tissues should be shaken off the balance. They should be gently removed (we use the Holter braking pipettes), because currents in the flotation medium should be minimized.

It would be unfortunate if this discussion should leave the impression that the Cartesian diver balance is exceedingly unreliable to handle and to work with. For the benefit of the few who have trouble with giant diver balances and of the many who have never heard of such instruments, we shall conclude by discussing a simple experiment (Fig. 1). We took a Carlsberg beer bottle and made it float bottom upward in a glass cylinder. The volume of air in the bottle in the floating position was 214 ml. Air bubbles on the outside of the bottle were avoided. The glass cylinder was tightly closed with a rubber stopper into which tubing leading to a water manometer was inserted. The pressure in the system was regulated through the side arm of a T-tube. The equilibrium pressure of the "diver" was read while empty, while loaded with 1 g, empty, loaded with 2 g, etc., as explained in (*3*) although misquoted in (*1*). With a 10-g laboratory weight as a standard (RW arbitrarily put = 1) and using formula (1), we found the relative RW's of a 5-g, a 2-g, and a 1-g weight to be 0.508, 0.198, and 0.100, respectively. This experiment was carried out in the crudest possible way. It is hoped that the relatively good results will appear encouraging. A 0.2-ml bottle will weigh RW's in the mg-range just as easily.

TABLE 1*

RW_{st} (mg)	RW_x (mg)	Change in manometer reading (cm Brodie)		RW_x (mg) calculated after	
		p_{st}	p_x	Smith and Post	Zeuthen
6.3	17.2	26.3	74.2	18.7	18.6
8.6	4.8	35.0	20.6	5.0	5.0
8.6	4.8	36.3	20.8	4.8	4.8
0.381	0.89	77.1	167.9	0.90	0.91
0.381	0.0286	76.1	6.8	0.032	0.031
0.381	0.89	77.8	163.0	0.87	0.88

* In this table p_{st} and p_x correspond to the numerical change in equilibrium pressure due to loading the balance. In the last example, second group, of Smith and Post (*1*), the "actual" RW is off by a power of 10. This has been corrected in our table.

Smith and Post conclude their paper by expressing the opinion that probably "the simplified method described can be applied to weighing tissues much smaller than embryonic hearts." Since no information is given about their method, the shape of their balances, or other details, it is of course difficult to decide whether they will ever reach this goal by their method. Smith and Post are working in the mg-range, but we have repeatedly shown that weighing of much smaller quantities is possible (*3–6*). The sensitivity of the diver balance described in (*3*) is $\pm 0.02\ \mu g$. This means that 1 µg RW—the order of RW of large amebae—can be weighed with a high percentage of accuracy.

SØREN LØVTRUP

Department of Cytochemistry
Carlsberg Laboratory

ERIK ZEUTHEN

Zoophysiological Laboratory
Copenhagen University

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Isolation of *Histoplasma capsulatum* and *Allescheria Boydii* from Soil

SKIN-TESTING surveys in Williamson County, Tennessee, have shown that more than 70% of the individuals tested with histoplasmin give a positive reaction to that antigen (*1*). This knowledge prompted the writers to initiate a search for *Histoplasma capsulatum* in the environment of that rural county.

The fungus has been sought in soil by utilizing the following procedure: A heaping teaspoonful of a soil sample is mixed with 30 ml of physiological saline in a 25 × 150 mm test tube. After standing for 1 hr, 5 ml of the supernatant is pipetted off and added to an equal volume of 5% gastric mucin. One-ml aliquots of this mixture are then injected intraperitoneally into each of 4 mice. The mice are sacrificed after 2 weeks, and duplicate tubes of a neutral dextrose-peptone agar are inoculated with portions of each of their livers and spleens. It has been found necessary to give the mice daily injections of a mixture of 1,000 units of streptomycin and 12,500 units of penicillin during the first week, to prevent death by bacteria. This procedure is a modification of one successfully developed by Emmons (*2*) in the isolation of *H. capsulatum* from soil collected in Virginia. The use of gastric mucin, suggested by the work of Strauss and Kligman (*3*), and treatment of the mice with antibiotics are the principal changes.

To date, 101 soil samples, collected from 24 farms in Williamson County, have been examined. Soil sample 22C, collected on July 18, 1950, yielded a heavily sporulating strain of *H. capsulatum*, which was recovered from 3 of 4 mice. This represents the first isolation of *H. capsulatum* from any source in Williamson County, despite the apparent heavy prevalence of human infection.

In addition, from soil samples 8E and 23E, collected on July 6, 1950, and July 18, 1950, respectively, two strains of *Allescheria Boydii* have been isolated repeatedly. This fungus is one of the etiologic agents of human mycetomas and, more rarely, of systemic infections. These soil isolations represent its first recovery from an extrahuman source.

Details of these isolations and further studies will be published elsewhere.

L. AJELLO

Communicable Disease Center
Public Health Center, Federal Security Agency
Atlanta, Georgia

L. D. ZEIDBERG

Tennessee Department of Public Health
Nashville

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Why Do Insects Have Six Legs?

WITH few exceptions, adults of the several million species of insects reputed to be in existence have three pairs of legs. This implies that this particular number of legs has some very general adaptive significance, or, to put it another way, in the vast majority of insects any deterioration in the genetic complex responsible for the production of three pairs of legs is promptly and effectively selected against.

Why three pairs of legs, and not two? Evidence from comparative morphology of the arthropods supports the concept that insects were derived from many-legged ancestors, perhaps centipedelike in appearance. Presumably the hexapod condition arose by gradual reduction of the number of legs. The reduction went no farther than three pairs, because locomotion on two pairs of legs is not efficient for a small animal encased in an exoskeleton. Normally, the insect walks by lifting two legs on one side and the middle leg on the other, sweeping these forward simultaneously and placing them down together, thus completing a single step. The other three legs furnish a tripod support while the step is taken. The center of gravity shifts out of the base of the tripod near the end of each step, and the insect falls onto the three legs just placed down. Thus, as the insect walks, it falls from one solid tripod support to another. Maintaining balance is an important problem in locomotion, and the smaller the animal, the more difficult it is. An illustration of one of the principles involved is shown by the ease with which a long stick can be balanced vertically on the end of one's finger, as compared with the difficulty of balancing a pencil. A contributing factor to this is that the pencil falls more quickly than the long stick. A large mammal has a comparatively long time to make the corrections necessary to maintain balance in the more precarious quadrupedal or bipedal locomotion, whereas a small insect has much less time, possibly not enough for nerve-controlled responses to operate. Another important factor in the difficulty of maintaining balance is the relative inflexibility of the trunk of the insect. Mammals can maintain balance by small, extremely varied movements of the trunk, and the even more flexible tail is an important balancing organ in many mammals. Insects can walk with one or two legs destroyed, but locomotion is then a slower and more uncertain process.

There are many aquatic, swimming insects which, as adults, cannot walk. The three pairs of legs invariably present in these forms could be explained on a similar adaptive basis, by assuming that in the terrestrial ancestors of these forms the number of walking legs was stabilized at six, and then that different auxiliary but important functions were assigned to different pairs of legs, such as antennae-cleaning, stridulating, elytra-cleaning, etc. Selection pressure then would operate to retain all three pairs. A similar explanation could be applied to other primarily nonwalking insects.

URLESS N. LANHAM

Department of Zoology
University of Michigan

Book Reviews

Population Genetics and Animal Improvement: As Illustrated by the Inheritance of Egg Production. I. Michael Lerner. New York: Cambridge Univ. Press, 1950. 342 pp. $5.50.

Although the author assumes that the reader has only an elementary knowledge of genetics and statistics, this book is primarily addressed to teachers, investigators, and advanced students of animal genetics. The treatment is nonmathematical. The biometric foundations of the book rest almost wholly on Sewall Wright and Lush and his school. The undercurrent of genetic theory is dominated largely by Mather's concept of polygenic inheritance (i.e., that genes acting on economic traits such as egg production are inherited in the Mendelian manner, but that variation due to them is small in relation to the total). The author's recent researches in the area of population genetics of egg production provide the principal source of illustrative material. Egg production is taken as the model trait to illustrate the principles of population genetics.

The first 4 of the 15 chapters in the book are introductory in nature. Chapter 2 gives a historical survey of the literature on the inheritance of egg production. The author points out the fallacy of the Mendelian approach which has been used to study the inheritance of egg production. He then sets forth arguments for the newer, more acceptable "polygenic" approach. Chapter 3 is devoted entirely to a biological analysis of egg production in the fowl. The 5 physio-