These last chapters of the book are much more complete than this brief review indicates, for they represent, as I have said, that field of biochemistry to which Morrow devoted his life. The value of these chapters is greatly added to by the giving of methods which have not before appeared in print, methods developed not only by Morrow himself but by his colleagues.

Dr. Morrow's book on biochemical laboratory methods is one which should be in the hands of every teacher and student in biochemistry, biophysics and physiology.

WILLIAM SEIFRIZ

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A COMBINED FIXATIVE AND STAIN FOR DEMONSTRATING FLAGELLA AND CILIA IN TEMPORARY MOUNTS

BELOW is given a new fixative-stain combination, which has proved to be especially suitable for the rapid preparation of temporary mounts to show flagella and cilia. The reagent contains:

80 cc	saturated solution of phenol in water
20 cc	40 per cent. solution of formaldehyde in water
4 cc	glycerine
20 mgms	gentian violet

It is advisable, in order to facilitate the dissolving of the dye, to moisten it thoroughly with a cubic centimeter of water before adding the other ingredients.

Mix a drop of the reagent with a drop of the culture or infusion containing the organisms to be studied. The flagella and cilia stain clearly, while the cell body remains quite natural in shape and sufficiently transparent to observe the nucleus and the other cytoplasmic structures, such as granules, pharyngeal rods, chloroplasts, pyrenoids, paramylum bodies and the like. The background remains practically colorless, the dye concentrating itself in the organisms. The depth of the stain can be regulated by varying the proportions of reagent to infusion.

The reagent promises to be extremely useful in demonstrating flagella to elementary classes and in identifying the minute flagellates in protozoology courses. It has been used with surprising success on Oicomonas, Tetramitus, Menoidium, Peranema, Euglena, Astasia, Chilomonas, Polytoma, Naegleria and others. It will undoubtedly prove useful as a quick method for studying the flagellated stages of algae, fungi and myxomycetes.

The cilia, cirri, membranelles and undulating membranes of the ciliates are stained by it in approximately natural form, permitting an accurate determination of the number of the ciliary rows, and the arrangement and number of the cirri, membranelles and membranes. To any one who has tried to work out the exact arrangement of the locomotor organelles of a small hypotrich the advantage of such a reagent is obvious.

For staining internal protozoan parasites it is advisable to use more glycerine and dye (approximately 8 cc glycerine and 25 mgms gentian violet have given good results). The presence of mucus interferes with the staining process. It is consequently advisable to mix the material to be examined with three or four times its volume of normal salt solution before using the reagent. With these precautions the method has been used with success on Trichomonas, Chilomastix and Balantidium. With further work along this line it might be possible to develop a method that would materially facilitate the diagnosis of intestinal and other parastic protozoa.

Unfortunately the reagent does not work well with Paramecium, since the discharge of the trichocysts tends to tear away the cilia, but satisfactory preparations have in some cases been obtained in spite of this difficulty. With smaller ciliates, such as Cyclidium, Colpidium, Urotricha, Colpoda and Aspidisca, the method works beautifully; and in larger forms without a heavy trichocyst layer very satisfactory results have been obtained, for example with Stylonchia, Ophryoglena and Chilodon. The cilia stand out as clear blue, individual threads.

Bacteria stain clearly and stand out distinctly against the colorless background. It is possible in the filamentous types to observe the gelatinous sheath in which the rods are imbedded. However, the flagella of the motile forms, such as the larger spirilla and bacilli commonly found in laboratory infusions, do not take the stain.

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