obviously complicated, expensive, time consuming and needs besides the voluntary support of some 7,000 men yearly, an additional aid at present of more than $100,000, all of which will have to be increased in the future. Considering that Biological Abstracts is not a personal undertaking, but a program of interest to all biologists let us see whether there is any other practical alternative to the present method.

Let us consider a plan of obtaining the cooperation of all editors of biological journals in requiring that an abstract of each article be submitted by the author with the original manuscript (as is already the case in certain journals). Assuming for a moment that such a plan could be put in force, every article of biological nature would be abstracted even before publication. When an editor had a number of his journal made up, these abstracts could be simply mailed to Biological Abstracts and published at once. In this way there would be no delay in the appearance of abstracts. Authors would receive immediate recognition of their work. Investigators could obtain an immediate review of all biological literature, and several thousand voluntary abstractors and section editors would be relieved of their constant nonremunerative drudgery. The paid editorial and clerical staff as well as general expenses could be greatly reduced.

The first and almost unanimous comment obtained regarding such a plan from those whom I have consulted during the past four or five years is that "It will not work." This has however been said of many successful undertakings. The advantages of such a plan are obvious, and have been granted by numerous abstractors, section editors, editors of biological journals, and several of the best librarians of the country. Let us consider the possibilities of carrying out such a plan and some of the criticisms which have been raised.

(1) It is said that the editors of biological journals could not or would not obtain these author abstracts. It is probable that only a small percentage of these editors would agree to such a plan at first, but if the plan were supported by an influential group of editors, and their acceptance of it brought to the attention of others, many more would fall in line.

(2) The comment has been made that authors would not submit abstracts. This could be very simply taken care of by editors refusing to publish manuscripts not accompanied by abstracts.

(3) Another criticism is that authors are often unable to abstract clearly and concisely. This may equally well be said of voluntary abstractors. What is wanted in an abstract is the main points of the work stated correctly, not a critical review. Certainly authors should be able to do this more intelligently than anyone else.

Finally let us consider practical ways in which such a plan might be carried out. Obviously the editors of Biological Abstracts do not wish to be burdened with further projects. The success of such a plan as outlined, lies with the editors of the various biological journals. It is felt that the most likely way to interest them in adopting such a method would be for all authors, abstractors, section editors, etc., to write to the editors of those journals in which they are particularly interested, expressing their opinion of such a plan. Biological Abstracts could be helped directly by any editor guaranteeing them abstracts of his journal. If a few editors should adopt the system others might fall in line and gradually such a plan might be universally adopted. The author would be glad to receive any comments on this proposed plan or word from any editor putting such a plan in force in his journal, and to report at a later day any progress made.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ADAPTATION OF THE BOX CAMERA TO PHOTOMICROGRAPHY

A BOX camera can be converted into a photomicrographic camera suitable for general routine work with a few minor changes. The camera used should be of metal construction and must have a removable front. Any of the Eastman Kodak Brownie cameras will serve the purpose though the larger models are to be preferred.

The first adjustment is to remove the front of the camera and enlarge the central aperture therein. Pry off the ferrule from about the hole and enlarge the hole with a round file until it will just admit the threaded portion of the eye lens of an ocular. Insert the eye lens into the hole from the inside surface of the front plate and screw the ocular tube in place, thus enclosing the camera front between the eye lens and tube of the ocular. Next remove the lens and shutter block from the camera, take out the lens and return the block to its former position.

To make the focusing apparatus, a tube of brass or stout cardboard between $\frac{5}{8}''$ and $\frac{7}{8}''$ in diameter is cut to a length ascertained as follows; remove the back of the camera and cut a piece of glass just large

enough to rest upon the rollers that support the film and upon nothing else. Mark an X with a wax pencil in the center of this glass sheet and bring a tripod magnifier (Bausch and Lomb 7.5X or other suitable lens) to focus through the glass on the X. (Be sure you focus through the glass.) Now place the glass sheet and the magnifier upon the camera with the X towards the inside of the camera, insert the ocular with its attached camera front into the microscope, place the camera upon its front on the microscope and measure the distance from the upper surface of the metal mount of the ocular eye lens to the X on the under surface of the glass and from the under surface of the glass to the under surface of the lens of the magnifier. Cut the tube in length corresponding to the sum of these two dimensions.

In using the camera it is loaded with film in the usual manner, the front plate is attached to a suitable ocular, the ocular placed in the microscope and the focusing tube placed upon the upper surface of the ocular. The tube is then surmounted by the same magnifier as previously used and the image is brought to focus through this assembly. When the focus is as sharp as possible remove the tube and magnifier and carefully place the camera over the ocular and upon its front. Turn off the light source or place a cardboard between it and the microscope, set the shutter for time and open it, turn on the light for the required length of time, turn off the light, close the shutter.

One warning is here necessary. Be very sure that the coarse adjustment of the microscope is tight enough to support the camera without putting the image out of focus.

Though the modern roll film box camera is here used as an example there is no reason why some of the older model plate and film pack boxes or some of the newer foreign film pack boxes can not be suitably converted into photomicrographic cameras. The advantages of plates and film packs in photomicrography is unquestionable.

Finally, any photomicrographic camera, in order to record the image at the same magnification that the eye sees it, must afford at least ten inches of space between the ocular and the plate or film. Since the box camera is much shorter than ten inches due allowance must be made in the magnification of the microscope in order to obtain the desired results.

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A METHOD FOR THE PRESERVATION OF OLD MANUSCRIPTS

AN entirely satisfactory method of preserving old manuscripts does not appear to be known. Particularly desirable is one for preserving old letters and similar material, which can be cheaply and readily prepared and which can be used by any one with fair manual dexterity, but without requiring special expert knowledge of physics, chemistry or paper technology. The method here discussed has been tested with gratifying results.

PROCEDURE

A mixture of equal volumes of carbon tetrachloride and benzene is prepared and kept in a tightly stoppered. bottle. The mixture is not explosive, but benzene vapor is, so reasonable precautions should be observed. As this mixture is an excellent solvent for fats, care should be taken to keep from contact with the worker's skin and to anoint the place of any contact with the person with olive oil, cold cream or some fatty ointment.

To 100 cubic centimeters of the solvent mixture is added 30 to 35 grams of a good hard wax. This solution is equivalent to one of a pint of the mixed solvent to five or six ounces of wax. In our experiment good results were obtained with the commercial product known as halowax number 1,013, with a melting point of 248° F. Oven tests of news print and other papers treated with this wax showed it would not run or stick at any summer temperature imaginable.

Most conveniently the wax is applied by pouring the solution into a shallow pan or dish, such as a photographer's developing trap. The paper is immersed, care exercised that it be completely wetted and any bubbles formed on either side be removed. The paper is then drained by holding it vertically and turning from time to time to prevent undue deposit of wax at an edge.

An alternative method is to apply the wax solution to the paper with the camel's-hair brush. But the immersion procedure has been found more desirable.

When drainage ceases, the treated paper is dried. Oven drying is practicable but air drying seems preferable. To this end the treated paper is laid upon a smooth surface on blotting paper (when practicable) and exposed until the odor of neither benzene nor carbon tetrachloride can be detected longer. When dry, if too much wax appears in places on the surface of the paper it may be smoothed over with the camel's-hair brush moistened with the solvent.

DISCUSSION

Manuscripts so treated are protected from atmospheric action. The paper always seems to be strengthened and very fragile pieces become susceptible of safe handling if careful. Breaks in the wax film, due