J. J. Tanzola, of Columbia University, in the U. S. Naval Academy, and Dr. C. H. Forsyth, of the University of Michigan, in Dartmouth College.

DR. CHAS. H. OTIS has resigned his position as instructor in botany and assistant botanist at New Hampshire College and Experiment Station, to accept a position in the biological laboratory at Western Reserve University. Dr. Otis will have charge of the instruction in botany in Adelbert College and the College for Women, taking the place of Dr. Wm. H. Weston, who recently resigned.

MR. PAUL C. GRAFF has been appointed instructor in botany at the University of Montana.

DISCUSSION AND CORRESPONDENCE

FURTHER EVIDENCE BEARING ON THE AGE OF THE RED BEDS IN THE RIO GRANDE VALLEY, NEW MEXICO

THE almost total lack of invertebrate fossils in the Red Beds exposed on the eastern side of the Rio Grande Valley has made it very difficult to determine their exact position in the geologic column. In some localities definite determinations have been made, largely upon stratigraphic evidence, showing that the red sandstones and shales occur at horizons ranging from the Upper Pennsylvanian to the Cretaceous. The work upon this region has been reviewed by Lee and Girty.[1]

During the last summer, while engaged in a survey of the Permo-Carboniferous boundary line for the Carnegie Institution, the writer was able to spend a short time in the Red Beds near Socorro, New Mexico. The examination was made possible by suggestions and maps furnished through the kindness of Dr. N. H. Darton, of the U. S. Geological Survey.

Two or three miles north of Carthage, New Mexico, the prominent ridge of Dakota sandstone is underlain by a series of shales and sandstone varying in color from bright green to brilliant red with a few patches of conglomerate and impure limestone of limited horizontal extent. The arid valley between the ridge and the hills to the north capped by the San Andreas limestone affords an excellent exposure of the beds.

Lee and Girty reported a few doubtful invertebrate fossils from the San Andreas at this place and speak of 200 feet of red beds overlying the limestone at the old lime kiln near Carthage.

No fossils were found in these upper beds and their age is a matter of conjecture.

They also report the Abo and Yeso formations as present, but the exact locality of their section is not given. The red beds above the San Andreas limestone are faulted down against it just at the old lime kiln and can be traced up the valley for several miles. Close to the lime kiln and about half way up to the base of the Cretaceous the writer found a small bed of conglomerate containing an abundance of lamellibranchs in a very small patch. These have not yet been identified.

A few fragments of bone were found in the same bed and further up the valley, but at a lower level, other fragments were found. The following list shows them, and the containing beds, to be clearly Triassic.

1. A small section, about four inches, of the snout of a slender-jawed Phytosaur, suggesting *Angistorhinus* or *Mystriosuchus,* with teeth diverging at an angle of 15 to 20°. This was found in a concretion in a dark brown, impure limestone occurring as a lens in the red shale.

2. Three vertebræ, found at different localities, apparently Phytosaurian.

3. The proximal and distal ends of a large limb bone, badly worn and unidentified, but certainly not related to any of the known forms of Permo-Carboniferous vertebrates.

4. Two small dorsal plates. One with a median dorsal ridge and the other, regularly hexagonal and with a ventral rugosity evidently for attachment to the dorsal spine of a vertebra.

5. Several imperfect ends of large limb bones; two suggesting the ends of a tibia and a radius respectively.

6. Two fragments of thoracic plates. One

[1] Lee, W. T., and Girty, Geo. H., "The Manzano Group of the Rio Grande Valley, New Mexico," Bulletin 389, U. S. Geological Survey, 1909.

from a large plate with deep radial flutings and the other, smaller, with similar markings. Both are evidently Stegocephalian.

7. A large vertebral centrum, evidently from a sterospondylus Stegocephalian.

Most of the bones were found in the conglomerate beds, but a few in lenses of impure limestone.

Lee and Girty also give a description of the beds near the Mesa del Yeso on the eastern side of the Valle del Ojo de la Parida and report typical Manzano fossils from the Yeso formation.

The Red Beds were examined by the writer near the Ojo de la Parida about ten miles northeast of Socorro, where the Abo, Yeso and San Andreas formations are easily recognized. In the Yeso and the upper part of the Abo no vertebrate fossils were found, but in the lower part of the beds near the mouth of the Canyoncito Colorado (see the Socorro topographic sheet) beds of dark red pebble conglomerate were found lying upon green, blue and drab shales which show in the bed of the arroyo. In this conglomerate were found typical Permo-Carboniferous bones such as were collected by Dr. Williston and the writer in Rio Arribo County, New Mexico. The following list shows the similarity:

1. A complete femur of *Eryops* sp.
2. The distal end of a clavicle of *Eryops* sp.
3. The distal end of a neural spine of *Eryops* sp.
4. A femur of *Sphenacodon.*
5. A fragment of the jaw with four teeth of *Sphenacodon.*
6. The distal end of the scapula of a *Sphenacodon* or *Ophiacodon.*
7. The distal end of a large scapula, possibly *Sphenacodon.*
8. Fragments of a large pelvis, possibly *Sphenacodon.*
9. In the bluish shale in the bank of arroyo, the proximal end of a rib of diadectid type associated with poorly preserved plant remains.
10. In the drab shale below the blue, several invertebrates.

The discovery of this fauna below the San Andreas limestone adds one more bit of evidence to those already cited by the author elsewhere, for the very early appearance of specialized reptilian life in North America.

E. C. CASE

THE SWEET POTATO "SOIL ROT" OR "POX" ORGANISM[1]

SINCE Halstead in 1891 published his results on the study of "Soil Rot" of sweet potatoes, which he credited to a fungus "*Acrocystis batatas,*" little positive work seems to have been done on the causative organism. During the present season observations by the author of slimy masses on the surface of roots developing large shallow "pox" marks, led to the discovery that the disease is due to a plasmodium and that there are two modes of infection. One is by the plasmodium as a whole, causing large shallow pits; the second is by means of swarm spores, which enter the growing-points of stems or roots and cause the formation of deep circular pits, when the infection reaches the main root. The swarm spores first entering a growing-point go through a rapid development in the outer host cells, passing through an ameboid and a plasmodial stage. During the plasmodial stage a large number of nuclei are formed by mitotic division. The plasmodium then forms a heavy-walled cyst in which hundreds of spores are developed. The swarm spores are liberated within the cyst, which breaks down and releases the spores, when a further infection of host cells occurs. The infection spreads rapidly to the main root, causing a pit or "pox" scar. When the pit has reached the limit of its development the plasmodium assembles and breaks out, migrating into the soil. A secondary infection by swarm spores in small immature pits, causing extensive blister-like elevations in the skin of stored sweet potatoes, has been observed. White potatoes are also subject to the disease.

The formation of a heavy-walled cyst containing several hundred swarm spores separates this plasmodium from the now-recognized genera of the Plasmodiophorales. Accordingly, the name *Cystospora batata* gen.

[1] A preliminary note.