AN ANATOMICAL EXPLANATION OF THE NORTHWEST CONIFEROUS CLIMAX FORESTS

INASMUCH as the summers of the Pacific Northwest are dry, while the winters are wet and mild, it has been suggested that the evergreen conifers have come to form the climax forests of that region because they grow during the winter months. Dr. D. T. MacDougal,[1] after dendrographic measurements, has said of the Monterey pine in California that "Growth was continuous for one period of three years." Over a considerable period of time the writer has attempted to gather anatomical evidence showing that the conifers of Oregon are active in the winter when the deciduous trees are resting.

This study was begun in 1914 with material collected in western Oregon during the winter months and has been continued at more or less regular intervals up to the present time. Beginning in 1921, material was collected in the summer and sometimes once a month for an entire year. Specimens from Kentucky were occasionally examined for purposes of comparison, since the Kentucky climax forests are dominantly deciduous.

Phloem, cambium and adjacent xylem of the following Oregon trees were examined: *Pseudotsuga taxifolia, Abies grandis, Libocedrus decurrens, Thuja plicata, Pinus ponderosa, Taxus brevifolia, Quercus garryana, Acer macrophyllum, Salix schouleriana.* For comparison similar material was used from the following Kentucky trees: *Pinus rigida, Picea rubra, Juniperus virginiana, Tilia americana, Ulmus americana, Celtis occidentalis, Quercus velutina.* Results were fairly consistent except under conditions of abnormally cold weather.

The Oregon conifers studies from October to February showed in radial view from 3 to 10 sieve tubes free from callus and an undifferentiated cambium region 5 to 14 cells wide. The deciduous trees at this time showed no open sieve tubes, and the cambium was 3 to 5 cells wide.

During July and August in the conifers from 1 to 4 immature sieve tubes were free from callus, and the undifferentiated cambium was 5 to 6 cells wide. At this time, in the deciduous trees there were either no open sieve tubes, or from 2 to 3 immature ones, while the cambium was 6 to 9 cells wide.

In the Kentucky conifers in winter there were no open tubes, though occasionally there was one partially free, and the cambium was from 4 to 5 cells wide. The deciduous trees there showed no open tubes.

Since the absence of callus pads in sieve tubes together with a wide undifferentiated cambium is accepted as evidence of activity, it may be assumed that the Oregon conifers were active during most of the winter season, while the deciduous trees were quiescent. In the late dry summer both types were practically inactive. In Kentucky, on the other hand, both conifers and deciduous trees were inactive in winter.

It was interesting to note that the winter activity of the Oregon conifers seems to be confined to three phases: food manufacture, some phloem development and some apical elongation. As far as was observed, no new xylem cells were formed in the main trunk at this time.

It seems then that the Oregon deciduous trees, having leaves for only two or three months of that part of the year when water is sufficiently abundant to carry on photosynthesis, must have inevitably lost out in their competition with the evergreens which are active to a certain extent for nine or ten months of the year.

A complete detailed account of this study will be published shortly.

ANSEL F. HEMENWAY
UNIVERSITY OF ARIZONA

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

MINUTES OF THE EXECUTIVE COMMITTEE

THE fall meeting of the executive committee was held on October 14 and 15 at the Cosmos Club in Washington. Those present were J. McKeen Cattell, *chairman,* D. R. Curtiss, Philip Fox, B. E. Livingston, Henry N. Russell, Henry B. Ward, E. B. Wilson and A. F. Woods.

The first session was devoted to an extended discussion of major problems of policy. Plans were considered for supporting the prosecution of research under federal auspices, for maintaining and extending the membership of the association, for utilizing the funds available and for aiding effectively the various movements for national recovery. No formal action was taken on these items.

Specific questions on which action was recorded were the following:

(1) The treasurer's financial report for 1933 was received and read. It was ordered audited and referred to the Boston meeting of the council.

(2) The treasurer's budget for 1934 was presented, and after consideration referred to the council.

[1] Carnegie Institute Yearbook, No. 30, 1930–31, p. 243.

(3) The permanent secretary's financial report for 1933 was presented and ordered audited, after which it is to be laid before the council.

(4) The permanent secretary's budget for 1934 was presented and ordered referred to the council at the Boston meeting for final action.

(5) The director of the press service, Austin H. Clark, reported on arrangements for the Boston meeting and discussed with the executive committee plans of the work in general and in relation to the coming meeting.

(6) The director of exhibits, F. C. Brown, reported on preparations for the Boston exhibit, and was authorized to make a trip to Chicago to ascertain if any exhibits at the Century of Progress were suitable and available for future exhibits of the association.

(7) It was voted that Dr. Henry Crew be added to the present exhibit committee.

(8) Dr. T. H. Morgan was named the association's representative on the committee of review, as provided in the deed of trust of the Marine Biological Laboratory.

(9) The report of the committee on patents, trademarks and copyrights was presented, with the recommendation that it be published by the association. The executive committee instructed the permanent secretary to provide for printing the report as the first in a new series. The matter of format and other details was left in the hands of the chairman and permanent secretary.

(10) The executive committee accepted an offer from The Science Press to print and sell the report of the committee on patents, trademarks and copyrights.

(11) The permanent secretary was authorized to secure estimates for printing the next volume of summarized proceedings.

(12) Under the terms of the emeritus annual membership fund established last year, the following were selected as members for the year 1934: Dr. Beverly T. Galloway, U. S. Department of Agriculture, Washington, D. C.; Professor Clarence P. Gillette, Fort Collins, Colorado; Professor John Lane Van Ornum, Washington University, St. Louis, Missouri.

(13) The application of the Minnesota Academy of Science for affiliation was approved and referred to the council for information.

(14) A communication was presented from Dr. Arnold Kruckman, of the Tennessee Valley Authority, asking the aid of the association in acquiring further knowledge of the territory covered by the authority. The executive committee advised that if possible a symposium on various phases of conservation be organized for the Boston meeting and that such symposium bear upon the fundamental features of the project. The permanent secretary was instructed to write accordingly and to state that the association desires to be of service in carrying out the plans in the Tennessee Valley.

(15) Reports of the Fifth Pacific Science Congress were presented by the delegates, C. A. Kofoid and T. W. Vaughan. The committee expressed its appreciation of the work of these delegates.

(16) The committee adjourned at 3:30 P. M. to meet in Boston, Tuesday evening, December 26, at the Statler Hotel.

HENRY B. WARD
Permanent Secretary

SCIENTIFIC APPARATUS AND LABORATORY METHODS

PHYSIOLOGICALLY BALANCED CULTURE SOLUTIONS WITH STABLE HYDROGEN-ION CONCENTRATION

ONE of the important problems in the culture of higher plants in artificial media is that of maintaining the hydrogen-ion concentration of the culture solution within limits favorable to growth. Even when high concentrations of dissolved phosphates are used as chemical buffers, the solution may need to be passed through the culture vessel at a very high rate if the pH value is to be held within a narrow zone. The purpose of this note is to emphasize the advantage of employing physiologically balanced solutions which, under the influence of absorption and excretion of substances by the plant, tend to maintain a constant hydrogen-ion concentration.

The observations of several investigators, particularly those of Jones and Shive,[1] have clearly indicated that this means of stabilizing the reaction of culture solutions may be of considerable practical value. The effectiveness of this method has recently been demonstrated in a detailed study of the influence of the ionic ratio of NO_3 to NH_4 on the reaction change produced by wheat plants during various phases of their development. Initial pH values of 4.3, 5.1 and 6.0 were secured by means of suitable proportions of H_3PO_4, KH_2PO_4 and K_2HPO_4. A wide range of NO_3/NH_4 ionic ratios was obtained by varying the proportions of KNO_3 and $(NH_4)_2SO_4$, KNO_3 and NH_4NO_3, and $Ca(NO_3)_2$ and NH_4NO_3; but the total nitrogen concentration was kept the

[1] L. H. Jones and J. W. Shive, "Influence of Wheat Seedlings upon the Hydrogen-ion Concentration of Nutrient Solutions," *Bot. Gaz.*, 73: 391–400, 1922.