THE fourth annual conference of workers who are engaged in the study of the root-rot disease (caused by *Phymatotrichum omnivorum*) was held at College Station, Texas, on January 19 and 20. This conference, which is part of the cooperative attack on the root-rot problem by the United States Department of Agriculture and the Texas Agricultural Experiment Station, affords a yearly opportunity for the prompt presentation of results secured during the previous year at the many laboratories and field stations at which work on the problem is under way. The 46 papers presented at the present conference included results from six laboratories and field and plat studies from eight stations. A total of 34 plant pathologists, soil chemists, agronomists, botanists and horticulturists took part in the discussions. Director A. B. Conner, of the Texas Experiment Station, and Dr. Oswald Schreiner, of the United States Department of Agriculture, presided at the various sessions. A report of the results presented at this conference will appear in *Phytopathology*.

ON Wednesday afternoon, December 31, those interested in hydrobiology and aquiculture met for papers and discussion in the Herrick Room of the Medical Library Building of Western Reserve University. Dr. E. A. Birge, of the University of Wisconsin, acted as chairman. The secretary, Dr. P. R. Needham, University of Rochester, writes that this was the second special meeting of this group to be held in conjunction with the American Association for the Advancement of Science, the first having been held in Des Moines last year. The great amount of interest in these subjects was evidenced by the attendance which was well over one hundred persons. There were fourteen papers given, most of which were illustrated by lantern slides. Delivery of papers occupied most of the afternoon and discussion periods were all too brief. The subjects covered were as broad as the field of hydrobiology itself and were in most cases the results of research carried on by the speakers. Seven of the papers had to do with lakes and covered such phases as light transmission, gases in solution, thermal stratification, plankton, bottom faunas and fishery problems. Three of the papers were on ecology and life histories of fishes. The only paper having to do with salt-water was one given by Professor Thurlow Nelson, of Rutgers University, on oyster larvae and their reactions to currents and salinity of waters. Most of the papers had to do with pure hydrobiology. Little was said on the more practical aspects of aquiculture or the means by which our bodies of water are to be made into producing units. The meeting was very successful from all points of view.

THE Council of the American Association for the Advancement of Science at the Cleveland meeting passed on January 1, 1931, the following resolution on the revision of the copyright laws of the United States:

WHEREAS, There is prospect of Congressional action at this session on the long discussed Vestal General Revision Copyright Bill (H. R. 12549), which includes among its many just and progressive provisions the qualifying of the United States for entrance into the International Copyright Union, and

WHEREAS, It is highly desirable that the United States outlaw piracy and thus in turn obtain for its authors and composers the automatic protection which is afforded by membership in this Union; it is hereby

Resolved, That the council of the American Association for the Advancement of Science hereby expresses its hearty approval of the Vestal Bill, and it is further

Resolved, That the council recommends that, if without defeating passage, the bill be amended to preserve to the individual, whether resident or incoming, his old privilege of importing for use all legitimate foreign books without intervention, and also to provide for adherence to the 1928 Convention of the Union instead of the 1908 convention, as provided in the present bill.

DISCUSSION

ORIGIN OF PALOUSE HILLS TOPOGRAPHY

THAT part of the loess-covered Columbia plateau which lies in the adjoining counties of Whitman, Washington, and Latah, Idaho, possesses a curious rolling mature topography which has puzzled geographers and physiographers because it appears to belie the topographic age of the surrounding and adjacent country.

This rolling topography has been locally called "the Palouse Hills" from the time of the early white settlers. It is an area of extremely dissected loess, with a relief of more than 150 feet bearing relatively few streams, and presents an aspect so unusual that it is gradually becoming known as a new type, the Palouse Hills topography.

Guesses at its origin over a period of forty years have attributed the unusual topographic forms to normal stream erosion, to aeolian deposition, even to barchan dunes of loess. Unfortunately, the field evidence fails to support any of these hypotheses satisfactorily.

The only topographic map of the area is the Pullman, Washington, quadrangle and its large contour interval and small scale fail to show the most characteristic features of the Palouse Hills topography. It was not until 1927 that Dr. Francis A. Thomson, president of the Montana School of Mines, but at that time dean of the School of Mines at Moscow, Idaho, crossed the region by aeroplane and noticed that nearly all of the intermittent streams tributary to the main drainage lines headed in cirque-like bottle-necked amphitheaters. The studies of the authors,

inspired by his observations, showed that about 90 per cent. of the minor valleys which drain into the regular stream channels are of the cirque-like amphitheater type. These valleys are streamless throughout the year and carry water only for a week or two in the spring when the snow melts and produces a temporary sheet run-off which is concentrated in the bottoms of the valley heads.

The cirque-like amphitheaters range from a few feet to several hundred yards in diameter. In the smaller ones the bowl or amphitheater is nearly circular in ground plan, but the larger and doubtless older ones have an oval plan, opening at the lower and smaller end to debouch into another amphitheater or into a normal stream valley. In all the smaller and younger types and in the majority of older and larger examples the debouchure is constricted into a small bottle neck. Variant forms have a constricted S-shaped neck or a non-constricted neck which is no wider than the cirque-like depression at the head.

The walls of the amphitheater are always notably steep and concave in profile. The depth is, of course, controlled by the thickness of the loess mantle which in some places approaches 200 feet. In no case is the depth greater than the width, and in the smaller ones it reaches only a few feet, while in the larger ones the depths are commonly 75 feet and more.

The amphitheaters are all enlarged and elongated by headward erosion and new ones are from time to time developed in the walls of the larger forms until a clover-leaf pattern becomes characteristic where two, three or more amphitheaters, each with a bottle neck, converge on the bottle-neck opening of the original amphitheater.

Studies during 1927–28–29 have permitted the detailed examination of more than sixty characteristic amphitheaters. The main drainage lines lead to the southwest and the cirque-like depressions are found on both sides of each valley and around the heads. Compass readings taken from the bottle necks to the heads were made on 65 amphitheaters and indicate a general tendency to orientation in two directions. About an equal number of amphitheaters headed to the west and opened to the east, southeast and northeast as compared to those which headed to the south and opened to the north, northeast and northwest. A few poorly developed amphitheaters headed to the north and opened to the south and southwest.

The relation of the depressions to the normal stream drainage is not the normal dendritic pattern. The amphitheaters may lie at right angles to the main valley or may join with obtuse angles opening up stream.

That the depressions were not caused by ordinary run-off and stream erosion is admitted by everyone who has given the area any study. That the crescentic depressions do not represent the lee side of barchan dunes is proven by the lack of orientation with the prevailing wind or with any consistent orientation in any one direction.

The best theory for their origin was suggested by Dr. J Harlen Bretz, professor of geology, University of Chicago. Upon his suggestion that nivation might have been a contributing cause the evidence was restudied and the writers are at this time reporting preliminary conclusions resulting from a three years study of the phenomena.

Nivation[1] appears to be the largest single contributing factor and appears to be the factor which determines the two directional orientation, the headward erosion and the cirque-like shape of the amphitheaters. Other factors, such as soil-slip, slump, mud flow and rill erosion, contribute in a minor way to the formation of these depressions.

The precipitation of the region occurs largely as snowfall and great drifts form on the valley sides and remain for several months of the year. The soft, easily eroded loess lends itself exceptionally well to erosion by nivation and to the formation of steep concave slopes on the uphill side of the drift.

The following lines of evidence indicate that nivation is the chief cause of the pseudo-cirques or amphitheaters:

1. The largest and best developed pseudo-cirques open in easterly or northerly directions. These are the sides of the valleys on which the snow drifts achieve the greatest depths and remain the longest because they are protected more from the direct rays of the winter sun. Very few hills or valley walls show concave slopes on the sunny side.

2. The steepest head slopes of the pseudo-cirques occur in those which face in northerly or easterly directions.

3. There is more mud on the north and east slopes. As long as six weeks after the south and west slopes are dry enough for cultivation, the north and east slopes are covered by mud which may be very slowly flowing across the floor.

4. In all cases the walls inside the pseudo-cirques are the steepest and most concave.

5. The drainage divides have been shifted from normal position because of greater headward erosion in some amphitheaters than in others. The divide which lies between two parallel streams flowing southwest bears amphitheaters on the southeast side which face east, southeast, and northeast, and amphitheaters

[1] Francois E. Matthes, U. S. Geol. Survey, Twenty-first Annual Report, Pt. II, pp. 179–185, 1900.

on the northwest side which face north and northwest. As these pseudo-cirques work headward the divide becomes staggered with cols, horns, and ridges analogous to the "grooved and fretted" divide in a range where mountain glaciation has occurred.

6. The mud flows are the largest on the slopes where the largest drifts occur. These in turn are in the largest valleys.

Nivation itself loosens up the loess, results in mud flows, develops concave depressions independent of drainage lines, and leaves no indication of scour or transportation.

The transfer of material from the upper edge of the snow drift, under the mass of the snow drift, by sheet erosion is very slow and would be imperceptible except for the mud flow which develops at the toe of the drift.

Annually after the drift has entirely disappeared the shady sides of the amphitheaters retain soil moisture much longer than the other sides and slump and soil slip result. The scar resulting from the slip exposes a still steeper surface in the loess to run-off and rill erosion.

During the early spring the walls of the amphitheaters are scarred by soil slips. These extend down the slope from the point of inflection to the bottom, forming black V-shaped gashes on the surface. The slips occasionally move the surface layer to a depth of one foot, but a few inches is the common depth. Gentle spring rains form rills, which in turn follow the soil slips and thus intensify and localize the erosion.

In conclusion it can be said that the predominant process of dissection of the loess-covered plateau is by the formation and enlargement of amphitheaters. All of the valleys and depressions regardless of age present the characteristic curves of maturity with the upper part convex and the lower part concave.

A full discussion of this type of erosion and topography is in preparation. It will be accompanied by large-scale topographic maps, cross-sections, aërial and landscape photographs and statistical data, all of which amply justify the above conclusion.

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A FOSSIL CYCAD IN NEW JERSEY

THE clay deposits belonging to the Raritan formation of the Cretaceous near Woodbridge, New Jersey, which in the eighties of last century yielded so many fossil leaf impressions to Newberry, have recently furnished an unusual specimen. A member of the party of Rutgers University geologists who were removing a group of footprints of a dinosaur picked up the piece of lignite which forms the subject of this note, and submitted it to me for examination. The specimen represents the apical region of a trunk with a large number of scales standing out from this, the whole having a diameter of about 180 mm, while the diameter of the trunk proper is 85 mm. The tips of the scales have been worn away, so that the original diameter of the fossil was probably as much as 200 mm. Some detached scales measure about 50 mm long by 18 mm wide, and are 4 mm thick at the middle, which region forms a broad thickened ridge on each surface of the scale. These organs were apparently narrower and thicker in their distal region, contracting to a diamond-shaped area on the free end.

In spite of the weathered condition of the specimen it has been found possible to make out several imbedded fructifications which superficially resemble those of the cycadeoids described by Wieland and others. Although the axis of the specimen shows a poor state of preservation, certain of the scale-like organs look so favorable that they have been converted into serial sections by the celloidin method. A study of these has shown that they have precisely the same arrangement of their vascular strands as is figured by Carruthers for the leaf-bases of the English cycadeoids. Moreover, our specimen shows a well-developed covering of epidermal scales or ramenta of the same type as those figured by Carruthers and by Wieland. The minute structure of the vascular bundles of our specimen has been compared with Wieland's photographs and found to correspond. The evidence for the view that the scale-like lateral organs are leaf-bases appears convincing. A striking feature of the New Jersey specimen is the excessive development of periderm, which not only surrounds each leaf-base but penetrates it in various directions, resulting in an extensive fragmentation of the organ. An odd feature of certain leaf-bases is the presence of a fossilized fungus which appears to have been parasitic. The evidence at hand points with certainty to the conclusion that we have here a species of *Cycadeoidea*. The nearest locality from which the genus has been reported is Maryland. The discovery of a specimen in New Jersey raises some questions with respect to the sort of climate which prevailed in this region during the Cretaceous period. Taking into account the xerophytic characters exhibited by the conifers occurring in the Cretaceous beds of Staten Island, and described by Hollick and Jeffrey, we may venture the opinion that New Jersey was both warmer and drier during the Cretaceous