that female rats grown and maintained on it exhibited "initial fertility" in the first and second generations. We have never observed "initial fertility" in even first generation female rats grown on purified E-deficient diets.

In this connection our attention was directed to the fat-soluble factor by the observation that the paralysis of the hind legs exhibited by adult rats on a highly purified, E-deficient diet, could be prevented by administration of a highly potent vitamin E concentrate.[5] Our experience confirms Goettsch and Pappenheimer's observation that young rabbits, restricted to their diet 13, develop muscular dystrophy and die. We obtained the same results when 10 per cent. of ether-extracted wheat germ was included in the diet. Morgulis[4] noted increased excretion of creatine by rabbits with impending dystrophy. We have recorded the weight, food consumption and creatine excretion, day by day, while rabbits were maintained on diet 13, and have established detailed criteria based on these data, which enable us to predict with considerable certainty when the attack of acute dystrophy will occur. Remedial measures were instituted a few hours before complete collapse was to be expected.

With these criteria as a basis for diagnosis we were able to produce cures in rabbits on diet 13, plus 10 per cent. of ether-extracted wheat germ, by administration of small doses of our vitamin E concentrate.[6] Since the results strongly suggested vitamin E as the curative factor, we next fed natural alpha tocopherol.[7] There was a sharp drop in urinary creatine, accompanied by increased food consumption and gain in weight. Within a few days the animals were able to move about the cages without difficulty, and the creatine output had fallen to the normal level. We have, therefore, shown conclusively that one of the factors, deficiency of which is involved in causing experimental muscular dystrophy in the rabbit, is alpha tocopherol.

This study is being extended and the results will be published in detail elsewhere.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

"LUCITE" FOR MICROSCOPIC TRANSILLUMINATION

"LUCITE," polymerized methyl methecrylate, is a transparent resin produced by the plastics department of the du Pont de Nemours Chemical Company.[1] It is optically similar to fused quartz in the following ways: it has a high light transmission in the visible spectrum,[2] a beam of light will pass around a bend in the material with very little loss of intensity, and there is a tendency for a beam of light to become concentrated at a constriction in the material. Because of these properties it is therefore well adapted to serve as a substitute for the quartz rod in microscopic transillumination, and has the added advantages of low cost of the material and the ease with which it is machined. Leiter,[3] Knisely[4] and McClung[5] have given the uses and methods of construction of the quartz rod for microscopic transillumination. This is presumably the first report of the use of lucite for this purpose and as a substitute for the Abbe condenser.

CONSTRUCTION OF THE TRANSILLUMINATING ROD

Lucite is easily turned or shaped on either a machine or hand lathe.[2] A piece of one half inch round stock twelve inches in length was used. Four inches of this length were turned to a diameter of one eighth inch on a machine lathe at moderate speed with the application of water to make the cutting smoother. A thirty degree bevel was found to be most satisfactory between the one half and one eighth inch surfaces. Following the cutting operations, the surfaces were polished with jeweler's rouge while the lathe was turning at a high speed until a smooth surface showing no turning marks was obtained. The ends of the rod were polished in the same way. It is necessary to have both ends of the rod flat-surfaced, because distorted surfaces give a field of uneven illumination which makes critical definition impossible. After the rod was completely polished it was ready for the bending operations. The small end was softened in hot oil and bent to the desired angle, care being taken not to distort the small light-delivering surface (see illustration). The angle of the bend can be varied to meet the special require-

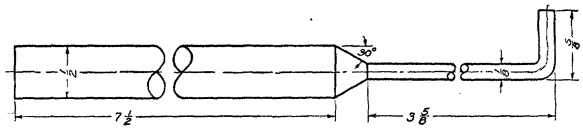

FIG. 1

[5] C. G. Mackenzie, J. B. Mackensie and E. V. McCollum. In press.

[1] The Lucite used in this work was graciously furnished by the E. I. du Pont de Nemours and Company, Plastics Department, 350 Fifth Avenue, New York City.

[2] Manufacturer's descriptive pamphlet on Lucite.

[3] S. B. Leiter, *Jour. Optical Soc. Amer.*, 11: 187–189, 1925.

[4] M. H. A. Knisely, *Anat. Rec.*, 64: 499–523, 1936.

[5] C. E. McClung, "Handbook of Microscopical Technique." Paul B. Hoeber, Inc. 2nd ed., 632–642, 1937.

[6] C. G. Mackenzie, J. B. Mackenzie and E. V. McCollum, *Pub. Health Reports*, 53: 1779, 1938.

[7] The alpha tocopherol was furnished by Merck and Co., Inc., Rahway, N. J.

ments of the work for which the rod is intended; however, an angle of ninety degrees was found satisfactory for most general work.

THE USE OF THE ROD FOR TRANSILLUMINATION

The finished rod was supported by a burette clamp on a ring stand where it could then be adjusted to the desired position for operations. The light-delivering end of the rod should be placed in such a position that its surface is parallel to the surface of the microscope objective, this being necessary to produce a field of even illumination. The small tip can be inserted into incisions in live animals such as dogs, cats, rats and frogs for microscopic study of the living organs. For illumination of such tissues as frog or rat mesentery, a sixty-watt lamp placed at the large end of the rod gave sufficient light for observation. For illumination of structures containing pigment, such as liver, a light source of higher intensity will prove more satsifactory. When using the carbon arc for illumination over extended periods, it is necessary to place a water jacket around the large end of the rod to prevent the softening of the rod by the heat from the arc. Lucite rods have been found to give an even field of illumination at both high and low magnifications.

This illuminator may be also used as a very satisfactory substitute for the Abbe condenser and substage mirror of a microscope in general histological work. Sections thus illuminated stand out in brilliant definition. For all general histological sections, a "daylight" sixty-watt lamp gave ample light for oil immersion.

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LANTERN SLIDES FROM TYPEWRITTEN MATERIAL

A METHOD of making lantern slides of tabular and text matter, which eliminates one step in the photographic process, is to type the data through white carbon paper on black paper. The ribbon indicator on the typewriter is set at the position for stencil cutting, to obtain as white an imprint as possible from the carbon paper. The material transferred as white on black paper is then photographed in ordinary daylight (artificial light does not give good results), Eastman contrast lantern slide plates being used as negatives. Each negative is bound with a cover glass as an ordinary lantern slide. This method results in slides that show black letters and figures on a white background and avoids the necessity of making positives after the negatives are made. Kymograph records on smoked paper can be mounted on black paper, the legends typed through the white carbon paper, and both the records and the legends will be reproduced photographically as black on white. Simple curves and diagrams can be traced through the white carbon paper onto the black paper. We have been unable to find a white typewriter ribbon on the market. For black paper we have found the "Black Antique Atlantic Cover" ($20 \times 26 - 65$) of the Cook-Vivian Company satisfactory and for white carbon paper the "Panama White Carbon" of the Manifold Supplies Company, both of Boston.

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BOOKS RECEIVED

Actualités Scientifiques et Industrielles: 653, Leçons de Métrologie, III, Mesure des Temps, Vitesses, Débits. Pp. 110. 93 figures. 30 fr. *654, Physique Théorique, XXIII, Application de la Méthode du Champ Self-Consistent aux Noyaux Atomiques.* Pp. 88. 25 fr. *655, Photochimie, II, The Determination of the Mechanism of Photochemical Reactions.* Pp. 71. 18 fr. *656, Photochimie, III, The Photochemistry of the Halogens.* Pp. 53. 20 fr. *658, Bibliothèque de la Société Philomathique de Paris, III, L'Activité Électrique de L'Écorce Cérébrale.* Pp. 46. 14 plates. 8 figures. 15 fr. *662, Biochimie de la Choline et de Ses Dérivés, I, Choline-Neurine.* Pp. 61. 15 fr. Hermann, Paris.

BATES, L. F. *Modern Magnetism.* Pp. ix + 340. 97 figures. Cambridge University Press, Macmillan. $4.50.

BEGHIN, P. *Le Fonds National de la Recherche Scientifique et L'Industrie.* Pp. ix + 408. 135 figures. Le Fonds, Bruxelles, Belgium.

CANELLA, MARIO F. *Orientamenti Della Moderna Biologia.* Pp. 141. Nicola Zanichelli, Bologna.

DALCQ, ALBERT M. *Form and Causality in Early Development.* Pp. 197. 64 figures. Cambridge University Press, Macmillan. $3.50.

GUSTAFSON, A. F. and others. *Conservation in the United States.* Pp. xi + 445. 232 figures. Comstock Publishing Co. $3.00.

HEINRICH, CARL. *The Cactus-Feeding Phycitinae: A Contribution Toward a Revision of the American Pyralidoid Moths of the Family Phycitidae; Vol. 86, No. 3053, Proceedings of the U. S. National Museum, 1939.* Pp. 331–413. 51 plates. Smithsonian Institution, Washington.

MCCURDY, JAMES H. and LEONARD A. LARSON. *The Physiology of Exercise; a Text-Book for Students of Physical Education.* Third edition, revised. Pp. 349. 2 figures. Lea and Febiger. $3.75.

MITCHELL, H. L. *The Growth and Nutrition of White Pine (Pinus Strobus L.) Seedlings in Cultures with Varying Nitrogen, Phosphorus, Potassium and Calcium.* Black Rock Forest Bulletin No. 9, Henry H. Tryon, Director. Pp. vi + 135. 22 figures. The Director, Cornwall-on-the-Hudson, New York. $1.50.

RICKETTS, EDWARD F. and JACK CALVIN. *Between Pacific Tides; An Account of the Habits and Habitats of Some Five Hundred of the Common, Conspicuous Seashore Invertebrates of the Pacific Coast between Sitka, Alaska, and Northern Mexico.* Pp. xxii + 320. 112 figures. 46 plates. Stanford University Press. $6.00.

TRUE, W. P. Editor. *Explorations and Field-Work of the Smithsonian Institution in 1938; Publication No. 3525.* Pp. 116. 122 figures. The Institution, Washington.

VASCONEZ, PABLO A. *Síntesis, Obras V.* Pp. 158. Editorial Labor, Quito, Ecuador.

WILLIS, L. G. *Bibliography of References to the Literature on the Minor Elements and their Relation to Plant and Animal Nutrition.* Third edition. Pp. 488. Chilean Nitrate Educational Bureau, New York.