

have been crippled; the Association has now to draw on its very limited capital. The committee took the view that, as an Imperial people, it is our duty to shoulder our responsibilities and develop the resources of the Empire—resources of knowledge as well as resources of material—in time of war as well as in time of peace. We are too apt to make war an excuse for postponing our immediate duty. Sir Thomas Wrightson, Bart., has given 50*l.*, but it does not seem too much to expect that three other subscriptions of equal amount may be placed at the disposal of the Research Committee for Archæological Investigation in Malta, in addition to the grant from the British Association. The labour conditions in Malta are at present favourable for the continuance of this kind of Imperial undertaking, and the men who are in charge have the skill and experience to employ to the best advantage the modest sum here asked for.

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#### A Successful Method of Obtaining Amœbæ for Class Purposes.

ZOOLOGICAL departments in all parts of the British Isles have experienced, during the last few years, considerable difficulty in obtaining a good supply of *Amoeba proteus* for class purposes at the proper time, the usual hunting-grounds for this organism failing, for some reason or other, to yield their former abundant supply.

The difficulty was overcome in this department during the present session by making use of amœbæ obtained from soil by a suitable culture method, the outcome of the writer's work on soil protozoa. This method has proved so successful that it has been thought desirable to give a brief account of it, especially as it has come to my knowledge that other zoological departments are desirous of trying it. A somewhat similar method of obtaining amœbæ for class purposes has been in use for some years in the University of California, and has been described by Kofoid in the *Trans. Amer. Micro. Soc.*, vol. xxxiv., October, 1915.

For the cultivation of amœbæ from soil a liquid medium is preferable to a solid one, such as nutrient-bouillon agar, frequently used for amœba cultivation, owing to the fact that one frequently finds on a solid medium amœbæ with two or more nuclei and various other abnormalities not found in amœbæ from a liquid-culture medium.

One per cent. hay-infusion is a very useful medium, and is constantly used here. It is prepared as follows:—Ten grams of chopped hay are put into a beaker or flask with one litre of distilled water, and steamed for about three-quarters of an hour; filter, and then make the filtrate just alkaline by the addition of a sufficient quantity of caustic-soda solution (N.NaOH solution is quite suitable) to make a strip of red litmus paper turn a bluish tint when immersed in the liquid. Sterilise in the autoclave, and, when cold, pour a small quantity into three or four Petri dishes until the liquid is a few millimetres in depth, and inoculate each with soil; about half a gram is sufficient soil for each plate. Almost any kind of soil will serve—garden or field soil.

Put the dishes aside for a day or two, either in an incubator at 20°–25° C., or on the laboratory-table, away from direct sunlight, and then examine under the microscope for amœbæ. The latter are, as a rule, of the *limax* type, and are generally to be found on the surface or at the bottom of the culture.

Ciliates and flagellates will also be found in con-

siderable numbers; in fact, the ciliates frequently predominate in the early days of the culture, and only when they become less numerous do the amœbæ increase in numbers.

For the purposes of examination clean coverslips may be dropped on to the surface of the culture-liquid, and then removed to slides and examined under the microscope; or a platinum loopful or two of the surface layers may be taken and put on a slide and then covered with a clean coverslip. When most of the amœbæ are at the bottom of the culture, as sometimes happens, they are more difficult to remove to slides, but they may be sucked up by means of a capillary pipette gently moved over the bottom of the dish and then transferred to the slide. The coverslips should be sealed with vaseline or wax to prevent evaporation.

The amœbæ vary in size from very small forms, which are not of much service for class purposes, to fairly large forms, which are quite admirable, showing great amœboid activity and revealing clearly under the higher powers of a junior-class microscope the differentiation between ectoplasm and endoplasm, the nucleus, and the streaming of the protoplasm during the progression of the amœba. Such forms may measure anything from 20  $\mu$ –60  $\mu$  in length, according to the degree of extension of the body, and even larger forms may be met with. The organism which has been obtained in practically pure mixed culture here, and has proved so useful, measures between 30  $\mu$  and 50  $\mu$  when extended. The cyst has a diameter of 16  $\mu$ –17  $\mu$ .

Having obtained a good-sized form, one should allow it to multiply, and finally to encyst. The cysts may then be picked up by means of a capillary pipette and transferred to fresh culture medium, when one is almost certain to obtain a practically pure mixed culture. Further subcultures can be made by inoculating the cysts into fresh dishes of hay-infusion, and by this means the race may be kept going for months, or even years.

Even if the cultures dry up, and remain dry for a month or two, it will still be found possible to obtain a supply of organisms by scraping some of the brown deposit from the inside of the dish and placing this in fresh sterile hay infusion. After a few days amœbæ will be plentiful, having hatched out of the cysts contained in the deposit from the old culture.

Such a cyst-containing deposit or old culture containing cysts can be kept as a stock, and when active amœbæ are required all that is necessary is to seed a dish or two of hay-infusion with cysts two or three days before the organisms are wanted, and one can be certain of obtaining a good supply of active forms.

I shall be pleased to supply any zoological department with a small quantity of cyst-containing deposit or old culture liquid containing cysts of the form cultivated here in case no success is obtained with the method described above.

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#### SCIENTIFIC PLANT BREEDING.

SO much attention has been directed to the purely scientific advance that has followed the birth of Genetics as a new branch of science that little regard has been paid to the very remarkable results already reached by the application of Mendelian methods to the problems of economic plant production. It is necessary to distinguish somewhat sharply between the facts which Mendel was the first to discover, and the hypotheses which