cent 38-year old bluegrass sod and was notably deficient in the entire cultivated area. These preliminary tests prompted quantitative determinations in the different areas. The quantitative determinations were made by leaching the soil with normal neutral ammonium acetate and then determining the potassium in the leachate by a standard method.[3]

These quantitative results show conclusively that potassium is very high to a depth of from 24 to 32 inches and sometimes to 40 inches beneath the 38-year old mulch. This is highly significant in light of the characteristic fixation of potash salts in the surface inch and a half to two inches of surface soil. In no case was potash fertilizer applied to the mulched trees.

Samples of soil taken from the grass area between the trees showed no such accumulation of available potassium. Those taken from an adjacent unfertilized plot which has been in a three-year rotation of potatoes, wheat and clover showed a very low potassium content even in the first few inches of top-soil.

Another orchard nearby which has been in the different systems for twenty-two years shows similar results. The soil under the mulched trees has a high available potassium content to the depth of the rooting area of the trees, while the soil under the trees kept in the tillage-cover crop system is very low in this element. For example, the soil beneath two trees in the mulch system has a content of 1,000 pounds per acre of available K at a depth of 24 inches, while the soil beneath a tree 40 feet away in cultivation contained less than 175 pounds at the same depth.

The authors offer no explanation at the present time of the occurrence of the potassium to such a depth beneath the mulch. This finding, however, would indicate that fruit trees grown under the mulch system would not need potash applications even on soils greatly deficient in potassium.

I. W. WANDER
J. H. GOURLEY

THE OHIO STATE UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN INTERVAL COMPUTER

BEING required by the exigencies of a certain problem to convert large numbers of time intervals as measured in the ordinary way by clock times to hours and decimal fractions of hours, the writer has devised the following instrument for this purpose.

The instrument (of which a portion is shown in Fig. 1) consists of two flat metal discs, an "inner disc" some 3 inches in diameter and an "outer disc" some 7 inches in diameter, so fastened by a bolt through their centers that the inner may be rotated concentrically with the outer. The inner disc is graduated around its periphery from 0 to 24 hours, and each hour is further divided into the smallest time interval it is desired to deal with. (In Fig. 1 the instrument is divided into quarter-hours.)

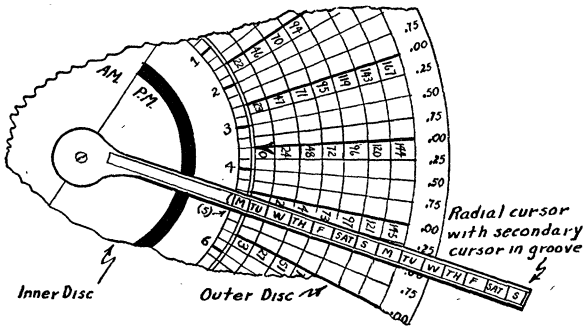

FIG. 1. Relevant portion of an interval computer set to show a start at 3: 30 P.M. on a Tuesday, and a termination at 5 P.M. on any succeeding day.

The outer disc is divided by radial lines into the same divisions, and has also, depending upon the number of days range it is desired to handle, a number of concentric "day-circles" separated from each other by concentric circular lines. Starting at any radius (henceforth known as the "zero radius") and on the innermost day-circle, the short intercepts of the hour-radii are numbered consecutively from 0 to 24 around this innermost day-circle, stepping outward one day-circle and continuing with 25 to 48 on the second day-circle, and so on. Finally the radii between hours are marked on the periphery of the disc with their decimal equivalents, starting at zero with each hour.

On the bolt holding the two discs together is mounted a "radial cursor," of which one edge, if produced, would pass through the center of the pivot, *i.e.*, this edge is a radius. (The edge nearest the bottom of the page in Fig. 1 is the radial edge.) The radial cursor is grooved on its exposed face to carry a sliding "secondary cursor" marked by cross-lines the same distance apart as the width of a day circle, with the spaces between these lines marked with the days of the week as shown in the figure. There should be twice as many intervals as there are day-circles.

In operation the inner disc is rotated with reference to the outer until the time appropriate to the start of the experiment is opposite the zero radius of the outer disc. The secondary cursor is then slid along in its groove so that the day of the start comes opposite the innermost day-circle. In Fig. 1, the instrument is

[3] R. H. Bray and F. M. Willhite, *Ind. and Eng. Chem.*, 1: 3, 144, July 15, 1929; V. H. Morris and R. W. Gerdel, *Plant Physiol.*, 8: 315–319, 1933.

shown as set for a start at 3:30 P.M. on a Tuesday. The radial cursor is now rotated to a position such that its radial edge coincides with the time of the termination of the experiment as marked on the periphery of the inner disc. The integral number of hours elapsed is then read on the scale of the outer disc, picking out the proper day-circle by reference to the secondary cursor, while the added decimal portion is found from the marking at the end of the radial edge of the radial cursor where it crosses the scale around the periphery of the outer disc. In Fig. 1 the instrument is set for an experiment terminating at 5 P.M. If this is on the following Wednesday, then 25.500 hours have elapsed, while if it is on the following Monday, 145.500 hours have elapsed.

Owing to the way in which the graduations step outward as one goes around the successive day-circles, it is necessary to make an adjustment in the position of the secondary cursor for some computations. This adjustment may be made by following this rule: "When computing time intervals which terminate at a time located between midnight as shown on the inner disc and the zero radius of the outer disc, push the secondary cursor inward one day before selecting the day-circle from which the number of integral hours is read off. Otherwise have it set as directed above."

The writer's instrument is graduated to the nearest 5 minutes over an interval of 10 days, the scales being marked with india ink on heavy drawing paper cemented to the discs. If the discs were made of white celluloid and engraved by machine, no doubt the graduations could be made to the nearest minute or less, over an interval of as many days as necessary, depending on the size of the outer disc.

JOHN STANLEY

QUEEN'S UNIVERSITY,
KINGSTON, ONT., CAN.

GIEMSA PREPARATION FOR STAINING BLOOD FILMS

THERE have been many varieties of blood stains proposed, and each stain has its peculiar advantages. In a large proportion of clinical laboratories, where many blood films are stained daily, Wright's stain is generally found to be satisfactory and is relatively inexpensive. However, some laboratory workers prefer the more precise results obtained from other stains in the Romanowsky series. Giemsa's modification has been found to be very satisfactory as a routine blood-stain as well as for blood parasites. Its chief disadvantage is its cost.

For several years the writer has prepared blood films containing avian malarial parasites, using the Giemsa method exclusively. Ready prepared solutions of Giemsa generally cost about $12.00 per eight-ounce bottle. The cost of eight ounces of prepared Wright's stain, on the other hand, is but $2.85. This difference in price means a great deal to private laboratories and to many institutions. Some workers, even though preferring the Giemsa method, use Wright's stain regularly to reduce the expense involved.

The following method for preparing Giemsa stain, although not conforming to the usual technique suggested, has been found to be very satisfactory by the writer. The resulting stain costs about $3.25 per eight ounces and gives uniformly well-stained blood films. In laboratories where a great deal of stain is used the cost of Giemsa so prepared is little more than Wright's.

Azur II–eosin	3.0 gms.
Azur II	0.8 gms.
Glycerin (c.p.)	250.0 gms.
Methyl alcohol, absolute (neutral), acetone free	250.0 gms.

Dissolve the Azur II and Azur II–eosin in the methyl alcohol in an Erlenmeyer flask. Shake well for fifteen minutes, add the glycerin, shake for ten minutes and filter through a moderately fine grade of filter paper. Collect the filtered stain in a bottle and discard the undissolved residue.

There is generally quite a bit of stain that does not dissolve. This, however, seems to make very little difference in the character of the resultant stained blood films. Results have been equally satisfactory with human blood and avian blood. Malarial parasites are brought out sharply, with distinct differentiation of chromatin and cytoplasm.

REDGINAL HEWITT

THE JOHNS HOPKINS UNIVERSITY

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