there are as there may well be cases of temporary explosions of population growth.

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HAPLOID MALES IN PARACOPIDOSOMOPSIS

SEVERAL years ago one of us (Patterson, 1917)[1] called attention to the fact that in certain species of parasitic Hymenoptera a majority of their polyembryonic broods are mixed, that is, contain both males and females. In a species showing polyembryonic development we should expect to find all the individuals belonging to one sex, provided the entire brood is derived from a single egg. One of the most striking cases of mixed broods is seen in Paracopidosomopsis floridanus (Copidosoma truncatellum). About 87 per cent. of the broods of this species are mixed, and a majority of such broods have less than 6 per cent. of males. In one case a single male was found in a brood of 1,550 individuals.

The rule among polyembryonic species is that the fertilized egg produces females, while the unfertilized egg develops into males. The usual explanation offered to account for the appearance of a mixed brood is that it has come from two (or more) eggs, one of which is unfertilized. In dealing with the data on the sexes of the species under consideration, the senior writer pointed out the difficulty of applying this hypothesis, and suggested that a mixed brood might arise from a fertilized egg during the early cleavage stages, by the loss of a sex chromosome in one or more blastomeres. Such a blastomere would have the diploid-minus-one number of chromosomes and might give rise to a group of males. It was further pointed out that this suggestion could be tested out by making a cytological study of the germ cells of the males appearing in mixed broods. For several years we attempted to secure the necessary material for such a study, but not until last fall (1923) did we succeed in obtaining favorable preparations.

The object of this note is to record the results of our observations. We find that the males from mixed broods possess the haploid number of chromosomes, and not the approximate diploid number. The spermatogenesis in these males is identical with that in males reared from unfertilized eggs (Patterson and Porter, 1917).[2] Our observations leave no doubt as to the fact that males in mixed broods are haploid, and this is true even in broods showing a very low percentage of males.

[1] *Biol. Bull.*, XXXII, p. 291.
[2] *Biol. Bull.*, XXXIII, p. 38.

While the discovery of these facts settles the question of the number of chromosomes in males in mixed broods, it does not, however, definitely determine the manner of origin of mixed broods. To some it might seem to indicate that all mixed broods are to be explained on the two-egg hypothesis, but there are several facts in the development, at least of Paracopidosomopsis, that are difficult to explain on such a basis. Chief among these are (1) the appearance of asexual larvae, and (2) that while a pure male brood reared from an unfertilized egg is about as large as a pure female brood, yet if the unfertilized egg is associated with a fertilized egg in the same host it produces a few males only—sometimes but a single individual.

For the final solution of some of these problems we must look to the study of some of the more primitive polyembryonic species, such as that studied by Leibly and Hill, 1923.[3]

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AN ANATOMICAL SPELLING MATCH

WHEN the freshman begins his work in the anatomy laboratory he frequently fails to grasp the importance of using all possible channels for gaining the necessary anatomical information, and frequently the story of the test given Vesalius, in Paris, has been described to the students. Richardson, in his book "Disciples of Aesculapius," tells that Vesalius "was closely blindfolded. Then every bone of the body that could be distinguished by the touch was put into his hands and by the sense of touch he was able to name every bone correctly. . . ." Recently, some members of the class asked if they might not try this same test and now two classes have tried this "anatomical spelling match" and so I am passing it on for what it is worth.

The students choose two leaders and they in turn select two groups, thus dividing the class or laboratory section into two teams, as is done in the regular spelling match or in the chemical spelling match, of which so much has been heard lately. The two groups arrange themselves in two rows with their backs towards the opposing sides so that the bones may easily be placed in their hands held behind their backs. This is as satisfactory and takes much less time than blindfolding all the contestants. The one in charge passes down between the two rows and places a bone in the hands of each contestant, one after another, alternately from side to side.

We have found that only one or two men can be

[3] *Jour. Agr. Research*, XXV, p. 337.

eliminated by giving the students the entire bones, and so the second time an assistant holds a watch and each one is given but a very limited time in which to identify the bone. This will eliminate a few more and then we have permitted the contestants to feel only a limited part of each bone and as a final test we have taken bones from the comparative anatomy laboratory and this usually floors more of them, as most of the men have not had a course in comparative osteology. Students who have passed the test are permitted to turn around and thus see what bone is being given to those farther down the line and this makes the test more interesting for all.

This may or may not contribute much in teaching gross anatomy, but it does help to teach the freshman that anatomy and its application in medicine and dentistry requires the training of the fingers as well as the eye. It also helps to stimulate interest in the history of anatomy.

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HOW MANY FIGURES ARE SIGNIFICANT?

THE discussion of this subject ought to prove interesting to all research workers, teachers and students. It is one of the hard subjects to teach and a harder subject to follow out in practice. The ordinary school boy and girl is usually driven by the teacher to carry out all his calculations in science to an unwarranted extent, the only deciding factor apparently being the number of decimal places. The teacher thinks more of the accuracy of the arithmetic than of the truth of the statement. It takes a long time in the university to replace these ideas (or lack of ideas) in the student's head by a little of the common sense of the theory of measurements. The research worker trained without a course in this subject often wastes his own time and wearies the patience of his readers with an absurd number of "significant" figures in his numerical work. Professor Kelley has done well in calling for a statement on definite and uniform practice. As a mere tyro in this subject and one whose experience lies largely with elementary students I should be inclined to use less significant figures than Professor Kelley. Unless the variates follow the Gaussian Law of Error, and in practice this is rarely the case even when a large number of variates are used, I do not like to quote results with more than a two figure probable error or standard deviation. I don't think the results warrant a greater accuracy than this. In Professor Kelley's first case (SCIENCE, Dec. 5, 1924, p. 524) I should say Mean = 82 and standard deviation 13; in the second case, Correlation coefficient .75 and its probable error .02. In the second case I give only one significant figure to the probable error because of the variation likely to occur in another independent calculation of the correlation coefficient from a different but equally reliable set of data.

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LABORATORY APPARATUS AND METHODS

STAINING PARAMECIUM IN THE CLASS-ROOM

A VERY simple, inexpensive and practical method of showing trichocysts, cilia and nucleus of Paramecium was recently demonstrated to students of general biology by the writer, through the application of two different colored inks to the slide of living material.

One or two drops of solution containing the culture is placed on each student's slide, and time is allowed for the study of specimens in their usual activities. When the trichocysts and cilia are to be observed and compared the cover-slip is removed, and a dab or two of Sanford's red ink is carefully stirred into the culture by means of a tooth-pick or pin-head. The slip is then replaced. The swimming and "tumbling" of the slightly opalescent specimens are more pronounced. In about four minutes a fountain-pen containing Waterman's blue ink is applied to the edge of the cover-slip. One can see the expulsion of the trichocysts when the animal plunges into the encroaching wave of blue. In a flash the cytoplasm turns a deep red with purplish tinge, the cilia a flame color and the trichocysts a deep blue—without disruption of the specimen. Various shades may be obtained by the students, depending upon the amount of inks used, and the length of time allowed before applying the blue. Incidentally, the nucleus takes on a more concentrated hue than does the surrounding cytoplasm.

This method can be employed by the students themselves and can be repeated several times during the laboratory period with generally uniform success.

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SPECIAL ARTICLES

TRYPARSAMIDE TREATMENT OF AFRICAN SLEEPING SICKNESS[1]

THE problem of sleeping sickness in tropical Africa is a source of great concern. The disease is be-

[1] From the laboratories of the Rockefeller Institute for Medical Research, New York.