tofore in eastern Oregon have also been discovered and are being studied.

Dr. Merriam published an excellent summary of the physical geology of the John Day region in 1901. No detailed mapping of the geology had been done, however, before the present program was initiated. The region is a key area for the whole northern Great Basin Province in that a larger number of post-Jurassic formations is exposed here than at any other locality. In no other district are the great Columbia lava fields dissected so as to expose earlier Tertiary formations so extensively.

To facilitate geologic mapping the U. S. Geological Survey, under a cooperative arrangement with the Carnegie Institution, has made topographic maps of two areas: the Mitchell Quadrangle of about 750 square miles, and the Picture Gorge Special Quadrangle of about 56 square miles (on large scale). The writer has finished the geologic mapping of the latter area and has nearly completed the Mitchell Quadrangle. The areal and structural studies are as detailed as the scales of the two maps permit.

The formations exposed are: a pre-Cretaceous crystalline complex; Chico, upper Cretaceous; Clarno, Eocene or Oligocene; John Day, upper Oligocene; Columbia lavas, middle or upper Miocene; Mascall, middle or upper Miocene; and Rattlesnake, Pliocene. All the contacts excepting the Columbia lava-Mascall and perhaps the Clarno-John Day are very striking nonconformities. Both an exceedingly eventful geologic history and a very interesting series of gemorphic changes are evidenced by the results of the mapping.

The investigations in all phases of the John Day program are being continued during the summer of 1927.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE STUDY OF RHIZOPUS IN THE GENERAL COURSE OF BOTANY

IN many botanical laboratory courses it is the custom to study bread mold as a mass of hyphae covering bread or some other medium and to mount some of the mycelial mass on a glass slide, teasing it out for further observation of the vegetative structure. This method has seemed unsatisfactory, and I wish to suggest another method which has been used with success in the course in general botany at Macalester College.

Between two glass slides (5 cm. × 11½ cm.) are placed several layers of filter-paper of the same size as the glass slides, the interior portions of which have been cut out so as to form a border of filter paper about one centimeter wide. A small piece (2 or 3 cu. mm.) of the moist bread on which the culture is growing is placed between the glass slides in the center of the band of filter-paper. The slides are then tied together with thread, the filter-paper moistened by dipping the edges of the slides in water and the whole mount placed under a bell-jar. In about two or three days the stolonifers will extend outward in various directions from the moist bread, and wherever they come in contact with the glass surface rhizoid-like hyphae and sporangiophores are produced. This may now be studied either with the compound microscope or with the binocular microscope.

This enables the student to trace the stolonifers with ease from their origin to their attachments to the glass and to study the sporangiophores and rhizoid-like hyphae in their natural positions without any disturbance of the hyphae or any danger of their drying during the study.

The above described damp chamber is practically the same as that used by Dr. R. E. Jeffs in his studies of root-hair elongation and described in the *American Journal of Botany* 12: 577–606, 1925.

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SPECIAL ARTICLES

THE VARIABILITY OF LONG DIFFRACTION SPACINGS IN PARAFFIN WAXES

So much interest is being manifested in the polymorphism of long chain compounds, particularly the fatty acids (Piper, Malkin and Austin, *J. Chem. Soc.* 1926, 2310; deBoer, *Nature,* 119, 50, 635 (1927); Thibaud, *Compt. rend.* 184, 24, 96 (1927); Müller, *Proc. Roy. Soc.* 114-A, 542 (1927), that it seems advisable to report the results of some X-ray experiments with ordinary commercial paraffin waxes. Only one mention of X-ray studies of these complex mixtures of many hydrocarbons has been made, that of Piper, Brown and Dyment (*J. Chem. Soc.* 127, 2194 (1925) who found that the lines of the C_{28} hydrocarbon appeared alone for a paraffin wax although this fraction furnished only 16 per cent. of the mixture and other members as high as C_{32} were probably present.

In the present investigation samples were prepared from waxes melting at 135, 130, 125 and 120° F. by solidifying on glass plates and photographing in an oscillating spectrograph with copper Kα rays.