallowing such dry food was not an easy process."

During the months of November, December, January, and February further experiments were conducted in the laboratory at the Abraham Lincoln Junior High School at Rockford, Illinois. Several different species of various sized turtles were used, namely, *Chrysemys marginata bellii*, *Chelydra serpentina*, *Sternotherus odoratus*, and *Platypeltis spinifera*. The large aquarium was well provided with vegetation. Once a week small bits of fresh liver were placed on a large stone slab in the aquarium, and a suitable place for observation of the animals was taken. Immediately the turtles (with the exception of the soft-shell) would climb the large rock and grasp the meat with their mouth, then slide off into the water to swallow their meal. These species used essentially the same methods in the manner of devouring their food. In about a month the turtles were no longer afraid, and when small bits of meat were held an inch or two above the water level, the turtles would thrust their heads out of the water in an attempt to grasp the food. Several goldfish and frogs were placed in the aquarium, but at no time did any of the *Chrysemys* chase or devour any of the other living animals. The snapper and musk turtle, however, caught and devoured several of them. Several times the snappers were observed chasing and fighting with *Chrysemys*.

Chrysemys marginata bellii has often taken the worms from the hooks of fishermen. Fishermen often claim that they have seen the Painted Turtle attack and devour fish that they had trailing in the water on a fish stringer. This no doubt is why most fishermen and perhaps other people as well think that the Painted Turtle is a predatory animal. The occurrence of the single animal containing fish among the specimens examined may be explained in the following manner. A fish box was cleaned out, and about 50

dead minnows ranging in size from 1 to 4 inches in length were left floating near the edge of the pier. A few hours later this particular turtle was observed feeding on them. After it had eaten several of the dead fish it was captured for examination purposes. Within the stomach were the remains of at least three of the small fish. This is the only time, however, in the many hours that they have been watched and in the large number that have been examined that any evidence of feeding on dead animals has been observed. Newman (8) writes that he has observed individuals "feeding on dead fish, dead clams, decaying tortoises, worms, meat, and aquatic insects." Pope (6) also states: "In nature individuals have been seen to eat dead birds, mammals, reptiles, fish, and clams." This seems to be only an occasional occurrence, and not the general rule.

Collections of specimens for examination were made at different times of the day to determine if turtles had any special feeding time. It seems probable that early morning and during the night is their natural feeding time. This belief is based on the fact that in the majority of turtles examined the stomach and intestines contained the largest amount of undigested and also the least digested food in the morning. Also from early afternoon until the sun goes down they seem to spend most of their time basking upon logs or any other obstacle protruding out of the water. They will eat in the laboratory, however, whenever food is available.

DISCUSSION

In reviewing the available literature on *Chrysemys marginata bellii* very little information regarding the food habits of this particular species was located. In some ways the above observations are not in exact agreement with the statements of some of the other writers. Hay (9), in describing *Chrysemys marginata*, says that, "The food of the Western Painted Turtle consists of insects, tadpoles and other feeble and small animals." Just what is inferred by "other feeble and small animals" is uncertain. Newman (8) writes that he has observed individuals "feeding on dead fish, dead clams, decaying tortoises, worms, meat, and aquatic insects; the tender shoots of water plants are also eaten." From this statement one would infer that the eating of tender shoots of water plants is a secondary matter, and that animal matter constitutes their regular normal diet. It is my impression that vegetation is distinctly the primary constituent of the food of these animals, since it is present in nearly all stomachs examined, and usually forms a large volume of the stomach contents.

Pearse, Lepkovsky, and Hintze (10) studied the contents of thirty stomachs containing food; their specimens were taken from the vicinity of Madison, Wisconsin where the Western and Central Painted Turtles intergrade. Their results are summarized in estimates of food percentages by volume:

Percentage of plant remains	55.0
“ “ animal “	41.2
“ “ insect “	36.2
“ “ vertebrate remains	4.8

The above writers concluded that crustaceans and molluscs had scarcely been touched; and also that May and damsel-fly nymphs constituted by far the most important item among the insects, and wild celery and duckweeds among the flowering plants. Roughly a third as much algae as flowering plants had been consumed. It will be noted that in this study aquatic plants constitute a distinctly greater amount of the food by volume. They also found some evidence for change in diet with season, and an examination of their data shows that a pronounced decrease in quantity of insect larvae occurs from June to September, while an increase in quantity of vegetation and a slight increase in vertebrate consumption is indicated in the same period. It may be pointed out that this is associated very likely with a decreased availability of aquatic insect larvae during the late summer months (Morgan, (11)), rather than with an actual change in feeding habit. From our evidence, the possibility of seasonal change in diet is not confirmed. Somewhat higher percentages are indicated for molluscs and crustaceans in our data, since 26.7 per cent of the turtles examined contained the former and 13 per cent contained the latter. The amount of vertebrate material observed is significantly low and it seems obvious that this species is not an enemy of vertebrates.

Surface (5) found on examining the stomachs of 86 individuals of *Chrysemys picta* that their diet included algae, grasses, mosses, stems, leaves, seeds, grass, slugs, snails, mussels, dragonflies, crickets, bugs, larvae of Lepidoptera, flies, beetles, rose-bugs, wasps, ants, fragments of fish and mammals. His results have been summarized in the following list:

Percentage of stomachs with plant remains	73 (63 stomachs)
“ “ “ “ algae	35 (30 stomachs)
“ “ “ “ animal matter	80 (69 stomachs)
“ “ “ “ molluscs	27 (23 stomachs)
“ “ “ “ insects	71 (61 stomachs)
“ “ “ “ vertebrate remains	9 (8 stomachs)

In comparing the present investigation with those of Surface (5), one will find that they also are very similar in regard to plants, algae, molluscs and insect contents.

Babcock (2) says, "This species (*Chrysemys picta*) is omnivorous, feeding on small fish, tadpoles, aquatic insects and their larvae, and various other plants." He examined the stomach contents of one and found it consisted of vegetable roots and parts of beetles. He further states that, "This same species will eat table scraps of almost any variety and when kept in aquaria will often attack small fish and tadpoles." The present observations agree for the most part with the findings of other writers in that *Chrysemys* is to a certain extent omnivorous in its feeding habits. Observations in both the laboratory and in their natural environment leads me to believe that it is not usual for them to molest living fish and tadpoles or small vertebrates. It is possible that many of the large number of insects and insect larvae as well as the snails found in the stomach contents may be incidental or accidental in the ingestion of vegetable matter. Large numbers of snails and insects are usual inhabitants of most aquatic plants and in algal beds. If this is correct, it would indicate that *Chrysemys marginata bellii* is essentially herbivorous in its food habits, and omnivorous to a certain extent by chance when in natural environments. In the laboratory, or under adverse conditions, they eat nearly anything that is offered, and in nature may attempt to devour dead or dying vertebrate animals. In this respect they may be regarded as scavengers. Pope (6) states: "Painted turtles have strong scavenger tendencies, which must account in part for the alleged vertebrate eating habits as well as for the occasional devouring of large invertebrates. In nature individuals have been seen to eat dead birds, mammals, reptiles, fish, and clams." Since the turtles observed in this study have rarely been observed feeding on dead animals, and since evidence of large vertebrate remains was not seen in the stomach contents, it does not seem that they are habitual scavengers, but only occasional ones.

While the data of the various writers are essentially similar in regard to the food habits of the Painted Turtle, lesser differences may be partly due to the differences in environmental conditions. Two facts made clear in all investigations are that Painted Turtles seem to devour a greater amount of plant than animal matter, and that vertebrates are utilized as food in insignificant quantities.

Pope (6) points out that Surface (5) and Pearse, Lepkovsky,

and Hintze (10) come to opposing conclusions concerning the Painted Turtle and its feeding habits in relation to man and conservation. Surface maintains that, since only aquatic plants and some small fish species of little value are eaten, while many obnoxious insect species are destroyed, the turtles on the whole are beneficial. Pearse, Lepkovsky, and Hintze emphasize, on the other hand, that the aquatic plants consumed are useful as food for fish, ducks, and other animals valuable to man, and that the turtles, therefore, are injurious and should be destroyed. They do not mention the destruction of insects as a significant item. Pope feels that even the quantity of valuable plants consumed could hardly be significant enough to warrant destruction of the turtles. In view of their probable value as insectivores and scavengers, and also in agreement with Pope's view, it is hardly likely that the conclusion of the joint writers is justifiable.

SUMMARY

1. *Chrysemys marginata bellii* (Gray) is essentially herbivorous and insectivorous in its food habits, feeding mostly on aquatic vegetation and its associated animal population of snails, insect larvae, and crustaceans.
2. Apparently they do not usually swallow food unless the head is under water.
3. Early morning and during the night is probably their natural feeding time.
4. It should not be considered as a predator species, or as harmful to vertebrate organisms. It is perhaps useful as a scavenger.

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