The committee of the board of trustees of Cornell University on faculty participation in university government has recommended that three representatives of the faculty selected by ballot shall sit at meetings of the board with full powers except that of voting, and that each faculty shall select committees to meet with the general administrative committee of trustees. The board has approved in principle the second recommendation and has referred the whole question back to the committee for further conference with the faculty committee.

Dr. Willard C. Fisher, whose enforced resignation from Wesleyan University will be remembered, has been appointed acting professor of economics at New York University.

At Princeton University, E. Newton Harvey, Ph.D., has been promoted to an assistant professorship of physiology.

Professor William Stern, of Breslau, has received a call from Hamburg to fill the chair of philosophy and psychology vacant by the death of Professor Ernst Meumann.

DISCUSSION AND CORRESPONDENCE

PARASITES OF THE MUSKRAT

In the *Journal of Parasitology,* Vol. 2, No. 1, p. 46, Linton describes cestode cysts found in the liver and omentum of a muskrat found near Washington, Pa., in 1884. On the basis of the size and shape of the hooks and the appearance of the bladderworm Linton considers these to be *Cysticercus fasciolaris,* the larval stage of *Tœnia crassicollis,* a tapeworm which is frequently found in the intestine of the cat.

The finding of *Cysticercus fasciolaris* in the muskrat has been previously reported by Stiles & Hassall, 1894, in "A Preliminary Catalogue of the Parasites Contained in the Collections of the United States Bureau of Animal Industry, United States Army Medical Museum, Biological Department of the University of Pennsylvania (Coll. Leidy) and in Coll. Stiles and Coll. Hassall."

Dr. Allen J. Smith, of the University of Pennsylvania, has written me that he has in his possession "a specimen of liver of the muskrat which is tremendously enlarged and riddled with *Cysticercus fasciolaris.*" This muskrat was trapped in the winter of 1904–05 near Philadelphia.

Among fifty muskrats examined from Nebraska and Minnesota in no case have we found the liver infected with any kind of parasite.

We have found in the intestine of one muskrat, shot at Lake Chisago, Minnesota, in August, 1915, several hundred minute monostome trematodes which represent a new species.

These two parasites should be added to the list given by us for the muskrat in Science, N.S., Vol. 42, p. 570, and the *Journal of Parasitology,* 1915, Vol. 1, pp. 184–197.

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THE USE OF THE INJECTION PROCESS IN CLASS-WORK IN ZOOLOGY

It is often difficult or impossible in a laboratory class in zoology to demonstrate pathways of fluids or food in certain animals, in other than a purely structural way. Blood vessels are injected and studied as so many colored strings or tubes, and cavities and ducts are explored with a probe, leaving much to the imagination. During the summer course in zoology at the University of Cincinnati, we have made extensive use of the injection method for studying the mechanics of these structures, and their condition during operation. A glass tube is drawn out into a point of any desired size, and attached to a rubber hand bulb, either directly or by a rubber tube. This apparatus, including a bunsen burner and cutting file, is simple and cheap enough to be included as a part of each student's equipment. The injecting fluid used is usually India ink or Prussian blue. The following example will show how the method is used in studying the circulation of a freshly killed crayfish.

The animal is killed by chloroform or ether, and the carapace dissected off. The student then exposes the heart, being careful not to cut any of the surrounding tissue. A fine-pointed glass cannula is now inserted through a hole made with the point of the glass injecting

needle, or through a slit made with a scissors. Under favorable conditions, the point may be fitted into one of the ostia. The India ink is now slowly injected, and the progress of the ink watched through the transparent vessel walls. In this way, a student can realize what is meant by blood pressure, peripheral resistance of capillaries, physiological pathways open at the time of death, delicacy of capillary beds, as well as the course of the main blood vessels. There is an added advantage, in that one is able to "feel" the resistance of the vessels and capillaries, as well as to see the fluid as it passes through. The addition of a mercury manometer between the bulb and the glass tube may be of use in making quantitative or comparative studies. The advancing stream of black is carefully watched and the order in which the vessels are filled is noted. A very good idea of the relative strengths of the vessels is obtained by watching for extravasations. After these points have been observed, the injection still remains and can be studied, considerable dissection being possible without leakage. In case the ink runs on to the tissues, it can be washed off under the hydrant. The brilliant contrast of black and white is of course obvious.

A particularly instructive study can be made by injecting the venous system of the crayfish. The carapace is removed from a freshly killed specimen, and the gills exposed. The ink is then slowly injected into the ventral sinus of the abdomen. The advancing stream can be followed from the different parts of the body (well seen in the transparent joints) to the gills, through them, back to the body wall, and to the pericardial sinus. The picture seen on clearing one of the gills in glycerine has a new interest to the student, he having watched and controlled the process of filling them.

This method, besides presenting many anatomical structures from a physiological point of view, has a wide range of application. A truer, safer and more graphic picture is obtained by injecting a duct or opening, than could be secured by probing it. This is of value in some animals in tracing the bile and pancreatic ducts, as well as those of other glands. It has been successfully applied in some cases to formalin material. Thus the stomach and radial canals of *Gonionemus medusa* can be demonstrated very well, as can also the pharynx of *Amphioxus* and its relation to the atrial cavity. Formalin specimens of tapeworm show the longitudinal and connecting excretory canals very clearly. The living earthworm is very resistant to injections of the blood vessels, a point easily correlated with the fact that on cutting the worm, contraction of the vessels prevents bleeding to death. In the grasshopper, the connections between the alimentary canal and gastric ceca can be well shown by injection per os. In some cases water serves the purpose of the ink, as in studying the path of the water in the nasal aperture of the dogfish, or the change of the relations of the parts of the digestive tract when full and empty, or the resistance their inner folds presents to the passage of the food.

In these injections it should be borne in mind that the process is the part desired, not necessarily the finished product. Furthermore, the student should realize that the condition of the preserved specimen merely represents one set of conditions in the life of the animal, and the injection should therefore be considered as showing graphically the physiological condition of the animal at the time of death only, with such subsequent changes as naturally follow. This is well shown by the different amounts of ink flowing into each vessel, and the ease with which they are filled. The details noted above, while probably including points now in use in many laboratories, are given here, as we have found that the use of this technique has given the elementary student a simple means of studying, in the animals dissected in the laboratory, some of the more fundamental problems of the dynamics of organs.

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THE POISONOUS CHARACTER OF ROSE CHAFERS

I WAS particularly interested in the article on this subject in SCIENCE, January 28, 1916,