are made from the finer grades of wool, among which the medullated fiber does not so frequently occur. Among British wool manufacturers, however, the medullated fiber is looked upon as a menace to the prestige of British woven fabrics. It is thought to be responsible for harsh, wiry fleeces which do not work up well in the manufacturing processes. The medullated fiber is also criticised for lack of tensile strength and elasticity, and by some is accused of being responsible for uneven dyeing of certain goods.

Medullated fibers may be found among most of the improved breeds of sheep, including the Merino, but it is found in greatest quantity among the long-wool breeds, such as the Lincoln, Leicester, Cotswold and Romney. Sharp criticism of some New Zealand crossbred wools has recently been made by certain leading figures in the British textile trade, who point to the very great desirability of eliminating those "strong" or "hairy" fibers from the fleece. Obviously such elimination must be made by the breeder, if it is to be accomplished at all.

The presence of the medullated fiber can not be accurately detected by simple optical examination of the fleece, although the medulla is easily seen under the low power of the microscope when the fiber is prepared in a balsam mount. The literature on the subject contains no references to macroscopic detection.

A problem recently undertaken by the writer, involving the isolation of several thousand medullated fibers, led to the discovery of a method of detecting medullated wool fibers without the aid of a microscope. The method is simple and its use by breeders as well as by investigators seems warranted.

A rectangular piece of glass, of a size somewhat shorter in one dimension than the length of the fibers to be tested, is placed horizontally over a dull black or dark blue background. A small quantity of glycerin is then poured on the glass. The glycerin will have a tendency to spread over the glass and thus gradually become too shallow in depth to permit proper immersion of the fiber. This difficulty may be overcome by making on the glass a wall of paraffin in the shape of a parenthesis almost joined at the top and bottom. The fibers are cleaned in benzene to remove the excess of natural oil and dirt, and then are immersed one at a time in the shallow lake of glycerin. The ends of the fiber are held in the fingers and the two openings in the wall of paraffin permit the fiber to be held completely submerged and almost in contact with the glass.

The operation is carried on in natural light subdued to a point where reading would be difficult. The writer has found it convenient to work close to a window and to regulate the light by manipulation of a piece of very thick felt used in place of the ordinary window blind.

If the light has been properly regulated, a medullated fiber subjected to the treatment described can be seen as a faint white line across the glass, while non-medullated fibers can not be seen at all.

Tests of the efficacy of the method were carried out by examining under the microscope many fibers, both medullated and non-medullated, separated by use of the glycerin. These tests showed no errors in isolating medullated fibers, although a few which contained only traces of medullae were classed as non-medullated. The method is applicable to the examination of wool from any of the long-wool breeds, and with practice might be applied to finer fibers.

Tests with liquids other than glycerin, having a high refractive index, suggest that the index of refraction may be responsible for the phenomenon. Cottonseed oil, aniline, balsam, and other substances give fairly satisfactory results, while with water the detection is impossible.

J. F. WILSON

COLLEGE OF AGRICULTURE,
UNIVERSITY OF CALIFORNIA

A PERFUSION FLUID FOR ELASMOBRANCHS

THE use of diluted sea-water as a perfusion fluid for vertebrate tissues has been attended in the past with only partial success. Failure in the case of elasmobranch hearts, at least, was considered by Mines[1] to be due to the excessive magnesium content. The ratio of Mg to the other metals is about five times as great in sea-water as in elasmobranch serum, and about fifteen times as great as in the sera of land vertebrates.[2] Since the relative proportions of Na, K and Ca in sea-water are very similar to those found in vertebrate tissues generally, it seemed that the Mg might be the only disturbing factor.

It has been found possible to precipitate most of the Mg and relatively little of the Ca from sea-water by the addition of NaOH. To each liter of sea-water is added 12 cc of a 10 normal solution of NaOH, and the mixture is allowed to stand overnight in a stoppered flask. The flocculent precipitate settles in a compact mass at the bottom of the flask, and the supernatant liquid may be decanted easily through a filter. If the precipitate is not allowed to settle completely, filtration is unduly slow. The filtrate, after neutralization to pH 8 with a few drops of concen-

[1] Mines, G. R., "On the Relation to Electrolytes of the Hearts of Different Species of Animals," I—Elasmobranchs and Pecten, *Jour. Phys.*, 1912, 43, 467.

[2] Macallum, A. B., "The Paleochemistry of the Body Tissues and Fluids," *Phys. Rev.*, 1926, 6, 316.

trated HCl, may be used as the stock solution for a perfusion fluid which has proved highly satisfactory for dogfish and skate hearts. Preparatory to its actual use, this modified sea-water must be diluted as follows:

Modified sea-water	30 cc.
Urea, 20 per cent. sol.	10 cc.
Distilled water	60 cc.

The acidity will then need to be adjusted with dilute HCl to pH 7.4, to correspond with the pH of elasmobranch serum. The diluted mixture compares favorably in its physiological effects with Knowlton solution, the standard artificial salt-mixture for elasmobranch tissue; and it has the advantage of being much simpler and cheaper to make up.

Determinations of the Ca and Mg content of solutions prepared in this way yielded the following results. Unmodified sea-water similarly diluted and Knowlton solution are included in the table for comparison:

	Ca-Mols/liter	Mg-Mols/liter
Modified sea-water (a)	.0020	.0037
" " " (b)	.0019	.0046
" " " (c)	.0021	.0042
Plain sea-water	.0032	.0145
Knowlton solution	.0040	.0050

A detailed study of the precipitation of Ca and Mg from sea-water by NaOH[3] shows that the removal of more Mg entails the loss of so much Ca and the gain of so much Na that the physiological salt-balance is destroyed. It is therefore impossible to extend the foregoing technique to the preparation of a medium suitable for land-vertebrates.

ELEANOR M. KAPP

MARINE BIOLOGICAL LABORATORY,
WOODS HOLE

SPECIAL ARTICLES

THE SEXUAL STAGE OF FUNGI INDUCED BY ULTRA-VIOLET RAYS

ON January 29, 1928, while studying the effect of ultra-violet radiation of fungi in agar plate cultures radiated on January 25, it was noted that perithecia, the sexual stage of the fungus, had formed in great numbers on certain portions of the exposed plates.

The fungus under consideration was one, our laboratory number "G 10," of several strains of *Glomerella cingulata* that have been under close observation for some months. This culture was originally derived from apples affected with Bitter Rot and in October a single conidium was isolated in my laboratory. All cultures of "G 10" since that time have been from this monosporous strain. In no case were perithecia observed to develop on this monosporous strain.

This same essentially non-sexual strain in all agar cultures exposed to ultra-violet rays of certain intensity and for certain time develops perithecia literally by millions. Thus in the plate represented in the figure more than one hundred perithecia were visible in one focus of one low power field of the microscope or more than 1,500 on the exposed region of this small colony. It will be observed that no perithecia developed in the non-radiated part. Perhaps the most striking evidence that the radiation induces the perithecia was given by projecting the rays through a circular aperture of 0.5 mm. diameter upon a susceptible colony. The perithecia developed in great quantities in the small area radiated and only in that area. Their origins are visible two days after radiation as hyaline globose bodies and they can probably be traced to a much earlier time, since unusual branching is apparent within a few hours after radiation. In four days they appear as well-developed, spherical black bodies; asci and spores soon form. The perithecia differ from those naturally formed in that they are spherical and non-stromatic, but the asci and spores agree precisely with those found in nature.

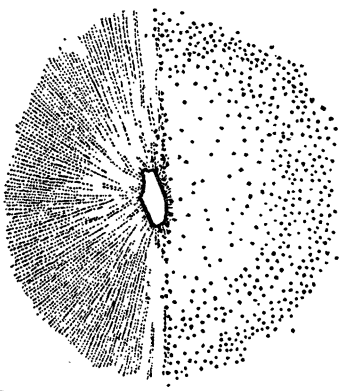

FIG. 1. Portion at right directly radiated; at left not so. Dotted region is perithecial; these on the right induced by direct radiation, the few at the left by indirect radiation.

All other strains of Glomerella that have been tested have given responses like those of "G 10." It appears certain that these ultra-violet rays or others near them have also a greatly accelerating effect on conidial production in this and other genera of fungi, for example, a Coniothyrium that normally produces pycnidia only at the end of several weeks and when the colony has completely occupied the petri dish, when radiated responds within a few days with numerous pycnidia.

[3] Kapp, E. M., Unpublished.