physical state of fat in milk will not explain the activation of lipase by cooling. Our data indicate that the most plausible hypothesis for the acceleration of the lipase activity in milk by cooling is to be found in the effect of cooling on the permeability to lipase of the adsorption "membrane" surrounding the fat globules. A mild, churning-like agitation of milk will activate the enzyme without cooling of milk. The addition of formaldehyde to milk and aging will also increase considerably the rate of lipase action without the necessity of cooling. The addition of formaldehyde to well-cooled milk has no effect on the rate of lipase action. The ineffectiveness of formaldehyde as a milk lipase inhibitor was shown by Palmer in 1922.[2]

2. The holding of milk at 32°–37° C. for 1 to 3 hours immediately after it leaves the udder exerts a profound retarding effect upon the activity of lipase even though the milk is cooled afterwards. Our results show that by holding for 2½ hours at 33° C. the development of perceptible rancidity was postponed for over 30 hours in milk which otherwise became strongly rancid in 12 hours. The retarding effect is inversely related to the concentration of lipase and is progressively increased up to about 3–3½ hours of holding.

It is expected that a detailed paper of this study will be published in the near future. It is becoming increasingly evident that in a study of lipase activity in milk a knowledge of the temperature history of the milk from the time it leaves the udder is essential.

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THIURAM SULFIDE FOR TURF DISEASES

APPLICATIONS of mercury fungicides are considered necessary for the maintenance of desirable bent turf in sections of the country where turf diseases are troublesome. The war has caused such a tremendous increase in the prices of mercury that the cost of these materials has become exorbitant. This fact has occasioned an increase in the work on the testing of materials for their fungicidal properties. More than 100 chemicals were tested during the past year for the control of turf diseases. Some of the thiuram sulfide compounds have shown considerable promise. Of these, tetramethyl thiuramdisulfide (known commercially as TUADS, Thiurad, and DuBay 1205–U) has been the most effective to date. Previous investigators have found it to be valuable as an insecticide[1] and also as a fungicide in the control of *Venturia inaequalis* (Cke.) Wint. on apple.[2]

Tetramethyl thiuramdisulfide was tested on the turf garden at the Arlington Experiment Farm, Arlington, Virginia, and on the two nearby golf courses for the control of both brownpatch (causal organism, *Rhizoctonia solani* Kühn) and dollarspot (causal organism, *Sclerotinia homoeocarpa* Bennett) on bent turf.

The experiments were conducted on three different strains of creeping bent, and no injury to the turf was observed at the rates used. The material was mixed with sufficient dry sand to serve as a carrier, broadcast evenly over the area and watered in lightly. It was applied at weekly intervals, during the summer months for the control of brownpatch, and during the spring and fall months for the control of dollarspot.

This season's applications of the chemical at the rate of 4 ounces to 1,000 square feet effected complete control of both diseases, whereas the untreated plots were 70 per cent. infected. In these series the turf was superior to that on the plots which had received treatments with mercury fungicides. Lighter applications were tried for the control of dollarspot. A 2-ounce rate gave just as effective control as a 4-ounce rate when repeated treatments were employed. Where the rate of application was reduced to 1 ounce to 1,000 square feet from 7 to 15 per cent. of the area became infected.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

NEW PARAFFIN–RESIN INFILTRATING AND IMBEDDING MEDIA FOR MICRO-TECHNIQUE

HERETOFORE the writer has used a paraffin, bayberry wax, rubber mixture for both infiltration and imbedding of tissues. The media herein described are prepared from paraffin of melting range 56°–58° C. and from a water-white hydrocarbon resin, LX-291, produced by the Neville Company, Pittsburgh, Pa. Preliminary advantages are that the ingredients are easier to obtain, the media are simpler to make, are clear and white and can be more easily filtered. The chief technical advantage is that the solidified media suggested here differ from each other appreciably in hardness at a given temperature, but not essentially in melting range. Consequently, excellent sections, which ribbon well, of any desired thickness below about 20 μ, can be cut at room temperature.

The compositions of the paraffin-resin media are indicated here by the percentage by weight of resin in the mixtures. Hardness of the media increases as

[1] H. G. Guy, Univ. of Del. Exp. Sta. Bull. No. 206, 1937.
[2] H. B. S. Montgomery and M. H. Moore, *Jour. Pomol.*, 15, 253–266, 1938.

[2] L. S. Palmer, *Jour. Am. Chem. Soc.*, 44: 1527–1538, 1922.

the content of LX-291 resin increases. The mixtures are most readily prepared by blending the weighed portions of paraffin and resin at a temperature of about 170° C., and filtering. Five per cent., 10 per cent., 20 per cent. and 30 per cent. solutions have been used in practical work, though solutions of higher concentration have been made. All melt over a range of several degrees, the lower limit of each being within one degree of 55° C. A paraffin oven set at 59° C. is satisfactory for all.

Best results are obtained by infiltrating tissues in pure paraffin, in a 5 per cent. mixture or in a 10 per cent. mixture, and imbedding in a harder medium. The hardness of that part of the block composed of tissue plus infiltrating medium should be about equal to, but in any event should not exceed, the hardness of that part consising of imbedding medium. It is desirable to use a wetting agent in the fluid used to float the sections on the slide, especially for thinner ones where incorrect infiltrating and imbedding media may result in production of fine creases in the tissue of the section. If the section is overheated on the slide or if the fluid is allowed to cool too long before it is drained off, the imbedding medium will shrink slightly, but the tissue will not.

So much of the relative success of cutting sections depends upon the degree of perfection of the knife edge that no attempt will be made here to list the range of thickness of sections which can be cut best with each paraffin-resin imbedding (not infiltrating) medium. Under comparable conditions in one certain case, the following observations were made. With a 10 per cent. solution as the imbedding medium, sections thicker than 12 μ failed to ribbon well, while sections thinner than 4 μ were deemed to be too wrinkled to be designated as good, although those of 3 μ and 2 μ were usable. With a 50 per cent. solution as the imbedding medium, sections of 1 μ were the only ones that would ribbon. These sections exhibited about the same horizontal compression as did the 5 μ sections of the 10 per cent. mixture, albeit the ribbon was so light that it was very difficult to handle. Invariably, as the medium becomes harder the range of thickness of sections which can be cut well becomes narrower and shifts downwards. Thicker sections in each range show less horizontal compression than thinner sections, but among ranges this horizontal compression of sections in comparable parts of the ranges is about equal.

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A MICROFILM CAMERA

THE recent discussions of equipment for microfilming have overlooked one means of making a truly precision camera suitable for short-run and volume work in the small school with limited facilities. This equipment can easily be built around one of the discontinued 35 mm moving picture cameras which are still to be found on secondhand shelves. The author picked up such a camera for $10, mounted a shutter before the lens to produce a camera suitable for microfilming in color and in black and white. The lens is unquestionably superior to those found in the less expensive miniature cameras; the camera is ruggedly constructed and holds enough films for the photographing of a small volume on a single roll—250 single frame pictures.

The camera is a Sept, a spring-driven camera with a color-corrected, anastigmatic f 3.5 lens, popular in the days of silent films with the many eclectic news cameramen. This camera with the prefixed shutter may be mounted on a stand such as that described by English[1] to give an assembly capable of producing microfilm equal to that of many commercial laboratories.

The writer reads his microfilm in two visual magnifiers,[2] mounted on illuminated bases which were made at a cost of approximately $1.00 each. Two readers are indispensable for cross-referring; but possibly the chief advantage in having two readers is that they enable one to photograph the even-numbered and odd-numbered pages on different rolls, thus eliminating the moving and centering of the copy after each exposure; a roll goes into each machine and they are then used alternately.

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[1] F. L. English, *American Photography*, 32: 825, 1938.
[2] Herman Branson, *School, Science and Mathematics*, 40: 411, 1940.

BOOKS RECEIVED

ALLEN, ARTHUR A. *Ornithology Laboratory Notebook.* Fourth edition, revised. Pp. iii + 204. Illustrated. Comstock. $3.00.

BURDON, R. S. *Surface Tension and the Spreading of Liquids.* Pp. xii + 85. 19 figures. Cambridge University Press, Macmillan. $1.75.

GOURLEY, JOSEPH H. and FREEMAN S. HOWLETT. *Modern Fruit Production.* Pp. vii + 579. 87 figures. Macmillan. $4.50.

HU, HSEN H. and RALPH W. CHANEY. *A Miocene Flora from Shantung Province, China. Part I, Introduction and Systematic Considerations. Part II, Physical Conditions and Correlation.* Pp. vi + 147. 57 plates. Carnegie Institution of Washington. $3.25.

LIPMAN, J. G., J. S. JOFFE and ADRIENNE B. CONYBEARE. *Analyses of United States Soils. Section I; North Atlantic States.* New Jersey Agricultural Experiment Station, New Brunswick. $0.50.

SILVERMAN, MILTON. *Magic in a Bottle.* Pp. xi + 332. Macmillan. $2.50.

Svenska Linné = Sällskapets Årsskrift. Årg. XXIII, 1940. Pp. 121. Illustrated. Almqvist and Wiksells, Uppsala.

WHITBECK, R. H. and V. C. FINCH. *Economic Geography, a Regional Survey.* Fourth edition, revised. Pp. xii + 647. 315 figures. McGraw-Hill. $3.50.