been subjected to the influence of aqueous vapour, which may be supposed to remove or render permeable this pellicle; also from the action of chloroform, oil, and cyanogen, which cause the discharge or diffusion of the hæmoglobin from the corpuscle, perhaps by first removing or rendering permeable —at any rate modifying—this outer pellicle.

Steam, chloroform, benzine, bisulphide of carbon, ammonia and cyanogen, act on the red blood-corpuscle so as to cause the escape of the hæmoglobin.

The further action of these reagents causes the elimination of what may be called Roberts's constituent, that which is stained by magenta and set by tannin.

A still further action of chloroform, of water, or of ammonia, dissolves first the stroma, lastly the nucleus.

The details of these actions are given in the paper.

Carbonic oxide and sulphuretted hydrogen produce their respective changes on the hæmoglobin, as demonstrated spectroscopically, without altering the form of the corpuscle, merely effecting the radiation of its body.

On Undulina, *the type of a* New Group *of* Infusoria.

By E. Ray Lankester.

In making the numerous examinations of the blood of frogs above recorded, I have now and then met with the interesting little parasite drawn in the woodcut. When I first saw it, in some blood from a frog last summer, I took it for a very active white blood-corpuscle, since it is a very little smaller than one of the red corpuscles of the frog's blood. On using, however, a higher power (No. 10 à immersion of Hartnack) I made out its infusorial nature, though, on account of the great activity of its movements, I was long uncertain as to the nature of its locomotive organs. Numerous specimens occurred in the blood of a frog (*Rana esculenta*) examined at Leipzig, in March last, and by the use of a small quantity of acetic acid vapour, I was able to kill the little creature without injuring it, and then to make out its structure. It was seen to be a minute pyriform sac, with the narrower end bent round on itself somewhat spirally, and the broader end spread out into a thin membrane, which exhibited four or five folds, and was produced on one side into a very long flagellum. The wall of the sac was striated coarsely, as in Opalina; and the direction of the striæ on the

two sides of the sac, as seen one through the other, showed that the small end of the sac was twisted as well as bent over on itself. A pale, clear nucleus and a very few granules were also seen. In life the broad membrane undulates vigorously in a series of waves, the flagellum taking part, and presents then a deeply toothed appearance (fig. 1). The movements produced by the activity of this membrane tend to urge the animal in a wide circle. The opposite extremity of the sac twists and untwists itself to a small extent also during life. The series of waves of the undulating membrane are not incessantly in one direction; after a certain time they change to the opposite direction, and then resume their original direction, an alternation of from right to left and from left to right being kept up. When minute traces of acetic acid vapour are passed into the gas chamber, where this infusorian is, it soon becomes affected. The undulations

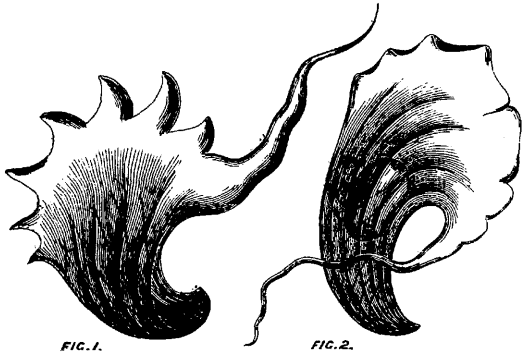

FIG. 1. FIG. 2.

become deranged, starting from both ends simultaneously and meeting in the middle, and at length ceasing (fig. 2).

In the blood of one frog, where these parasites are not unfrequent, about five or six in a drop of blood as big as a large pin's head, I noticed very numerous minute oblong bodies, which reminded me strongly of the pseudo-naviculæ which I have found in the cysts of the Gregarina parasitic in *Tubifex rivulorum*. These little oblong bodies (fig. 4) were in many cases attached to the end of the red blood-corpuscles (fig. 3), just as I have seen the similarly sharply terminated pseudonaviculæ of Tubifex attached to pieces of tissue-

fibre, &c., by the penetration of their points into such foreign substances. It seems not improbable from their association

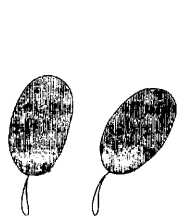

FIG. 3.

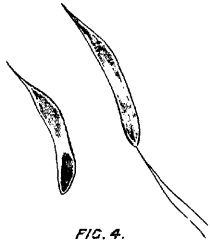

FIG. 4.

that these oblong bodies may be connected genetically with the little infusorian parasite. For the infusorian I propose the name *Undulina ranarum*. I have not been able to find any record of its occurrence hitherto, though I cannot but think it extremely likely that it has been seen and described. Undulina is a mouthless infusorian, closely allied to the Opalinidæ, from which, however, it differs essentially, as well as from the *Infusoria ciliata* generally, in possessing no cilia. In Undulina a wide flattened portion of the infusorial sac produced into a ribbon-like flagellum takes the place of cilia. We have indeed here an exemplary case of an "undulating membrane." On this account Undulina must be separated from the other Infusoria, logically indicating a new group of these animals characterised as devoid of mouth (as is Opalina) and devoid of cilia, but provided with a broad crest-like undulating membrane.

On the CIRCULATION *in the* WINGS *of* BLATTA ORIENTALIS *and* OTHER INSECTS, *and on a* NEW METHOD *of* INJECTING *the* VESSELS *of* INSECTS. By H. N. MOSELEY, Radcliffe Travelling Fellow, Oxford Univ. (With Plate XVII.)

WHILST working in the laboratory of Prof. Ludwig, at Leipzig, this spring, I obtained a number of specimens of *B. orientalis*, to look for nerve-endings in their salivary glands. I happened to examine their wings under the microscope, and finding a remarkably perfect circulation in them, was led to examine the wings of other insects, and study the subject somewhat closely. Several observers who have written on the circulation of insects have given lists of the insects in which they have observed the phenomenon.