A SIMPLE PHOTOMICROGRAPHIC APPARATUS FOR OBTAINING DEPTH OR FOCUS

THE generally prevailing use of the camera lucida as a means of illustrating Ostracoda, Foraminifera, insects and kindred small sub-spherical bodies evidences a difficulty commonly met with in achieving satisfactory photographic realization in combination with magnification. This is essentially due to the inability of the microscope's objective to provide depth of focus. The apparatus here described was constructed from the suggestions of Professor Albert Johannsen, of the University of Chicago. It furnished a magnification of from 12 to 28 diameters, depending upon the lens used, and was employed with excellent results in picturing the heads of flies and the wings and limbs of small insects. It proved satisfactory for the photographing of Ostracoda large enough to be retained by a forty-mesh screen, and offers the possibility of photographing even smaller ones.

The bellows of a good 5″ by 7″ view camera was extended by attaching to it an elongated wooden box, made by nailing together four boards, each eight inches wide by ten feet long. Cardboard diaphragms, properly sized, and containing circular openings four inches in diameter, were inserted into the box at distances of one third and two thirds of its length, respectively, to cut off any light reflected from its sides. The ground-glass plate and the plate-holder of the camera were then mounted in a cardboard support and fastened to one end of the tube, the seam being made light-proof by wrapping securely with black cloth. In a similar manner the bellows and lens of the camera were attached to the opposite end of the tube, and the whole apparatus firmly mounted upon a long table. Focusing was accomplished by means of the rack and pinion of the view camera. It required considerable care and precision, since very slight alterations of the distance between the lens and the object produce great changes in the focus on the ground-glass. Powerful illumination is essential, and two 250 candle-power bulbs, placed about eight inches from the object, were employed for this purpose. Under these conditions the time of exposure was between five and six minutes.

Since the size of the image obtained is a function of the length of the bellows extension, considerably higher magnification may be achieved by increasing the length of the wooden tube.

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SPECIAL ARTICLES

CHEMICAL STUDIES ON TOAD POISONS, IV, BUFAGIN AND CINOBUFAGIN

DURING the past three years Dr. K. K. Chen and I have been studying toad poisons from both a chemical and pharmacological point of view. Due to the difficulty of obtaining somewhat large amounts of material the work has been rather slow. The isolation of the various principles from Ch'an Su, the dried venom of the Chinese toad, and from *Bufo marinus* has been reported[1]. A thorough pharmacological study of cinobufagin, isolated from Ch'an Su and of Abel's bufagin, isolated from *Bufo marinus*, undertaken by Dr. Chen, revealed that their physiological action is qualitatively about the same as that of the cardiac plant glucosides, but that there is a quantitative difference. The results of the pharmacological study of the principles isolated from Ch'an Su have been published[2]. These pharmacological findings make it appear very probable that the principles of toad poisons are chemically also very closely related to the cardiac aglucones of the plant kingdom. The reported formulae for cinobufagin $C_{29}H_{38}O_7$ (1c) and for Abel's bufagin $C_{28}H_{36}O_6$ (1d), however, do not indicate any close chemical relationship to the plant cardiac aglucones, which are C_{23} derivatives, as has been shown by Jacobs and coworkers[3] and by Windaus and coworkers[4]. Further investigation, and especially a careful analytical study of various derivatives of cinobufagin and bufagin, have led to the revision of the above formulae and the following ones are proposed, cinobufagin $C_{25}H_{32}O_6$ and bufagin $C_{24}H_{32}O_5$. The published analytical data check very well with these revised empirical formulae.

Cinobufagin, $C_{25}H_{32}O_6$, when treated with alkali, gives rise to a hydroxy-carboxylic acid with the opening of a lactone ring and the splitting off of acetic acid. On acetylation one acetyl group is introduced into the molecule. Under the influence of hydrochloric acid water and acetic acid are split off. On oxidation with chromic acid a mono-ketone is formed. From the foregoing one can conclude that the molecule of cinobufagin contains a lactone, an acetoxyl, a secondary hydroxy and a tertiary hydroxy group, thus accounting for the six oxygen atoms in the molecule. On catalytic reduction tetrahydrocinobufagin is

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