a long period of vegetarianism is necessary if the rate is to be noticeably reduced.

A fuller account of this work will appear elsewhere.

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REACTION OF THE CONTENTS OF TRICHINELLA SPIRALIS CYSTS

THE late Dr. Allen J. Smith, former professor of pathology in the University of Pennsylvania, added crushed *Trichinella spiralis* (Owen) cysts from a human muscle to ordinary agar medium tinted blue with litmus indicator. The cysts were found in a portion of the pectoral muscles of a badly infested human cadaver (U. of P. Path. Mus. 37) in the dissecting room. There resulted a pink color indicating an acid reaction. He suggested to the writer, in 1925, to carry on this unpublished work and endeavor to determine the reaction of the contents of such cysts in rats.

Feeding rats with trichinosed meat, secured through the late Dr. B. H. Ransom, of the Bureau of Animal Industry, Washington, heavy infestation was secured in one month. It was deemed advisable to allow three months to pass before beginning work on them. Numerous cysts were found after lapse of that period, the regions of highest infestation being the diaphragm and intercostal muscles. The nematode larvae were found singly in the cysts, which measured 0.33 x 0.16 mm. The rats became fat and exhibited all the signs of general well-being.

Upon ordinary agar medium, having phenolphthalein indicator over the surface, were placed twelve capsules. They were then crushed between two needle scalpels and it was observed that the indicator turned pink—showing the presence of an alkali. This was repeated with the same result.

To the contents of other cysts crushed on agar Rosolic acid indicator was added. This resulted in a pink color, after a half-day well protected from the air. This acid indicator has a pH range of 6.9–8.

A series of Clark and Lub's sulfonphthalein dibasic acids were employed as a comparator set to determine the pH. This resulted in failure. The indicators are too delicate to enable one to note color changes under the microscope. Crushed cysts on a white china dissecting plate and on plaster of Paris impregnated with phenolphthalein indicator gave a pink color in four out of fourteen. Allowing cysts to dry, crushing them, and then adding indicator, resulted in no change.

It is evident that in order to determine the contents of *Trichinella spiralis* cysts it is not feasible to use the colorimetric method. Dr. Smith noted an acid reaction. However, these results seem to point to the presence of an alkalin substance. To check this one would need to determine if the contents would form a definite crystal that has a polarizing color reaction distinctive for some base. Some investigator with apparatus available could employ Barber's pipettes on a micro-dissecting apparatus to draw out the fluid to test. Or, better to employ an electrometric potentiometer with glass needle electrodes as has been done in entering single cells. Electrometrically one can show the exact pH, one characteristic, and a step further in determining the contents of Trichinella cysts. Its importance lies in the fact that it is not known what enables larvae to remain viable in this infective stage up to twelve years.

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SEX IN THE LOUISIANA OYSTER, OSTREA VIRGINICA

As far as the writer is aware, it has been stated by every worker in the field that the Eastern American oyster, *Ostrea virginica* Gmelin, is a dioecious species. The oyster of the Gulf Coast is considered to be identical with the Atlantic Coast form. A study of sex in the common oyster of the Louisiana coast made during 1929 and 1930 indicates, however, that although the sexes of this animal are usually morphologically separate, the oyster is regularly a protandrous hermaphrodite.

Approximately 1,000 individuals were carefully examined during the spawning season with reference to sex, size and position in relation to other oysters. Smears of the gonad of each, stained with eosin and iodine, were used in determining sex. Oysters whose gonads were destroyed by bucephalus or which contained no typical ripe sexual products were discarded, together with other oysters growing in the same cluster.

The sexes were found to be present in almost equal numbers, 371 ♂ to 373 ♀. When the ratio of the sexes was examined in relation to size, however, a striking fluctuation appeared. Of oysters 40 mm or less in body length, there were 220 ♂ to 58 ♀, while of oysters over 40 mm in length there were 151 ♂ to 315 ♀. As an even clearer illustration of this reversal, of oysters 20 mm or less in length, there were 50 ♂ to 5 ♀, while of oysters over 80 mm in length there were 7 ♂ to 48 ♀. These figures would seem to the writer to indicate that individuals of *O. virginica* first become sexually mature as males, and that with increase in size there may be a change of sex to female. This sex-metamorphosis would seem usually to occur at a body length of about 40 mm.

Further data, as given below, indicate that under certain conditions this sex-metamorphosis does not occur, and incidentally show that we are not here

dealing simply with a differential growth rate or death rate for the two sexes.

Among oysters over 40 mm in length, and growing singly, that is, not in the near neighborhood of other oysters, there were 34 ♂ to 131 ♀. Among oysters of length similar to the above, which, however, were growing in compact clusters of two or more individuals, so that the valve margins of the associated oysters were less than 40 mm apart, there were 85 ♂ to 82 ♀. Among oysters of this same length, growing in clusters, but whose valve margins were separated from those of their neighbors by 40 mm or more, there were 27 ♂ to 46 ♀. The clusters of closely associated individuals were almost always composed of oysters of dissimilar sex. Thus, the close association of large oysters seems to cause some members of the group to be male, while individuals of this same size, if growing singly, are almost all females. The figures given above dealing with clusters of less closely associated individuals indicate that the likelihood of large oysters being male decreases rapidly with increasing distance from associates.

Small oysters, no matter what their position relationships to other oysters, are almost always males.

Nine morphologically hermaphroditic individuals, irregularly placed as to size- and position-relationships, were found, an incidence of about 1 per cent.

The experimental control of the sex of oysters has been accidentally accomplished on a large scale in Louisiana, in the following manner:

Oysters growing in natural clusters are usually more than half of them males. The oyster planters of the state often break up these clusters and re-bed the individuals singly to grow for market. When these single, bedded oysters, presumably over half of them males at the time of replanting, are taken up during the next year's spawning season, almost every one is found to be a female.

A more detailed description and discussion of the data obtained is in preparation.

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CORRECTION ON PSYLLID-YELLOWS

IN the issue of SCIENCE for December 20, 1929 (lxx, 1825), on page 615, there was an article published on "Transmission Studies with the New Psyllid-yellows Disease of Solanaceous Plants." This disease was previously described by Dr. B. L. Richards, of the Utah Agricultural Experiment Station, who first associated the Psyllid insect with the trouble on potatoes. The report on the damage to the early potato crop, and the description of the symptoms on potatoes was likewise made by the same investigator. The work reported on in the article was based on Dr. Richards's first description and association of the insect with the disease.

In order to clear the confusion that exists on the original association of the Psyllid with the disease, this explanation is deemed highly necessary.

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SCIENTIFIC BOOKS

Plant Life through the Ages. A Geological and Botanical Retrospect. By A. C. SEWARD. 601 pp. 140 figs. including 9 reconstructions of ancient landscapes drawn by Edward Vulliamy. Macmillan Co., New York, 1931.

THIS book is written for the layman as well as for the student of botany and geology, and in the words of the author is designed "to illustrate the nature of the documents from which geologists have compiled a history of the earth, or at least such scraps of history as can be written from the material that is available: to give some account of the methods employed in the interpretation of the documents: and to present in language that is not unnecessarily technical a summary of the more interesting results obtained from the records of the rocks which throw light on the development of the plant world."

It is charmingly written and has a distinct literary flavor, and will undoubtedly enable many to obtain a comprehensive view of a wholly unsuspected past of the plant world. The special student will find it equally useful because very little that has been contributed to this and cognate sciences in late years has escaped the author's intellectual curiosity, as is attested by the very useful bibliography.

The general plan leads the reader from an introductory consideration of the elementary facts of historical geology, the manner of preservation of fossil plants, and the classification of plants, through a brief discussion of pre-Cambrian life and that of the earlier Paleozoic (Cambrian, Ordovician and Silurian periods), to a more detailed account of the earliest fairly well-known land plants of the Devonian. The later Paleozoic, appropriately enough since the floras in their variety and our knowledge of them is so much more complete, has three chapters devoted to its consideration. There follow chapters devoted to the Triassic, Jurassic, Cretaceous, Tertiary and Quater-