of which project downward and parallel to each other, two crescent shaped arms. Across the distal end of these arms is a bar, parallel to the table and 1/8 inch thick in order to support a 6/32 knurled head, brass, machine screw, the after-loading screw. Through the middle portion of the parallel crescents are drilled holes to receive 2-56 cup-pointed machine screws. These cups receive the pointed ends of the lever axle. The lever is made from a 3-inch length of 5/32 inch, outside diameter, brass tubing, which is drilled transversely at its middle point and a small brad soldered in place. Both ends of the brad are then sharpened to make an axle of sufficient length to fit the adjustment limits of the cup-pointed screws. The writing lever is made from a six to eight-inch length of split bamboo rod, about one eighth inch in diameter, and tipped with a small piece of thin brass shim.

The holder is firmly attached to the handle by means of a 6/32 brass machine screw which passes through the center of the table of the holder and whose head is countersunk in and soldered to the lower surface of the table. When assembled, this screw is passed through the hole in the handle and two wing nuts are placed thereon. It has been found that two wing nuts may thus be nested if the overlapping margins of the wings are slightly filed. These wing nuts then serve as check nuts and also as a means of attachment for a copper wire from one pole of the secondary coil of the inductorium. This method of attachment of the head to the handle allows swinging of the holder in a complete circle and greatly facilitates the adjustment of the writing lever to the kymograph drum.

If one desires to perfuse the circulation of the frog with drugs or sugar solutions and secure a record of the contractile powers of the muscle, the kick-up lever, Figure 1, D, shown in three views may be placed in the holder, the frog pinned in dorsal position for perfusion, and the graph made upon a slowly revolving drum.

Nickel- or preferably chromium-plating is useful to protect the brass from the action of sodium chloride and greatly improves the appearance of the apparatus.

Casting of the holders: Reference has been made to the casting of these holders or heads. In Figure 2, A and B, are shown the top and side views, respectively, of the pattern used for casting three holders. It is much more convenient to cast eight or ten holders at a time and partially finish them upon a shaper or milling machine than to cast a lesser number. After partially finishing the castings, they are sawed apart with a machine hack-saw and finished by hand. In all probability jigs could be made which would facilitate this work; but for the number of holders finished, the trouble involved in making jigs was not considered necessary.

In September, 1926, about eighteen of these muscle

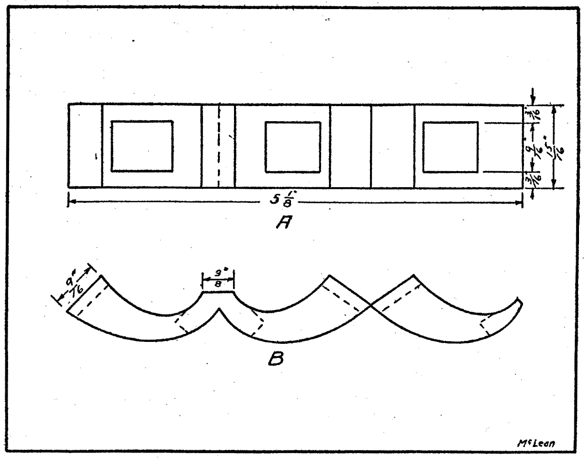

FIG. 2

levers were made and since that time, they have been used by over 600 students working in groups. These levers have been used for recording a simple muscle twitch, for demonstrating the maximum lifting power of a muscle, as well as numerous other experiments, and have given no trouble whatever.

Although this lever is as yet a relatively crude product, finished by hand, it has the following advantages:

1. An insulating handle or support rod;
2. An adjustable head with after-loading screw;
3. It may be used to record the responses of muscles reacting in either the vertical or horizontal plane;
4. It is sufficiently rugged that it will withstand the rough usage of college sophomores who are more accustomed to the manipulation of five-year-old Fords than to the delicate equipment of a physiological laboratory.

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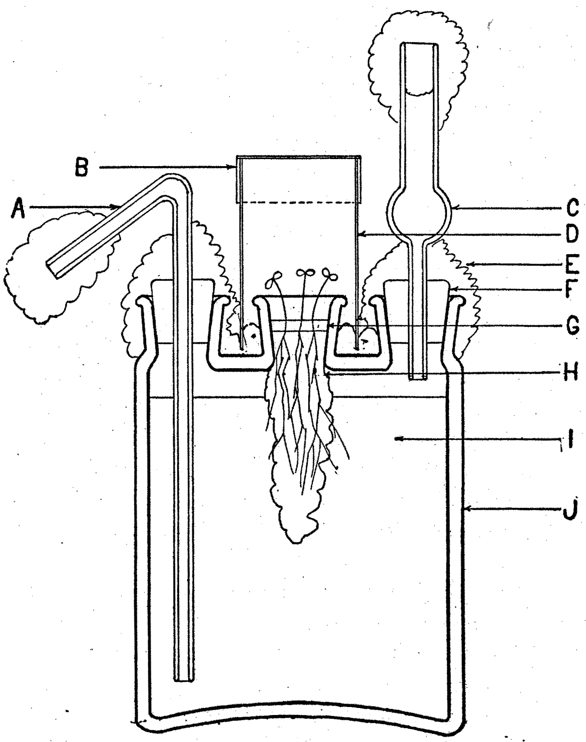
METHOD FOR GROWING SMALL-SEEDED PLANTS UNDER STERILE CONDITIONS

THE accompanying figure diagrammatically shows the principal details of a method now being used at the Massachusetts Agricultural Experiment Station for growing tobacco plants under sterile conditions.

In the middle opening of a 3-neck Wolff bottle is placed a plug (H) of absorbent cotton which serves both as a substratum for the plantlet and a wick for the nutrient solution (I). Before seeding, the entire apparatus as shown, with the exception of the layer of nutrient agar (G) and the celluloid cover (D), is set up and sterilized under steam pressure. Then, under aseptic conditions, the thin layer of nutrient agar is added, the seed planted in it, and the cover put on. A glass cover could under some circumstances be advantageously substituted for the celluloid cover.

Sterile non-absorbent cotton is used for protecting exposed openings. After the plantlets grow large enough to fill the cover, it may be removed, all but



one plant removed and sterile cotton worked around it, if it be desired to grow it further.

This method was especially worked out for tobacco, but seems applicable to any small-seeded plant whose plantlet is small, slow-growing and difficult to transplant under aseptic conditions. It differs from other proposed methods in that (1) the plantlet remains in the original substratum and (2) that a layer of nutrient agar is introduced to indicate asepticism.

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SPECIAL ARTICLES

THE OVERWINTERING IN MASSACHUSETTS OF IXODIPHAGUS CAUCURTEI

THE purpose of this communication is to record the overwintering of *Ixodiphagus caucurtei,* a hymenopterous chalcidian parasite of ticks, introduced upon the Island of Naushon for the control of *Dermacentor variabilis,* the common dog tick of Eastern Massachusetts.

This fly was discovered by Professor E. Brumpt in nymphs of *Ixodes ricinus* taken in the neighborhood of Paris (Chantilly and Fontainebleau). It was described by M. R. du Buysson in 1912 (*Archives de Parasitologie,* xv, p. 246). Its use for the control of ticks responsible for the transmission of diseases, including Rocky Mountain spotted fever, was proposed by Brumpt in 1913 in a short article "Utilisation des Insectes auxiliares entomophages dans la lutte contre les Insectes pathogénes" (*La Presse Médicale,* No. 36 du 3 Mai 1913). In this article Brumpt records the parasitization by this fly of the following species in addition to *Ixodes ricinus*:

Haemaphysalis concinna
Rhipicephalus sanguineus
Dermacentor andersoni

It is pertinent to recall in connection with this report early work of L. O. Howard. In 1907, he described and figured the first chalcid parasite of a tick and established the genus *Ixodiphagus* in his description of *Ixodiphagus texanus.* (*Ent. News,* xviii (1907), pp. 375–378). His specimens were obtained from nymphs of the rabbit tick *Haemaphysalis leporis-palustris,* Packard, collected in Jackson County, Texas. In 1908 (*Canadian Entomologist,* xl, p. 239–241) he described and figured another chalcid parasite, *Hunterellus hookeri* (tribe Ixodiphagini), obtained from nymphs of *Rhipicephalus texanus,* Banks, taken from a dog at Corpus Christi, Texas.

An unsuccessful attempt to introduce *Hunterellus hookeri* into South Africa is described by C. P. Lounsbury in 1908 (Rept. Govt. Entomologist for 1908, Cape of Good Hope, Appendix iv, p. 65.)

The Naushon experiment is probably the first adequately conducted attempt—apparently successful—involving the introduction and acclimatization of a chalcid parasite of ticks. Dr. S. B. Wolbach had long been interested in the possibilities suggested by Brumpt's brief paper, inasmuch as *Ixodiphagus caucurtei* already existed in a climate not too unlike that of certain Rocky Mountain spotted fever territories to preclude probability of acclimatization. The hope of ultimate utilization of the fly for control of the Rocky Mountain spotted fever ticks was the deciding factor in the decision to try first this method in an attempt to alleviate the heavy tick (*D. variabilis*) infestation of the privately owned island of Naushon, near Woods Hole, Massachusetts. Hence an altruistic spirit as well as a desire for relief from annoyance prompted the owners of the island in their financial support of this experiment. The Department of Pathology of the Harvard Medical School made necessary preparations, provided materials and equipment, and an assistant, Mr. Arthur G. King.