for the study of extinct mammalian faunas than has yet been discovered elsewhere in Nevada. Situated as they are between the typical localities of the Tertiary formations of eastern Oregon and the areas of Truckee Miocene in Nevada, they will probably be the key to the correlation of these formations. The examination of the beds made thus far has necessarily been exceedingly superficial, but it is hoped that the continuation of this work during the next season will put us in a position to make a satisfactory determination of the relative ages of the Oregon and Nevada Tertiary formations.

John C. Merriam
University of California

Physiographic Changes Bearing on the Faunal Relationships of the Russian and Sacramento Rivers, California

For some time biologists in this state have noted the close relationship between the fauna of the Russian River and that of the Sacramento, in forms that do not migrate through salt water. In a recent trip through Lake County very clear evidence was found that the waters of the Scott's Creek now flowing into Clear Lake and thence into the Sacramento, formerly flowed into the Russian River. Clear Lake is a sheet of water some twenty miles in length and lying at an elevation of about thirteen hundred feet in the middle of Lake County. Scott's Creek rises in the mountains to the westward and after flowing to within two miles of Clear Lake turns to the northwest, cutting a gorge through the mountains.

On going *down* this valley one is confronted by the startling physiographic fact that it bifurcates into two valleys without change of grade. Such a division is not unusual on the flat surface of a low-grade delta, but it challenges investigation when encountered in a mountain gorge with hills rising fully a thousand feet on both sides. The valley to the left has practically a level floor and is occupied by the narrow and rather deep Blue Lakes. Three miles from where it leaves Scott's Creek, without any narrowing it terminates abruptly against a transverse ridge about one hundred and sixty feet high. Beyond this ridge the valley is occupied by Cold Creek, which empties into the Russian River.

Returning to the point of bifurcation of Scott's Creek the gorge to the right turns eastward and empties into the northern end of Clear Lake.

Climbing the hills on either side of Blue Lakes the valley in which they lie is seen to be continuous in slope and outline with that of the upper portion of Scott's Creek and of Cold Creek except for the low transverse ridge already mentioned and which evidently is the dam that made Blue Lakes.

On examination this ridge is clearly a comparatively recent landslide. It has the characteristic hummocky, uneven surface and still shows two or three ponds not yet filled nor drained. The slide came from the southwest slope of the main valley and is approximately a mile in length, starting from an elevation of fifteen hundred feet (aneroid) above the Blue Lakes. The valley is here about an eighth of a mile in width, and the momentum of the slide carried it across the valley and somewhat up the opposite slope. At this point, which is crossed by the stage road to Ukiah, the contrast in color of soil of the slide and of the eastern valley slope is very marked.

When the slide occurred the waters of Scott's Creek were evidently backed up for some ten miles, forming a lake, narrow in the gorge and widening out in the more open valley above. The waters of this new lake rose until they overflowed a low divide separating a tributary from the head of a small tributary of Clear Lake. The outlet thus determined was lowered by erosion and is now the main channel of Scott's Creek. The base level for this channel was determined by Clear Lake and the lake in Scott's Valley was soon filled by sediment making a rich alluvial plain with a maximum width of two miles. In a well sunk in the center of this plain tules were found at a depth of about seventy feet below the present surface. The portion of the old channel below the tributary through which

the overflow took place did not fill with sediment as rapidly as the main valley and is now occupied by the Blue Lakes and Laurel Dell Lake—commonly termed, collectively, the Blue Lakes. The location of the low divide where the temporary lake overflowed is probably about one and a half miles from the Blue Lakes gorge. At this point the wagon road crosses a low spur that runs out to within four hundred feet of the opposite side of the valley, which is here undercut by the stream.

Remembering the recent settlement of California, it is needless to say that the time of the Blue Lakes slide is prehistoric. Indian legends tell of the sudden creation of the Blue Lakes, but they fix no date and are hardly acceptable in a physiographic court. The trees on the slide and on the adjacent slopes do not differ in apparent age, but the mountains are not heavily wooded in this vicinity. The filling in of Scott's Valley and the cutting of the divide separating the new lake from Clear Lake give some suggestion of the time. As the waters did not overflow the landslide which at its lowest point is about one hundred and sixty feet above Blue Lakes, the erosion of the new channel must have been to a less depth than the height of the slide.

Brief mention should be made of another connection between the waters of Russian River and the streams of San Francisco Bay. Copeland Creek flows down the western slope of Sonoma Mountain and debouches on a fan that spreads out over the flat divide separating the Russian River from the Bay. The southernmost of the distributaries on this fan empties into Petaluma Creek and thence to the bay. The northernmost flows into the Russian River. These distributaries meet today at the head of the fan and in flood time Copeland Creek discharges both ways. This connection seems less important than that of the Blue Lakes, for it connects the Russian River with a small stream emptying into the salt water of the bay. The Blue Lakes slide transferred bodily a portion of the fauna of Russian River directly to the Sacramento River system.

RULIFF S. HOLWAY

FOWLER'S TOAD (BUFO FOWLERI, PUTNAM)

WE are all familiar with toads—they seem common enough in our gardens and fields, yet few are aware of more than one common species in the eastern states. One toad has been strangely overlooked. Considered rare and local for many years, it is beginning to be recognized as one of the commonest forms, with a range from New England to the southern states. In fact the popular term "common toad," in much of this territory better applies to the toad (*Bufo Fowleri*), until very recently considered so rare and limited in its range, rather than to the older and better-known species (*Bufo Americanus*).

Concerning the range of Fowler's toad, Miss Dickerson in her excellent "Frog Book," reports it only from Danvers, Cutty Hunk Island, Mass., throughout Rhode Island, and New York near the coast. My own observations of this toad for a period of over ten years, lead me to believe it is a common toad that has been almost overlooked. It is heard in great numbers all along the Maanixit River, throughout the region from Oxford to Worcester, Mass., where I first became acquainted with the toad while doing some collecting in connection with nature-study work at Clark University. During the years 1900–05, I spent the greater portion of the spring and early summer at Chapel Hill, North Carolina, a small town about twenty-eight miles northwest of Raleigh. Here also I heard the unmistakable droning cries of these toads. In 1906 I took up quarters in Washington, D. C., and during the serene May nights I heard a great many of these toads in and around the Fish Ponds just west of the monument grounds. In fact these toads were hopping about throughout the vicinity—apparently the only species of toad to be met with frequently in Washington. Very recently, also, I learned from a competent observer that these toads were extremely abundant around Cumberland, Maryland. He stated that he had seen great numbers along streams in this region during the month of June, making the nights fairly hideous with their noise. In August, 1906, I met *Bufo*