unit capable of multiplication is in the same range of magnitude as that of vaccine virus.

The necessity of applying similar methods of cultivation and study to human arthritis of unknown etiology is obvious. Whether or not a similar microorganism shall be found to play a part in related human affections, the experimental disease provides a useful tool in the investigation of many pertinent questions.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

DEVICES FOR VISUAL COMPARISON OF SPECTROGRAMS

IN the commonly used method of photographic spectrophotometry due to Howe, the absorption spectra of equal thicknesses of two substances which are to be compared, usually a solution and a sample of the solvent, are photographed side by side in as nearly perfect contact as possible. An essential part of the method is to determine the point or points at which the spectrograms are equally dark. The points usually are determined by visual inspection. They may be located by means of a microdensitometer, with a worthwhile increase in accuracy under certain conditions; but visual determinations are much more rapid and usually are sufficiently accurate.

It is well known that if the two spectrograms are not in perfect or nearly perfect contact, without visible gap or overlap, the accuracy attainable in visually determining the match points is greatly reduced. For this reason, great care is taken to obtain the best possible contact. This necessitates very careful and accurate adjustment of the relative positions of the light source and other parts of the apparatus. Indeed, while satisfactory contacts are usually attainable, perfect contact throughout the entire length of the spectrograms is impossible in practice, since the image spreads on the photographic plate to an extent which varies with the density.

Obviously the time and effort involved in obtaining accurate absorption data could be reduced greatly by eliminating the necessity for excellent contact of the spectrograms. A simple device has been found to do this very satisfactorily, making it possible to view the spectrograms in apparently perfect contact, even when there is a wide gap or overlap between them.

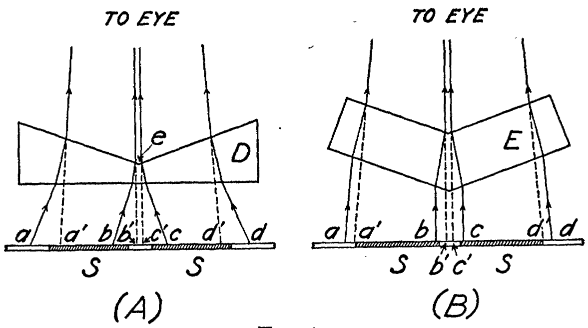

FIG. 1.

The device consists essentially of a biprism (Fig. 1-A) which is thinnest along the center line *e*. It is made preferably of a single piece of glass, but may be made of two prisms carefully ground and joined at the thin edges. It is held with its center line parallel to the lengths of the spectrograms and directly over the gap or overlap. Areas *ab, cd,* extending perpendicular to the plane of the paper, then appear at *a′b′, c′d′* in the visual field, with *b′* and *c′* apparently in coincidence. Thus the edges of the areas, at *b* and *c*, appear in perfect contact, with no visible dividing line. The area between *b* and *c* is invisible. The distance from *b* to *c* varies with the refracting angle and with the distance from biprism to spectrograms. By varying this distance, comparisons of the two spectrograms can be made at various distances from the edges.

The division between the visual areas remains sharp, while the distance between biprism and spectrograms is varied from zero to at least several millimeters. This range can be increased greatly by viewing the spectrograms through a small circular aperture (one eye) or (using both eyes) a narrow slit extending parallel to the center line of the biprism.

For convenience and accuracy in use, the biprism should be mounted in an apparatus in which it can be adjusted to any desired position above the photographic plate, with its center line parallel to the edges of the spectrograms. A low-power lens and a viewing aperture may be mounted above the biprism. Illumination of the plate should be uniform and by transmitted light.

The device can be used also for comparing the intensities, positions, widths or line shapes of the lines in two spectra; in comparing two parts of the same spectral line, as a check on uniformity of width and of illumination of the slit; in comparing the darkening at two different wave-lengths in the same spectrum; etc.

Instead of the biprism, the refracting unit shown in Fig. 1-B may be used. This may be made of two plane-parallel plates of glass cemented together at an angle, or, preferably, of a single piece of glass. Areas *ab, cd* of the spectrograms appear at *a′b′, c′d′*, in perfect contact, as when using the biprism. This unit is less useful than the biprism, however, as the distance between *b* and *c* can not be varied by varying the distance between the device and the spectrograms.

A biprism which is thickest along the center line also may be used. This reverses the images of the two areas with respect to the center line. Two images of the gap or overlap are seen, on opposite sides of the contiguous areas. These images may interfere with accurate comparison of the two areas. For this reason the biprism first described is preferable.

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A GASOLINE-TORCH LABORATORY BURNER

THE Biological Survey, U. S. Department of Agriculture, maintains several research stations at points remote from such utilities as gas and electricity. Field workers at such stations are handicapped in not being able to use Bunsen burners or electrical stoves. This difficulty has been overcome at the Delta Migratory Waterfowl Refuge, in Louisiana, by utilizing a gasoline-torch stove. The stove was designed and constructed by Timothy Sullivan, a machinist at the refuge WPA project. It can be built at little cost, requires for heat only an ordinary gasoline "blow-torch" such as that used by plumbers, and produces a high heat with comparatively little fuel consumption.

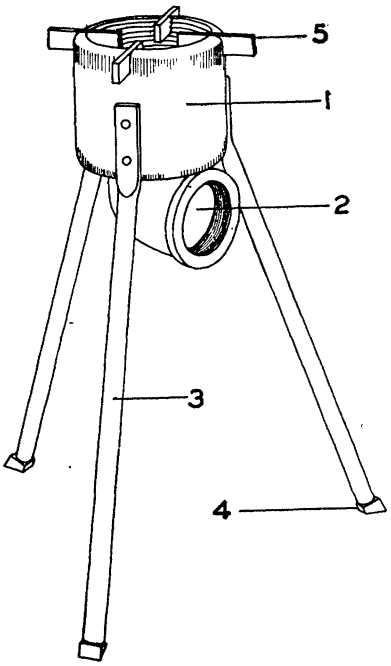

FIG. 1.

The Sullivan burner utilizes the following materials:

Materials: Many of these items may be salvaged from old machinery or from scrap-metal heaps. (1) One galvanized iron 3¼-inch pipe sleeve, 3¼ inches high. (2) One 1¾-inch pipe elbow. (3) Three pieces of ⅜-inch iron pipe, each 13 inches long. (4) Three pieces of rubber for insulating shoes for the legs of the stand. (May be cut from old automobile tire shoe.) (5) Four 2-inch lengths of $\frac{3}{8} \times \frac{1}{2}$ inch iron bar for grate. (6) Collar cut from ⅛-inch thick steel plate, to fit the inside diameter of the 3¼-inch pipe sleeve and with a hole to receive the 1¾-inch pipe elbow. (Not shown in figure.)

Assembly: One end of the elbow is welded to the steel collar, and this unit welded to one end of the pipe sleeve. This forms the body of the burner, the open end of the elbow being the flame intake, and the upper end of the sleeve the top of the burner. Then the top end of the sleeve is cut in four equidistant places to receive the lengths of iron bar. These lengths are spot-welded in place and form a grate. The ⅜-inch iron pipe is used for the stand, the upper end of each length being flattened and riveted to the outside of the lower half of the sleeve. The rubber shoes for the feet of the tripod stand may be cut with a projection that will fit up inside of the bore of the iron piping.

Use: a gasoline torch is heated and fired, and placed so that the end of the barrel is about an inch from the flame intake of the burner. The amount of heat may be regulated by adjusting the flame of the torch.

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