iological aspects of organs. For example, the questions on the functions of the corpus luteum in the light of many researches, should have generous treatment in our text-books. The same can be said for the results of research in, and for theories on the mechanics of development, experimental embryology and of the field of heredity which is of highest interest to the physician. While these methods and new territories will receive more attention in the future, Prentiss's book probably deals sufficiently with them at this time.

R. J. T.

CONCERNING THE SPECIES AMŒBA PROTEUS

WHILE carrying on some experimental work during the past several years with the larger fresh-water amebas, I became convinced of the existence of considerable confusion concerning the description of *Amœba proteus,* generally regarded as the commonest species of the larger amebas occurring in our fresh waters.

In order to be sure of the exact nature of the organisms I was working on, which is of course essential in experimental work, I decided to look carefully into the matter of species description with the hope of removing, if possible, the confusion I was sure existed here. This work was completed some months ago, but on account of disturbances incident to the great war, the manuscript and drawings reporting the results of this work have apparently missed their intended destination—at any rate their present whereabouts are unknown. Since it is uncertain when the manuscript and drawings will be found again, I have thought that the publication at this time of a brief summary of my findings would be welcomed by other investigators of the larger amebas, who also must have felt the need of a reexamination of the specific characters of *A. proteus.*

Leidy in 1879 described in detail several species of amebas and to one of these species he applied the name *Amœba proteus,* resurrecting Pallas's (1766) old specific name which had been dropped through the influence of Ehrenberg. Leidy described the nucleus of *proteus* as "a thick *discoid* body, with the broad surfaces somewhat convex, flat, or slightly depressed, and the border rounded."[1] Most of his figures show the nucleus a concave discoid.

Penard described *Amœba proteus* as possessing "always an *ovoidal* nucleus."[2]

Now a discoid differs fundamentally from an ovoid. A discoid is a solid generated by revolving a semi-ellipse around its short diameter as an axis, while an ovoid is a solid generated by revolving a semi-ellipse around its long diameter.

Penard's *proteus* is not at all the same species as Leidy's *proteus.*

The question therefore is, Is Leidy's description adequate? It is adequate. All his figures show discoid nuclei, as may be seen by inspection or by reading the descriptions, with one possible exception, perhaps two: Figs. 3 and 4, Plate II. In these two figures the round or polar view of the nuclei is shown. Although these two figures resemble Penard's *proteus* more closely than they resemble Leidy's typical *proteus,* there is not sufficient evidence to enable one to be quite sure of their correct species reference. There can be no question then but that Leidy considered the *proteus* to have typically a discoid nucleus.

Penard described an *A. nitida* with a much folded or crushed-in nucleus and says[3] that Leidy's drawing of the *proteus* nucleus (Fig. 9, Plate II.) "represents so characteristically" the folded nucleus of his *nitida.* But Penard misinterpreted Leidy's figure entirely. Leidy's figure does not show a folded nucleus, but one with a smooth surface, a discoid with slightly concave sides. Moreover, the folded nucleus of Penard's *nitida* I have found represents an old-age stage of the smooth discoid nucleus of Leidy's *proteus.* The ectoplasmic ridges and grooves described by Penard as canals in the endoplasm of *nitida* were also observed by Leidy in *proteus.* Penard's *nitida* represents therefore old (or abnormally large) individ-

[1] "Rhizopods of North America," 1879, p. 41.
[2] "Faune Rhizopodique," 1902, p. 58.
[3] *Loc. cit.,* p. 61.

uals of Leidy's *proteus,* or probably a varietal strain of this species in which the nucleus readily becomes folded. (Penard does not discuss anywhere to my knowledge the fact that Leidy speaks repeatedly of a discoid nucleus in *A. proteus.*)

According to the rules of priority of the International Code, therefore, Leidy's (really Pallas's) name *proteus* must stand for the ameba possessing a discoid nucleus and longitudinal ectoplasmic ridges and grooves on the pseudopods. This leaves Penard's *proteus*—the ameba with an ovoid nucleus—without a name, the name *proteus* having been preempted by Pallas and Leidy. I therefore propose the name *dubia* for this species.

This then clears up the confusion arising out of observations and descriptions relating to *A. proteus* as recorded by Leidy and Penard; but in the progress of my work in this connection some new observations were made which may properly be incorporated in this summary.

To wit: I found that the species *proteus* as Leidy described it may be divided into two species, one of which is larger than the other and always exhibits more or less conspicuous longitudinal ridges and grooves on the pseudopods and frequently shows folds on the nucleus; while the other and smaller species never shows ridges or grooves on the pseudopods nor is the nucleus ever folded. From Leidy's figures and descriptions it is evident that the former species—the one showing ridges and grooves—was considered by him the typical *proteus;* and this name should therefore be retained for this ameba according to the code. For the other species I propose the name *discoides.*

Amœba proteus then is recognized readily by the presence of longitudinal ridges and grooves on the pseudopods. *A. dubia* is easily recognized by the possession of an ovoid nucleus. *A. discoides* is recognized by a discoid nucleus and the absence of folds and grooves on the pseudopods. Any ameba in normal condition belonging to either of these three species may be readily recognized in the living condition under 360 diameters' magnification, according to the characters here enumerated. Of these three species *proteus* and *dubia* are the larger and the more common, while *discoides* is somewhat smaller and less common, so far as my experience goes.

These findings are based on individual pedigrees running for upwards of a hundred generations each for *proteus* and *dubia* and for about forty generations of *discoides,* including always a number of collateral lines. Numerous individuals from wild cultures from various localities were examined and compared with the pedigreed stock. There is much greater permanency in the so-called protoplasmic characters than is commonly realized.

This is a brief and doubtless somewhat unsatisfactory summary of the work on these amebas, but for fuller details and drawings reference must be made to the original paper, which I hope may soon be found and published.

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ZUÑI INOCULATIVE MAGIC

THERE are many varieties of sympathetic magic at Zuñi. I shall give only instances of that subdivision of the homeopathic variety which may be called magical inoculation. It is a form, as it were, of discharming. Instead of applying a bit of the analogous thing to produce an analogy, the direct form of homeopathy, a bit is applied to overcome the analogy, the principle obviously of inoculation.

Birthmarks and malformations are accounted for by the Zuñi as due to parental, for the most part paternal, carelessness during the pregnancy, the result of the expectant father taking part in a ceremonial or hunting rabbits or prairie dogs or other animals or killing a snake. The child will be marked in some way like the ceremonial mask or spotted like a snake or according to the injury suffered by the quarry, blinded or maimed. A medicine member of the Ne'wekwe or Galaxy Fraternity told me that at birth the forehead and chest of his son had had the print of an entrail—preoccupation with the entrails of animals is a characteristic of the Ne'wekwe Fraternity, and this man had in fact taken part in a fra-