been the fluctuating potentials of the machine, due, so far as I can see, to the casual partial self-discharge within. Sputtering is fatal.

3. *Mucronate electrode.* Borrowing a term from the botanists, what is needed therefore is a slightly convex electrode E' with a sharp fixed needle point projecting less than a millimeter from its center (see insert Fig. 6) and facing (convexities toward each other) a similar but unarmed electrode E. P. P' are as before, 4.5 cm apart.

The results obtained with this mucronate electrode (Fig. 6) are astonishing; for the curve sweeps aloft in some cases to over five times the heights of the original crests. Thus far these graphs have not started until $x = .5$ cm is passed. They are peaked at the upper end, and drop from the sharp crest. They imply a degree of sensitivity that makes interferometer observation difficult, every little irregularity of the Wimshurst being magnified.

By placing the posts P P' 10 cm apart with a clear field between, the crest has been increased to $s = 250$. A good example of these results is given in a reduced scale in Fig. 7, which consists of two approximately linear branches on each side of the crest.

Micrometer results on the pressures s as related to the inverse saliency of the needle point can not be given here; but I may mention that for a spark gap x = 2 cm (30 *kv/cm*) a needle point projecting .005 cm beyond the effective limit of the electrode, gave a pressure $s = 560$, that is, 70 per cent. above the crest of Fig. 7, and about fifteen times the original sensitivity. Finally, it seems clear that the crests in Figs. 6 and 7 are to be associated with the limiting potentials of the machine, their x position being an indication of the maximum field between electrodes.

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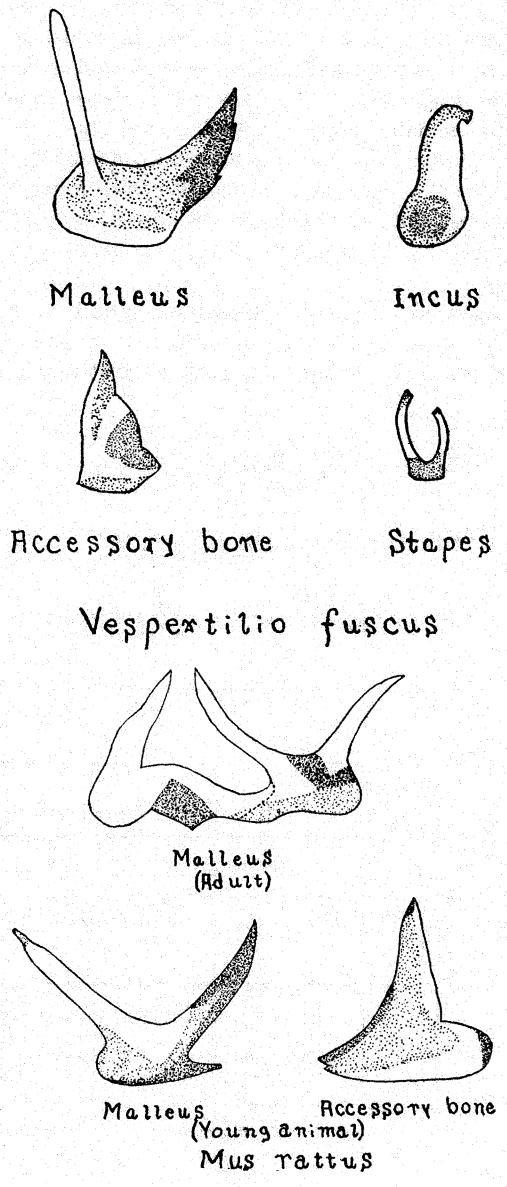
SOME PECULIAR AUDITORY OSSICLES

THREE auditory ossicles are generally said to be present in animals which possess these bones. While making a study of the ossicles of several genera of bats, the author found four present in many instances.

Doran, in his famous monograph on mammalian auditory ossicles, has described and figured the ossicles from several genera of bats. The chief difference between the ossicles from the genera used in this study and those of Doran's is in regard to the head of the malleus. Each malleus which Doran studied possessed a well-developed head. In no case did a head exist on a malleus in this study. However, a fourth bone was usually found. This was located between the malleus and incus. It was entirely separated from the malleus, but in some cases it was found fused to the incus. This bone has probably become the head of the malleus in those animals which possess only three ossicles. It is designated in this study as the accessory bone. The fact that four ossicles are present in some bats suggested the idea that four ossicles may exist in other animals in earlier developmental stages.

Three ossicles are present in the adult white rat (*Mus rattus*). The malleus has a peculiar shape. The ossicles from an animal one day old were removed and studied. Four bones were found to be present. Two of these represented the malleus of the adult animal. The discontinuous lines in the figure of the adult malleus show the approximate place where the two bones fuse in the adult. Since four bones are found to exist in the young of this particular species, it is probable that they exist in



earlier developmental stages in other animals. Further study will be made on this point.

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THE NATIONAL ACADEMY OF SCIENCES

AT the annual meeting of the National Academy of Sciences, held in Washington on April 25, 26 and 27, the following papers were presented:

The nature of the insensible perspiration: FRANCIS G. BENEDICT and CORNELIA GOLAY BENEDICT, Nutrition Laboratory of the Carnegie Institution of Washington. We have made numerous experiments, chiefly with one subject, in which the insensible perspiration has been analyzed, and the effects of environmental temperature, of the removal of clothing, and of a blast of air from an electric fan have been readily determined. Thus, a typical experiment showed in the preliminary period a total insensible loss, both from the lungs and skin, of 21.76 grams per hour, when the subject was nude in an environmental temperature of 25° C. In the next period, when the nature of the loss was studied, it was found that 7.58 grams per hour were lost from the skin, 8.13 grams were lost as water from the lungs, 17.08 grams of carbon dioxide were eliminated, and 15.36 grams of oxygen were absorbed. In another experiment at a room temperature of 20° C. the total loss, when the fan was blowing over the nude body, was 19.55 grams per hour. In a period immediately following, with the fan still going, 8.45 grams were lost from the skin, 7.29 grams were lost as water from the lungs, 22.54 grams of carbon dioxide were eliminated, and 19.81 grams of oxygen were absorbed. Although the results are in large part for one special subject, with whom experiments without clothing could be made, at least a dozen other persons have been studied with ordinary clothing, and the general deduction can be made that the total insensible loss in weight of the average woman, resting quietly, will be about 20 or 30 grams per hour. That of the average man will be nearer 40 grams per hour. Of this about 45 per cent. is in water from the skin, about 45 per cent. is in water from the lungs, and 10 per cent. represents the difference between the intake of oxygen and the output of carbon dioxide. The effects of the removal of clothing, of wind movement, and of temperature below the point when visible perspiration occurs are astonishingly small, chiefly because the skin temperature is profoundly lowered by such measures. The total insensible loss is a reliable index of the total metabolism and is finding use in modern clinics.

The embryology of Equisetum debile Roxb.: DOUGLAS HOUGHTON CAMPBELL, Stanford University. The genus Equisetum includes about 25 species, the sole survivors of a very ancient group of plants. A knowledge of the embryo is therefore of great importance in determining their relationships to the other Pteridophytes. No comprehensive study of the embryo has been made since that of Sadebeck in 1878, although several contributions to the subject have been made since. A large number of gametophytes of *E. debile* was sent the writer from India. These contained great numbers of embryos in all stages of development, so that it was possible to secure an almost complete series showing the early history of the sporophyte. *E. debile* differs considerably in some of the details of the embryo from the species (*E. arvense, E. palustre*) studied by Sadebeck, and more nearly approaches *E. hiemale* and *E. variegatum*. The most important point brought out in these investigations is the origin of the buds from which the secondary shoots develop. These buds are of endogenous origin, and sometimes, at least, arise from the root, thus closely resembling a primitive form, Ophioglossum. This fact supports the view already expressed by the writer that there is a real, if somewhat remote, relationship between the Equisetineae and the most primitive ferns. Both from its size, and from the many sporophytes produced from it, the gametophyte of *Equisetum debile* is strongly reminiscent of certain liverworts, especially Anthoceros.

Some aspects of protoplasmic surfaces: W. J. V. OSTERHOUT.

The effect of tubercle bacilli and the chemical fractions obtained from analysis on the cells of the connective tissues in rabbits: FLORENCE R. SABIN and CHARLES A. DOAN.

The effect of small amounts of chemicals in increasing the life activities of plants: F. E. DENNY, Boyce Thompson Institute. Plants in a dormant or relatively inactive period may be stimulated into increased activity by chemical treatment. Thus, the processes of coloration, which take place in lemons and oranges during storage after removal from the tree, may be hastened by treatment with low concentrations of ethylene (C_2H_4). The time required for coloration is reduced to about one fourth the normal time by adding to the air surrounding the fruit 1 part ethylene to 10,000 parts of air. The life activities of the fruit as judged by the rate of respiration is doubled or even trebled by this treatment. Potato tubers when freshly harvested are dormant, and will not sprout if planted at once under favorable growing conditions, the rest period lasting from 1 to 4 months in different varieties of potatoes. This period of inactivity may be shortened by treating the tubers with various chemicals such as thiocyanates (SCN), thiourea (N_2H_4CS), and ethylene chlorhydrin (C_2H_4ClOH). The gain in time of sprouting is about 2 to 6 weeks, depending on the variety of potato and the stage of dormancy at the time the treatment is applied. Twigs of apple, grapes, lilac, etc., also have this dormant period in autumn, and the buds of these species can be forced into early growth by treatment with certain of these chemicals, the gain in time of budding or blooming ranging from 1 to 9 weeks. It is shown that these facts are related to the general problem of growth in plants, and in particular to the theory of the mechanism of growth control, and to the causes of correlations in the growth of plant buds. These results have