to the temporal muscles. Other muscles of the body were similarly affected. Comparative measurements of individual muscles and of the total amount of muscular tissue indicated that the effect is on the muscular system in general.

The temporal muscles of adult male guinea pigs, castrated before sexual maturity, remain small and flat, as in the adult females. The muscles of such castrated males did not respond to treatment with gonadotropic hormone. This treatment was likewise ineffective in spayed females. These observations indicate that the presence of the gonads is necessary for the production of muscular hypertrophy.

The microscopic examination of the ovaries of treated animals showed, among other changes, considerable hyperplasia and hypertrophy of the interstitial tissue.[1] This suggested that the gonadotropically stimulated interstitial tissue of the ovaries was responsible for the stimulating effect upon the muscles.

Various experiments were then performed in order to determine particularly the effect of the androgenic hormone. Castrated immature males and spayed as well as normal adult females were treated with androgenic hormone (Testosterone Propionate), which represents the testicular interstitial secretion. A definite hypertrophy of the temporal and other muscles of the body resulted.

In another experiment castrated immature males and adult females, both spayed and normal, were treated for a period of 6 to 8 weeks with progesterone (Proluton) and with an estrogen (Amniotin). No definite effect was observed upon the voluntary muscles. On the other hand, when androgenic hormone was combined with either the progesterone or the estrogenic hormone, a general muscular hypertrophy resulted.

In conclusion, it may be stated that the androgenic hormone has a stimulating effect upon the muscles, producing enlargement after prolonged administration. The temporal muscles show a very pronounced response. Because of their superficial position, their enlargement can be readily recognized by palpation. The source of the androgenic hormone in the normal adult male and in the gonadotropically treated female seems to be the interstitial tissue of the testicles and ovaries.

The general muscular enlargement following androgenic treatment offers an explanation for the higher muscular development of the male mammal. It also contributes to a better understanding of the more specific morphological and physiological changes associated with the androgenic action. The importance of obtaining data on the action of the androgenic hormone in conditions associated with muscular deficiencies becomes apparent.

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[1] *Anat. Rec.*, 64; 1936; Suppl. p. 16.

# SCIENTIFIC APPARATUS AND LABORATORY METHODS

## EXPOSURE METER FOR CINEPHOTOMICROGRAPHY AND STILL PHOTOMICROGRAPHY

EXPOSURE meters for use with cameras and film of various types have been employed for several years. These instruments have generally consisted of some type of "barrier layer" or photronic cell and a suitable galvanometer calibrated in terms of stop opening, etc.

In this laboratory, we have been concerned with the making of still and motion pictures of microscopic subjects in black and white and in color. In the study of the capillary growth about tumor transplants under a window in the rabbit's ear, it was evident that the amount of light transmitted varied tremendously in different microscopic fields. A photoelectric cell and galvanometer system was designed for the purpose of indicating the proper exposure.

One of the first requirements was an inexpensive galvanometer of sufficient sensitivity and ruggedness, with an easily readable scale. The G–M No. 2562–A Pointer-type portable D'Arsonval galvanometer having a resistance of 1,100 ohms with a 60 mm scale and a sensitivity of 0.125 microamperes per mm division fulfils these requirements. This galvanometer is connected with the "G.E. light sensitive cell." This cell, which is small in size and weight, consists of a layer of selenium deposited on a steel plate and has an active area of approximately 1.1 square inches. Although we have not investigated many cells of this type, we find that the above combination is very sensitive and satisfactory.

A four-point switch is mounted on the unit which in one position short-circuits the galvanometer for transportation and protection. The three other points are connected to shunts which provide various sensitivities and make possible the measurement of the light intensities over a wide range. The galvanometer has three scales which are calibrated in "frames per second" for 16 mm Kodachrome film. The three ranges overlap permitting measurements from 0–60 frames per second. A master variable shunt permits the scale ranges to be adjusted for other types of film.

The photoelectric cell is mounted in a fitting which

slides over the barrel of the microscope and holds the cell flat against the ocular lens or the end of the lens barrel if the ocular lens is not used. All the light passing through the optical system of the microscope is intercepted by the cell. The camera speed is adjusted to fit the light intensity, or the light intensity is regulated by rheostat or diaphragm to conform with a desired film velocity. The cell is then removed and the camera lowered into place and the apparatus is ready for use.

The unit is subject to the same limitations as the usual exposure meter. The deflection represents the average of all the light intensities present and is satisfactory when calibrated for the kind of work in question by photographic test.

The use of a photoelectric device for the measurement of light values in photography is well established. The principles have been adapted to cinephotomicrography in the unit above described. The total cost of such a unit is less than $30.00 and soon pays for itself in the saving of film and time.

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## LONGEVITY OF PLANT CELLS IN TISSUE CULTURES

THAT certain cells in plants may live for long periods is well known, and Bailey[1] has shown that the cells in a section of cambium mounted in lactose or in liquid petrolatum may continue active cyclosis for weeks. In the course of recent work I have observed numerous examples of a surprising length of survival of plant tissues. Various parts of flowers were detached and placed in sterile culture on nutrient agar. Some of these parts have undergone no regeneration and have shown no significant growth but have lived many times as long as similar structures on normal plants. Examples of this are shown in the following Table 1.

TABLE 1
LENGTH OF LIFE OF PLANT STRUCTURES IN CULTURE

| Species | Structure | Time of survival in days |
|---|---|---|
| *Tulipa Gesneriana* | Petal | 206 |
| *Jasminium fruticosa* | " | 186 |
| " | Ovary | 236 |
| *Erythronium americanum* | Ovule | 273 |
| *Freesia refracta* | Sepal | 190 |
| *Reinwardtia indica* | Petal | 255 |
| *Caltha palustris* | " | 255 |
| *Calendula officinalis* | Corolla | 277 |
| *Scirpus americanus* | Section of culm | 191 |
| *Tradescantia paludosa* | Petal | 365 |
| " " | Sepal | 365 |
| " " | Stamen | 365 |

[1] I. W. Bailey, *Zeitschr. Zellforsch.*, 10: 651–682, 1930.

Most of the structures listed in Table 1 were still vital at the end of the recorded period and might have lived longer.

The cells of *Tradescantia paludosa* were most remarkable. The petals and sepals of this plant are ephemeral and usually live only a day or two after flowering, but in culture they remained alive for an entire year. Cells of these petals and of stamen hairs were plasmolyzed with a sucrose solution. When the sucrose solution was replaced by water many of the cells recovered promptly, although others did not. Active cyclosis was not seen in any of the cells. Pieces of Tradescantia petal 0.5 mm × 1 mm were still alive.

The cultures were made in ½ ounce bottles with bakelite caps which were tightly closed. It is doubtful whether reduced respiration resulted because the amount of inclosed air has been shown to be sufficient for growth and regeneration of masses of tissue much larger than any of these.

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