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

to bending or impact for instance, can be readily replaced by brushing with the dissolved wax or with the solvent.

The softer waxes generally impart a yellowish or brownish color, are prone to stick but are more pliable and being amorphous give a better protection from attack by air or moisture. The harder waxes, such as the above noted, impart no color, do not stick even under considerable pressure and rather high temperatures. They are more apt to yield cracks or breaks under rough handling. On standing, as can be observed under a microscope, the whole film tends to crystallize into a matter mass. It is reasonable to infer that such a film can not give as good protection from the atmospheric attacks as the softer films. Perhaps a satisfactory compromise may be obtained by mixing two or more waxes. Our experiments, however, favor the use of a hard wax as stated.

Due to the rapid evaporation of the carbon tetrachloride and benzene, the solutions become more concentrated when allowed to stand in the air. For this reason the solution should never be allowed to stand in the open except when being used. If the solution becomes too concentrated more of the carbon tetrachloride-benzene mixture should be added. If a hydrometer is at hand, it is a good idea to take the specific gravity of the solution at the beginning and on evaporation of the solvent more of it should be added to bring the specific gravity down to that of the initial solution.

If previous cleaning of the manuscripts is desirable, the procedure described by J. C. Fitzpatrick is suggested.[1] After waxing the manuscript can be conveniently cleaned or washed, although care should be exercised to carefully remove any excess water, especially when hard wax has been used.

No ink has yet been encountered which dissolves or "runs" in the wax or the solution, and the dried film produces no appreciable diminution of legibility.

The fire hazard is generally decreased by the wax. Treatment with insecticides, fungicides or even rodent repellents is not made more difficult. In fact, the use of some of these may be facilitated by dissolving them in the wax solvent.

Further work with protecting films is in progress. The easy application and apparently great usefulness of the procedure described impels us to call it to immediate notice of interested parties.

The halowax used was obtained from Halowax Corporation, 247 Park Avenue, New York City.

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[1] "Notes on the Care, Cataloging, Calendaring, and Arranging of Manuscripts," 3rd Edition, U. S. Government Printing Office, 1928.

THE USE OF LIVE NEMAS (METONCHOLAIMUS PRISTIURUS) IN ZOOLOGICAL COURSES IN SCHOOLS AND COLLEGES

ANSWERING very numerous requests for a free-living nema suitable for school and college class work, attention is called to *Metoncholaimus pristiurus*, a slender, five-millimeter species common in European and North American stagnant marine mud, below low tide—for example, in the harbors at Woods Hole, Massachusetts, and Naples, Italy—a nema suitable for study alive with moderate and high powers of the microscope. It is a well-differentiated, bisexual nema that can be sent by post or express long distances in a living condition, and there seems no reason why the usual collecting agencies should not supply it alive to any inland laboratory at moderate cost. It withstands journeys of thousands of miles; *e.g.*, it has been successfully shipped (both summer and winter) from Woods Hole, Mass., to Washington, D. C.; Durham, N. C.; and Salt Lake City, Utah; and successfully used in class work. One laboratory director reports a "very interesting and exciting two-hour period."

This nema may be ordered from the Supply Department of the Marine Biological Laboratory at Woods Hole, Massachusetts, and no doubt could be supplied from Naples, and many other harbors. Laboratory instructors will find readiest guidance to the anatomy, etc., of this and very similar nemas in *Jour. Washington Acad. Sci.*, vol. 20, No. 12, 1930. Experienced nematologists consider free-living marine nemas the best teaching material for entrance to nematology. *Metoncholaimus pristiurus* belongs to a large marine group, the *Oncholaiminae*—type genus *Oncholaimus*,—abundant in all oceans, and hence may perhaps be considered as nearly "a representative species" as one is likely to obtain from such an immense and varied phylum.

(1) *Collecting.* *Metoncholaimus pristiurus* may be successfully dredged with a metallic, one to two-liter cylindrical vessel, one to two decimeters in diameter and two to three kilograms in weight, cast several yards from shore, allowed to sink to the bottom, and slowly pulled in by means of 25 meters of $\frac{3}{8}$ inch limber rope, firmly linked at a single point on its rim. This dredge, cheaply made from iron pipe, should sink through any bottom growth of eel-grass, etc., so as afterward to bite into the top layer of mud in which the oncholaims live.

M. pristiurus is about the largest nema in its native mud, and hence is readily assembled for shipment, with the aid of appropriate sieves (1st, 1/8 inch mesh to remove coarse débris; 2nd, 1/24 inch mesh to catch the nemas while permitting silt to pass through). Preferably the nemas should defecate in clean, cool sea water for a day or two before examination, since