deposit; and (3) post-glacial faults are generally of only a few inches displacement. Possibly the slipping was due to the removal of sand by water running below the surface. Certainly all the evidence militates against the assumption that the digging of the pit could have been the cause.

FRED. H. LAHEE

HARVARD UNIVERSITY

BUFO FOWLERI (PUTNAM) IN NORTHERN GEORGIA

IN the September issue of SCIENCE for 1907, I discussed the range of Fowler's toad to some extent, according to my own observations. An opportunity to spend the spring and summer of 1908 in the counties of Gwinnett and Jackson in northern Georgia has enabled me to make further observations concerning this interesting and apparently little understood toad.

In this region throughout March I heard the occasional, prolonged trills of the so-considered common toad (*Bufo lentiginosus*). By the first of April these notes had become quite silenced, and the distinct chorus of congregations of Fowler's toads had begun. I first noticed these toads singing on the evening of March 26, although I think the first singers had appeared somewhat earlier. It was interesting to note that the voices of Fowler's toads were never heard with the appearance of cool, chilly nights, although the trilling of the common toad continued. Throughout the early spring, this contrast in the occurrence of the two notes, with respect to temperature changes, was very marked.

Fowler's toad in this region of Georgia is an exceedingly abundant species. Throughout the months of April, May and June its droning cries are heard in thousands along certain streams. At this season the females are laying their long, bead-like strings of eggs in the water, attended by hosts of noisy males. Especially during the spawning season, the females seem to be greatly outnumbered by the males.

During the last week of May, the streams and pools where the eggs had been laid, were alive with tadpoles in different stages of development. About the middle of June, many of these had developed into tiny toads which were hopping along the banks, and in a few days every tadpole had disappeared as if by magic. A few evenings later, there was a noticeable increase in the number of males in voice along this stream. On visiting the locality, I was interested to find the females again laying eggs in great quantities, accompanied by many males. It would seem from this that these toads may have several well-defined egg-laying periods in a season.

After the spawning season these toads leave the water and take up quarters in the fields and pastures. During the day they generally remain quiet beneath stones, logs and bunches of grass. I find them very frequently in deep gullies. Here also I have found their eggs in the transient pools following showers. Several times I have found these toads buried to the eyes in sand greatly heated by an intense sun. In gullies and banks by the roadsides, the horizontal holes left by the decay of tree-roots, are favorite hiding places for these toads during the day. Several sometimes occupy the same tunnel, and may be seen peering out with expressions evincing serenity and contentment. Fowler's toads are rather inclined to be social in their habits. Last summer, near Hartford, Conn., I noticed a great stone door-step under which fifteen or twenty of these toads had taken up summer quarters. Every evening throughout the summer they would appear, one by one, and hop in a long line, up the walk leading into the fields.

I find considerable variation in the size, markings and coloration of Fowler's toad. The general coloration varies from a bright reddish brown to a dark grayish brown. Beneath, I have found no markings whatever, in either sex.[1] In truth, in this region of Georgia every toad examined was, for this and other reasons, apparently a Fowler's toad.

The usual note of Fowler's toad is a brief, penetrating, droning scream. Only once have I heard a decided departure from this. I heard this note late in April, in Gwinnett Co.,

[1] A single small, dark spot in the center of the breast of the males is the only marking I have ever observed beneath.

in upper Georgia. A single individual of a noisy congregation of males had the unmistakable trill of the common toad, but short and decisive like the Fowler's song. It was a perfect combination of the notes of both.

Wherever I have found this toad—in central and southern New England, around Washington, D. C., and in northern Georgia—it has been the only common form. Throughout the region of Jackson and Gwinnett counties of northern Georgia this toad is extremely common. Whether or not its range extends into the central or southern portions of the state, I have not determined. It is evident that *Bufo fowleri* occurs abundantly in much of the territory east of the Appalachian Mountains, and is far from being an uncommon or local race or species.

H. A. Allard

Bureau of Plant Industry,
Washington, D. C.

A PRELIMINARY NOTE ON A GROUP OF LACTIC ACID BACTERIA NOT PREVIOUSLY DESCRIBED IN AMERICA

Various bacteria forming acid in milk have been described. The organisms most frequently met and which are of the greatest economic importance are those belonging to the group represented by *Streptococcus lacticus* (Kruse) or the *Bact. lactis acidi* of Leichmann. This group is characterized by the small amount of acid which the organisms are able to produce in milk. The milk acted upon by pure cultures rarely shows an acidity exceeding one per cent. The limiting factor is apparently the formation of free lactic acid, the organisms being unable to grow in the presence of free acid. As numerous investigations have shown, the amount of acid produced varies with the composition of the milk. Milks high in casein and ash constituents develop a greater amount of acid under similar conditions than do milks whose casein and ash content is lower, because these substances combine with the acid formed.

Freudenreich, in Switzerland, has described a class of lactic-acid-forming bacteria which are able to produce much greater amounts of acid in milk than the organisms of the *Streptococcus lacticus* group. This group of high acid-forming organisms has been brought into prominence recently by the work of Metchnikoff and others on the fermented drink yougurt which is prepared from milk. The organisms found in this type of fermented milk are characterized by the production of large amounts of acid, three per cent. and over, by the high optimum temperature for growth, 42–45° C., by growing only under certain narrow conditions on artificial media, and by their morphology, being large bacilli. In all these the organisms from yougurt agree with those described by Freudenreich.

It has not been thought that such organisms are widely distributed. Indeed some writers have asserted that this type was peculiar to the country to which yougurt is native, Bulgaria. Within the last few months it has been found that organisms whose characteristics are similar to those found by Freudenreich in Swiss cheese and to those found in yougurt are of common occurrence in this country.

If a sample of mixed milk is placed in a tightly stoppered bottle and incubated at 37° C. the acidity rapidly reaches one per cent., due to the growth of *Streptococcus lacticus*. The acidity then continues to increase slowly until at the end of two to three weeks it reaches 2.5 to 3 per cent. The flora at first made up almost wholly of the small diplo-bacilli changes, through the appearance of long slender bacilli, which increase in number with increasing acidity.

In cultural characteristics and in biochemical reactions, the organism isolated is apparently of the same group as those of Freudenreich and the bacteria in yougurt.

As far as the writer is aware, this type has not previously been found in this country, although it is of wide distribution, and has been present for years. Milk bottled in 1902 was recently opened, and showed an acidity of over 3 per cent. A detailed study of the distribution and characteristics of the organism is being made.

E. G. Hastings

Wisconsin Experiment Station