ences of opinion about this, however. The latter terms are mixed Greek and Latin. It is, of course, impossible to avoid errors in fact and some errors in proof in such a voluminous work. Users of the book who discover such errors will confer a favor both to the author and to future users of the book if they will notify Professor Hackh of such mistakes.

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The Oedogoniaceae. By L. H. TIFFANY. 253 pp., 64 pl., 25.5 x 17 cm. Published by the author, Columbus, Ohio, 1930.

THE algal flora of North America has been most incompletely explored, the modern studies mostly resulting in more or less elaborate local floras rather than general works. Regarding marine algae the situation is being materially improved, especially on the west coast, and a comprehensive monograph of North American diatoms has appeared, but the present work is different in character from almost anything else dealing with algae attempted in this country.

This monograph is expected to initiate a series of revisions of the groups of filamentous algae. The author is fortunate in dealing with a very distinct and highly specialized group, and has utilized the great diversity of form and stature presented to give concise and decisive keys to the many species. The great difficulty which a phycologist always meets in dealing with a large genus in its world-wide distribution, namely, the intergrading of a multitude of minor forms, seems to have been very effectively dealt with. Two of the genera, Bulbochaete (48 spp.) and Oedogonium (195 spp.), are large, with many varieties, but Oedocladium is small, three of its four species resting on the largely unpublished work of I. F. Lewis. Nearly ten pages are devoted to a description of cell structure and the reproductive organs, and these give essential aid in the interpretation of the morphological peculiarities of the family. The description of cell division and the reproductive processes is more complete and modern than is elsewhere available. With data probably unequaled the writer discusses the habitats and periodicity of the major genera over the north central states area he, in conjunction with E. N. Transeau, has studied closely. Maxima in May and June are reported, with a few species showing in a second generation an October maximum. The length of time required to reach a normal full maturity, rather than subsequent environmental conditions, seems most significant in determining the time of fruiting. The family Oedogoniaceae is retained in the group Stephanokontae of the Chlorophyceae following the suggestion of Blackman and Tansley. By far the greatest bulk of the book is necessarily devoted to the systematic treatment of the various species and varieties, with the usual synonymy, descriptive data and distribution well and fully presented, though it would seem that a convenient grouping of countries was not followed. The critical notes care for changes of interpretation and close comparisons, and almost all the plants described are illustrated, mostly original, by redrawing of the original figures, or figures from some other authoritative source. Some seven novelties are described, but the discoveries of the author have largely been previously reported. Since the volume has no geographical limits, it is sure to be the standard reference work on the family for many years, and for all countries.

WM. RANDOLPH TAYLOR

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A MANIFOLD DESICCATING APPARATUS FOR DETERMINING THE DRY WEIGHT OF SMALL SAMPLES OF WOOL[1]

THE desiccating apparatus discussed in this paper has been successfully used for some time in determining the dry weight of small samples of wool in connection with making determinations of the density in fleeces, that is, the number of fibers in a given area. Methods for taking these samples have been previously discussed by Burns,[2] Hultz[3] and Nordby.[4] Burns and Hultz have also discussed the method of calculating the number of fibers in the samples taken.

In determining the density in wool, samples .25 square inch in area are usually taken in different parts of the fleece. Each sample is thoroughly cleansed and treated with a yolk solvent, such as ether, and then air-dried. A definite number of fibers is counted out of each sample and weighed. The balance of the sample is also weighed. The total number of fibers in the original sample is calculated by dividing the weight of the original sample (sum of two weights) by the weight of the fibers counted, and

[1] Approved for publication by the director of the Idaho Agricultural Experiment Station as Paper 67.

[2] R. H. Burns, "Some Phases of Wool Inheritance in F_1, Generation," *Proc. Am. Soc. An. Pro.*, 1924; "Wool Analysis Density Determination," *Wool Rec. and Textile World*, V. 30, No. 902, 1926.

[3] Fred S. Hultz, "Wool Studies with Rambouillet Sheep," Univ. Wyo. Agr. Exp. Sta. Bul. 154.

[4] Julius E. Nordby, "The Idaho Wool Caliper and Its Application in Making Density Determinations," Ida. Agr. Exp. Cir. No. 52.

multiplying this result by the number of fibers in the counted sample. It is obvious that the most uniform results are available by desiccating to dryness the wool samples and the bottles in which the samples are kept.

The most satisfactory method used in this laboratory for driving moisture from wool is by means of passing heated air through the sample. Inasmuch as the water present in wool has a vapor pressure less than that of water under normal conditions it is obviously essential to heat the wool above the boiling-point of water in order to drive the contained moisture off as vapor. Barritt and King[5] made use of this principle in making comparisons of the actual moisture content of wool, referred to as true regain, with the commercial regain in an apparatus described by Barker and Hedges[6] and illustrated by King.[7]

The warm air distributing unit (Fig. 1) used with

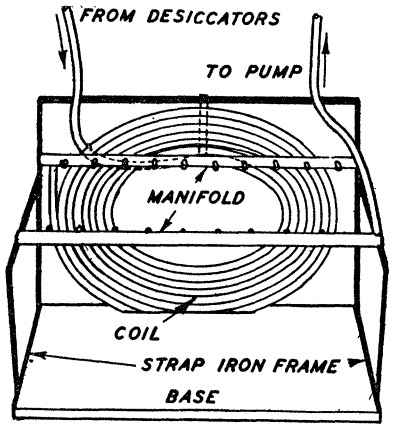

FIG. 1

this apparatus is adapted to a standard 18 x 12 x 14 inch, 220 V. electric oven. It is a removable unit composed of a steel frame into which are mounted a coil, made from twenty feet of one fourth inch copper tubing, and two brass manifolds each having ten three sixteenths inch jets. These manifolds are mounted in the steel frame in such a way that the bottles containing the wool samples (in this case U tubes with ground glass stoppers tightly fitted) may be attached to the jets by means of short pieces of a high-grade rubber tubing, which will maintain flexibility for two determinations. The air inlet and outlet of the unit pass through the ventilators in the oven top and extend above it sufficiently for outside connections.

[5] J. Barritt and A. T. King, *Jour. Text. Inst.*, 1926.

[6] S. G. Barker and J. J. Hedges, "Notes on the Determination of the Dry Weight of Wool." British Research Association for Woolen and Worsted Industries, Bul. No. 64.

[7] A. T. King, "The Determination of the Regain of Small Samples of Wool." British Research Association for Woolen and Worsted Industries, Vol. 1, No. 3, 1930.

The desiccators used are concentrated H_2SO_4, $CaCl_2$ and $Mg(ClO_4)_2$, all of which are provided in suitable containers for efficiently desiccating the air before it enters the heating unit. The air is drawn through the apparatus by means of a filter pump. Arrows in the accompanying figure indicate the direction of air movement. The desiccating efficiency of the H_2SO_4 has been enhanced by introducing the air through small perforations in bulbs blown into the glass tubing.

The temperature of the oven is raised to 105° C. before the filter pump is put into action. A two-way stopcock between the desiccating train and the oven makes it possible to run undesiccated air through the wool. This is done for fifteen to twenty minutes and is effective in removing the bulk of moisture from the wool samples, after which the air is passed through the desiccating train for approximately thirty minutes. The time required to reduce the samples to constant weight depends somewhat upon the rate of air movement through the apparatus which can be controlled by the filter pump and a stopcock between the filter pump and oven.

A mercury vacuum tube (Fig. 2) is part of the equipment and is very useful in operating the ap-

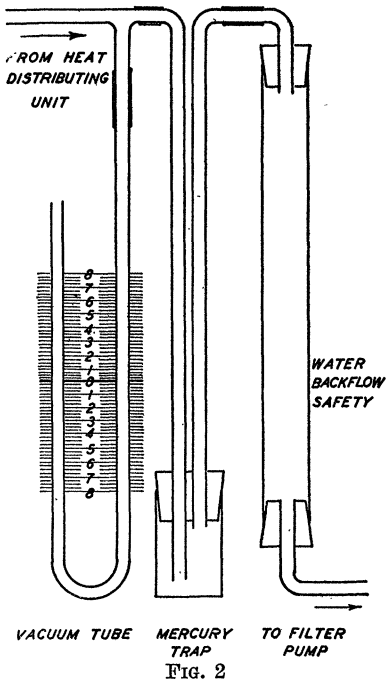

FIG. 2

paratus. It acts as an indicator of the air flow. The mercury trap stops any backflow of air into the wool samples. In the event the filter pump should suddenly stop there is a sufficient amount of mercury in the trap to satisfy the vacuum in the apparatus before the mercury supply in the trap is exhausted.

An additional safety factor, in the form of a one inch glass tube, is installed to accommodate any back-flow of water between the mercury trap and filter pump.

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THE PREPARATION OF PERMANENT SLIDES OF THE RHIZOPOD ARCELLA

HEGNER[1] has recently described a convenient method for fixing and preserving specimens of the shelled rhizopod Arcella. By his method, Schaudinn's alcoholic-acetic-sublimate is poured over the animals while they are attached to the bottoms of Petri dishes, and clearing and preserving are effected by the use of glycerin.

We use a similar method in the preparation of slides of Arcella in our protozoology course, and it is believed that a note upon the method will be of interest, for it supplements Hegner's method in that it concerns the staining of the arcellas as well as their fixation. The procedure follows.

The arcellas, together with several drops of fluid, are transferred from a hay-infusion stock culture to clean micro slides. The slides are set aside in a moist chamber and are left undisturbed for at least half an hour. In this interval, many of the arcellas usually settle to the bottom of the fluid and attach to the slides by means of their pseudopodia.

The surplus fluid on a slide is now poured off. This operation leaves the animals still attached to the slide and covered only by a relatively thin film of fluid. Schaudinn's solution (used cold) is now dropped directly on the arcellas by means of a pipette and is left on the slide for two or three minutes. This method of fixation leaves the animals attached to the slide, frequently with pseudopodia extended. Thus the common difficulty of cementing protozoa to the slide is circumvented by the behavior of the arcellas themselves.

The slide is now ready for staining, and in this process it is treated entirely like a histological preparation. It is immersed in succession in the following fluids: 70 per cent. alcohol, made light brown by the addition of tincture of iodin (to remove sublimate), 30 minutes; 50, 25 per cent. alcohol, water, 1 to 3 minutes in each; dilute Delafield's hematoxylin (1 part stock Delafield to 3 parts water), 5 to 10 minutes; water, 25, 50, 70, 95 per cent. alcohol, absolute alcohol, equal parts absolute alcohol and xylol, pure xylol, 1 to 3 minutes in each; balsam.

If desired, Heidenhain's iron hematoxylin may be used instead of Delafield's. In this case, after fixation and treatment with iodin, the slides are hydrated, and are then mordanted an hour in 4 per cent. ammonio-ferric sulphate (iron alum). They are stained at least four hours in 0.5 per cent. aqueous hematoxylin solution and are destained in 2 per cent. iron alum, after which they are dehydrated, cleared and mounted.

In preparations stained by either method, the nuclei, of which there are two in most species, each with a conspicuous central karyosome, are revealed with diagrammatic clearness. The shell aperture and the extended pseudopodia are likewise well shown. Arcella is particularly favorable for the demonstration of chromidia, and by this method the chromidial bodies—commonly overlooked by students—are rendered clearly visible.

In conclusion, the method affords a convenient procedure for demonstrating certain cell organelles which are not readily observed in the living animal. Furthermore, the permanency of such preparations makes them available for class study or demonstration at times when living arcellas are not immediately obtainable.

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SPECIAL ARTICLES

ACTINO-URANIUM AND THE RATIO OF ACTINIUM TO URANIUM IN MINERALS

VARIOUS speculations have been advanced in the past about the origin of actinium.[1] However, the experimental evidence in all cases is fundamental. This evidence is (*a*) Boltwood's original work[2] on the "constancy" of actinium to uranium in several uranium-bearing minerals from North Carolina, all presumably of the same age; (*b*) the very important recent work of Aston on the relative intensities of the mass spectral lines Pb_{208}, Pb_{207}, Pb_{206} from the lead isotopes of a bröggerite from Karlhus, Raade, Norway,[3] and also Aston's similar work on the ordinary lead,[4] and (*c*) the observations of various investigators that the relation of actinium to uranium seems to vary somewhat in minerals which may be of different ages. Among these the most recent work is that of Wildish.[5]

Rutherford[6] using Aston's data and making certain

[1] Robert Hegner, *Trans. Am. Micr. Soc.*, 48: 214, 1929.
[1] Résumé in *Radioactivity Bull. N.R.C.*, No. 51, 1929.
[2] B. B. Boltwood, *Am. J. Sci.* [4] 25: 269–298, 1908.
[3] F. W. Aston, *Nature*, 123: 313, 1929.
[4] F. W. Aston, *Nature*, 120: 224, 1927.
[5] James E. Wildish, *J. Am. Chem. Soc.*, 52: 163–177, 1930.
[6] Sir Ernest Rutherford, *Nature*, 123: 313, 1929.