always uninucleate, which despite their interrelations grow, divide and otherwise function as units. It is likewise clear that certain groups of organisms illustrate phylogenetic possibilities of a very different nature. The concept of the cell, based upon conditions in "higher" animals and plants, can, to be sure, be applied without serious distortion to the plasmodium of a slime mold or to the coenocyte of Vaucheria. Whether or not this possibility is insisted on, cytological study at present concerns mainly the predominant "cellular" type of organization. A clear analysis of the structure and functions of organisms so constituted, whatever may be true of other types of organization, is possible only in terms of cells. Witness the misty results of attempts to make such an analysis in other terms. It is interesting that, although Sharp announces himself an organismist and conscientiously reproclaims his faith from time to time, his discussion of almost all the problems he deals with is in terms of cell structures and cell functions. From one point of view it is immaterial if a biologist thinks abstractly of a plant or animal as a whole which organizes itself into cells, so long as he actually treats the cells as units which by growing, dividing, remaining adherent and undergoing differentiation organize themselves into a plant or animal.

Viewed in another aspect, however, the difference between these conceptions is more important. Experience shows that progress is to be made in the study of complex organisms by accepting the fact of cellular organization and by using this fact as a means of analysis; whereas the concept of "the living system as a whole" exercising a mysterious control over its cells leads as to an inevitable corollary to the doctrine that "the organism is more than the sum of its cells"; and the whole-hearted acceptance of this in turn to confused thinking, mysticism and sterility. There is good reason to hope that our author's interesting adventure into this perilous field will end in a realization of the troubles ahead.

CHARLES E. ALLEN

SCIENTIFIC APPARATUS AND LABORATORY METHODS

IMPROVEMENTS IN ALPHA-RAY TRACK APPARATUS

THE apparatus recently described by the writer and N. E. Sowers[1] has been still further simplified and standardized through the experience of the past few months, and hence a brief note regarding its present form seems justified.

[1] *Jour.* Optical Society of Amer., Vol. 11, No. 2, Aug., 1925; Proc. Ind. Acad. Sci., Vol. 34, 1925.

Its appearance in elevation is shown in Fig. 1a. The containing vessel is blown into form from a pyrex glass Erlenmeyer flask. A tungsten wire C, making contact with the upper inside flat surface, forms one electrode M, while another wire D, fused through the body of the flask, forms the other electrode N, which in reality is the surface of the water. A nipple P is placed near the surface M and through it is supported the glass cane on the inner end of which is mounted the radioactive material so essential to the success of the experiment. The manner of mounting this cane is shown in Figs. 1a and b. The tap T is for filling the vessel with water, which is readily done by compressing the bulb RB. The water level should be at N, distant about 1.3 cm from M.

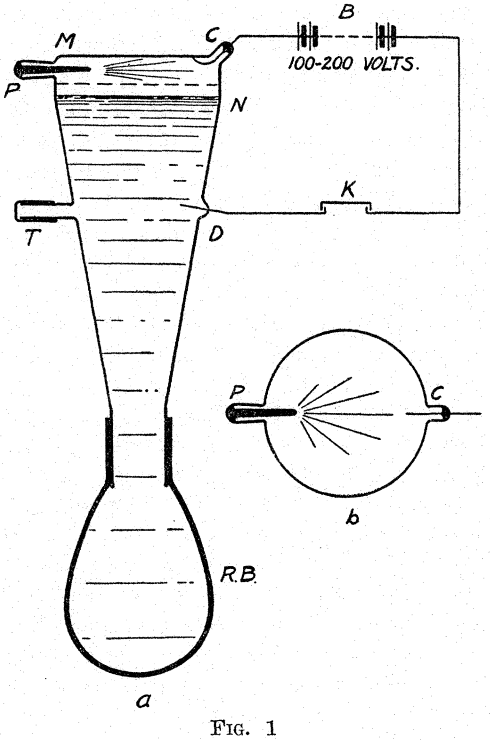

FIG. 1

The necessary electrical connections are also shown in Fig. 1a. For best results one hundred to two hundred volts (an ordinary B battery in radio) should be placed in the circuit, though good results are obtained by connecting directly to a 110 D.C. source. The 100 A.C. lighting source will not work. In making the electrical connections it is not necessary to pay any attention to polarity, or to earthing, or, as was commonly supposed, to arrange for *closing* or *opening the circuit* at proper intervals when producing the alpha-ray tracks. The space between the plates M and N must be illuminated. A shielded 60 watt, 110 volt, mazda lamp answers very well. Fig. 1b is a view of the top looking down.

The procedure in operating the apparatus is briefly as follows: With the connections as in Fig. 1a, and the surface M previously wetted by tilting the apparatus, compress the bulb RB gently and then release it suddenly. Repeat this until (by trial) the proper expansion ratio is obtained, whereupon the tracks will appear freely, being very distinct and persisting for some moments.

When the radium salt is mounted, as was formerly done, on the inner tip of P and *not protected,* the emanation escaping soon contaminates the expansion chamber with the result that the ray tracks proceed from random points in addition to those from the original source, thus adding confusion to the picture. The radium, being exposed to the moisture of the enclosure, or at times in actual contact with the water, is in danger of being detached and lost.

Various types of protecting cavities have been tried, but all proved undesirable, since it seemed to be impossible to make a housing with a sufficiently thin window to allow the passage of the alpha particles. The solution came, however, from a suggestion made by L. P. Garner, a graduate student in electrical engineering. This mounting is of pyrex. The glass cane carrying the radium salt is inserted through the nipple P (Figs. 1a and b) and fused in position.

A protected source of alpha particles thus constructed apparently leaves nothing to be desired. The emission of alpha-rays seems to be unaffected by the thin glass window. The troublesome emanation is eliminated and with it the random ray tracks. The active salt is effectively protected from moisture and subsequent loosening. When such a mounting is used there results a clear-cut fan-shaped grouping of alpha-ray tracks, that may be reproduced at will and which seems to be unaffected by time.

CHARLES T. KNIPP

LABORATORY OF PHYSICS,
UNIVERSITY OF ILLINOIS

SPECIAL ARTICLES

FURTHER STUDIES ON ADRENAL INSUFFICIENCY IN DOGS[1]

DURATION OF SURVIVAL OF CONTROL ANIMALS NOT SUBJECTED TO ANY TREATMENT

DATA were given in previous papers[2] on twenty-five males and sixteen non-pregnant females. These can now be supplemented by seven more males and sixteen more non-pregnant females, making thirty-two of each. Of the seven additional males, one survived the removal of the second adrenal for four and one fourth days; one for six and one fourth days; one for seven and one half days; one for eight days and five hours; one for eight and two thirds days; one for fourteen days and eleven hours; and one for fourteen days and twenty hours. The average for the thirty-two males (6.97 days) was only slightly changed.

Of the sixteen additional non-pregnant females, one lived after removal of the second adrenal for three and one half days; one for four days and one hour; one for four days and seven hours; one for four days and eight hours; one for four and two thirds days; one for five days and ten hours; one for six days and ten and one half hours; one for six days and twenty and one half hours; one for seven days and two hours; one for seven days and three and one fourth hours; one for seven days and seven hours; one for nine days and one half hour; one for nine days and two and one half hours; one for ten days and eight hours; one for ten days and eighteen hours; one for eleven and one half days. Average for thirty-two non-pregnant females 6.82 days, practically unaltered.

Our object in preparing so large a series of control animals (which is still being added to) was two-fold: (1) to permit a careful study of the symptoms, blood changes and *post-mortem* appearances (macro- and microscopic) and (2) to permit definite conclusions as to the life-prolonging effect of certain methods of treatment. Further experiments on the influence of intravenous injection of Ringer-dextrose solutions have shown an even greater maximum prolongation of life, into the fifty-fourth day, after loss of the second adrenal in a male dog. Gastric and colonic lavage with hyper- and hypo-tonic NaCl solutions and other liquids were tried systematically in several animals without noticeable effect on the final result. Feeding adrenal preparations and dextrose *per os* was without result; the same was true of intravenous and subcutaneous injection of certain adrenal preparations. Cholin, which some writers have considered a substance of physiological importance associated with the activity of the cortex, was tried in a number of animals in varying doses and had no effect in prolonging life.

Blood studies[3] were made in a large number of animals, embracing estimations of serum proteins, specific gravity, conductivity of blood and serum, relative volume of erythrocytes and serum hemoglobin percentage, counts of erythrocytes and leucocytes, blood sugar, serum calcium, chlorides, non-protein nitrogen, urea, uric acid, creatin and creatinin and amino-acid nitrogen. Concentration of the blood

[1] From the H. K. Cushing Laboratory of Experimental Medicine, Western Reserve University.

[2] Proc. Soc. Exper. Biol. and Med., 1925, xxii, 394; *ibid.*, 1925, xxiii, 190. *Journ. Pharmacol. Exp. Therap.*, Abel Memorial, sent January, 1926.

[3] *Journ. Pharm. Exp. Therap., loc. cit.*