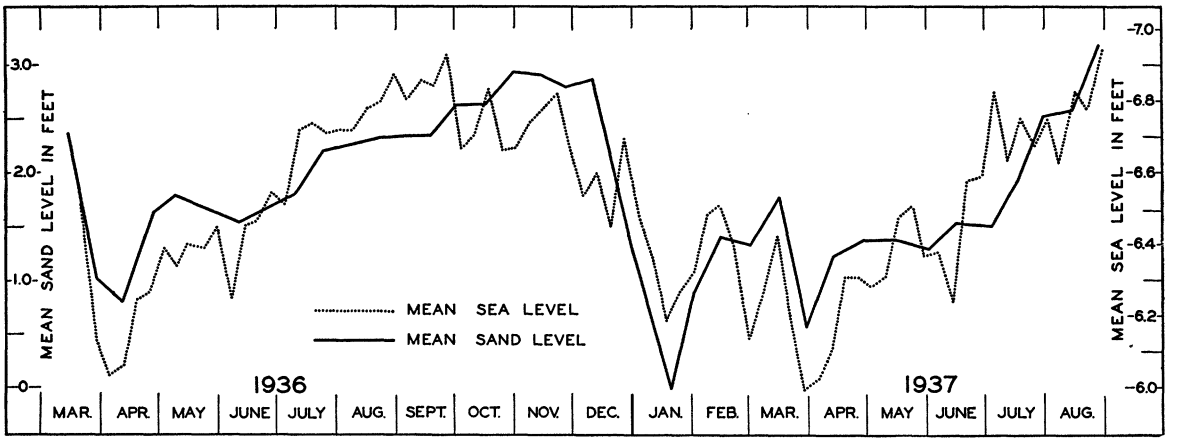

FIG. 1. Relationship between mean sea level and mean sand level. Sand level is expressed in feet above the lowest level and sea level is the tide staff reading in feet.

that there is a rise each summer and fall and a decline in winter and spring. However, it is not only in these large seasonal changes that the agreement of the two curves is found. Changes in shorter periods can be observed, as, for example, the rise in February and March, 1937. Furthermore, the changes in tide level during the 36-hour survey, when observations were made every 40 minutes, showed that the variations of tide level were closely associated with the fill and cut of sand along the pier.

The causal relationship of these changes to each other is not easily understood. It should not be concluded that the rise in sea level alone causes a building up of the sand, but many of the factors which influence the sea level must likewise affect the sand movements. It seems likely that changing currents and winds which affect sea level must have similar influence upon the sand movements. Such an influence may be increased by large swells which tend to occur during certain wind directions and which stir up the sand and keep it in suspension.

Continued observations, which include current studies, wave height observations and meteorological data, together with the sand measurements, which are now in progress, may be expected to throw more light upon the underlying cause of this relationship.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SUBSTITUTE FOR CARGILE MEMBRANE IN THE CONSTRUCTION OF BRODIE BELLOWS

VOLUME recorders of the bellows type have a wide variety of application in physiological experiments, but their construction as described by the originator, Brodie, and subsequent experimenters, involves the use of Cargile membrane for the actual bellows. Cargile membrane is the peritoneum of an ox and has been used by surgeons and goldbeaters, but unfortunately it is now both difficult to obtain and quite expensive. A search was therefore made to find a suitable substitute.

We found that the Japanese tissue paper which is used in model airplane construction when properly prepared works most admirably. Since the heavier types of this tissue are too stiff and tend to crack when folded, it is important that only the thinnest and toughest variety be used.

The tissue is prepared for use in the following manner: Care being taken to avoid wrinkles, a section of the paper is placed over the open end of a tin can or other container of suitable size and shape and glued at the edges with banana oil. With a tuft of cotton the entire surface is gently moistened with water. This serves to align the fibers and stretch the tissue. In order to render it impermeable to air and moisture it must then be treated at least three times with a mixture of one part banana oil and five parts acetone. This is done by simply brushing the mixture on gently with a soft brush. The membrane may then be removed and will be found to be smooth and flexible.

The construction of the bellows is self-evident from the illustration, but great care must be exercised in applying the membrane so that it folds smoothly and without bulging out when the bellows is in actual use. Most efficiency was obtained when the membrane was first cemented on so that it formed the sides of a box the top and bottom of which are the metal surfaces (A). The sides are then gently pushed in with thumb and forefinger so that they fold as in (B). Now, at one end the metal top is pushed down to form an angle

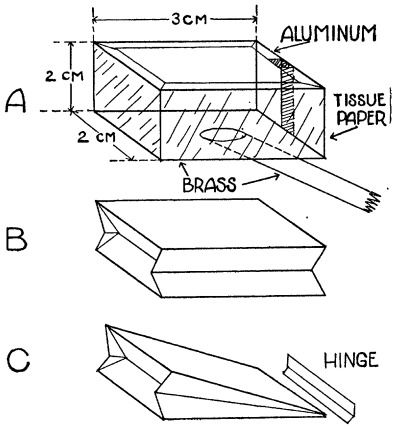

FIG. 1

with the base and a membrane hinge is cemented on (C). A writing lever (not shown in the illustration) is attached to the top surface. The bellows is now made ready for use by smearing generously a layer of paraffin oil on the membrane, thus not only sealing any microscopic holes, but rendering it more flexible.

These bellows may be made of any volume capacity to fulfil a particular condition of recording. It should be remembered that the more cubical the bellows is made, the more amplitude will be recorded for a certain volume change, and thus it is more sensitive but has less mechanical advantage. A useful proportion is shown in the illustration.

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A SIMPLE FEEDING DEVICE FOR CULEX PIPIENS IN AVIAN MALARIA STUDIES

THE meticulous and rather laborious procedures required for satisfactory continuance of the mosquito-canary propagation of plasmodia in the laboratory suggest that any simplification of methods should be placed on record. The accompanying rough sketches show a device which has been very helpful in my own work through (1) eliminating the possibility of loss of mosquitoes by the toppling of a lantern globe off a Petri or crystallizing dish, and (2) providing a "bed" in which the bird lies very comfortably, indeed often quietly asleep, while the mosquitoes are feeding. There are, as shown, three simple parts to this device: first, a round flat base cut with shears from light-weight galvanized iron and having four projecting portions turned up at right angles, two of these latter supporting upright hooks of stiff wire soldered against their outer surface; second, a small piece of rubberized cloth with a hole cut in it eccentrically; and, third, a rubber band. Without cloth, the band stretched between the two hooks holds the globe and dish securely together; for blood feeding, the cloth is slipped beneath the strands of the band, the bird is laid between the strands with its bared pectoral region over the hole, and the two sides of the cloth are brought together on top and held in place by a pin.

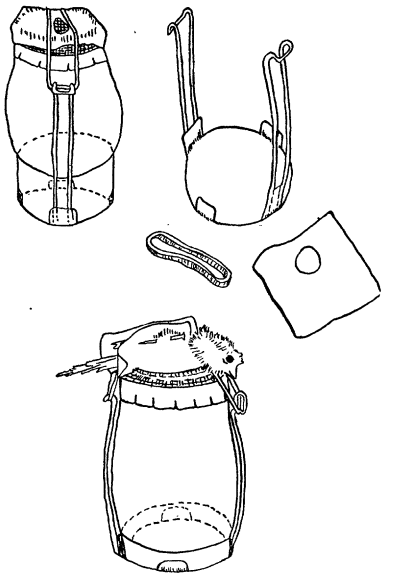

FIG. 1. A simple feeding device for *Culex pipiens* in avian malaria studies.

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