other difficulty for the theory of somatic disjunction of chromosomes. Moreover, the same condition would account for the bilateral gynandromorphism of individual feathers.

These principles fit the situation so perfectly in all respect that I have no hesitation in presenting the theory that these gynandromorph birds are cases of hemihypertrophy combined with ovarian deficiency, as by far the most reasonable interpretation. The theory has the very great advantages of requiring no subsidiary hypotheses and of being in accord with well-known physiological principles.

If such lateral hemihypertrophy were to occur in a male bird, gynandromorph characters would not appear, for no ovarian tissue occurs in males. Crew's[18] case of lateral asymmetry in a male resulting from a cross between Light Sussex ♀ and a Rhode Island Red ♂ is a case in point. The bird was male externally and internally; the left side was much hypertrophied, especially in the skeleton, with the exception of the skull and vertebral column which were practically symmetrical. The left leg was pinky white, somewhat like the color in the Light Sussex, and the right leg yellow like the Rhode Island Red. This difference suggested the theory that an autosome carrying the dominant factor for white epidermal pigment had been eliminated during early cleavage divisions of a male zygote heterozygous for white and yellow, though it is somewhat difficult to correlate this with the general hypertrophy of the left side, as Crew admits. If, on the other hand, we assume that the lateral hemihypertrophy is the primary factor in this case, the other asymmetrical features might conceivably receive a consistent physiological explanation.

The data suggest that it would be profitable to look for cases of lateral hemihypertrophy in birds, with a view to ascertaining how common the phenomenon is, and what other asymmetrical characters may be associated with it. It would be particularly desirable to ascertain if in the female it is always associated with gonadal abnormalities, or whether the fact that it is so far known in females only in such association, is due to the interest that has attached to gynandromorphism and the lack of interest in asymmetry as such.

The interpretation of hemihypertrophy itself has been dealt with by Gesell[16] and by Newman.[19] Gesell is inclined to interpret it as incipient twinning, thus explaining the degree of physiological isolation that seems to exist in such cases. To the writer these cases seem to be classifiable as extremes of the asymmetry that characterizes bilaterality in all organisms or parts of organisms. It may be, of course, that exaggeration of asymmetry of the germ in early stages is one of the causes that leads to twinning, a suggestion that would reconcile these two points of view. In the feather system of birds there are all possible degrees of asymmetry of individual feathers ranging from the barely perceptible to the most extreme types, and these gradations have certain regular relations to position on the body.

Without discussing the question farther in this place we may conclude at once by saying that the problem is much more surely one of the physiology of bilateral asymmetry than of differences of genetic constitution on the two sides of the body.

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[18] F. A. E. Crew, *Journ. of Genetics*, 20, 179, 1928.
[19] H. H. Newman, "The Physiology of Twinning." 230 pp. University of Chicago Press. 1923.

ANGUILLULA ACETI—A DESIRABLE NEMA FOR TYPE STUDY

DR. N. A. COBB'S excellent summary of recent advances in nematology, in these pages, prompts the writer to give his own experience in teaching the subject. Early attempts with mixed classes of students forcefully demonstrated the impracticability of using such forms as *Ascaris* and *Gigantorhynchus*. Considerable friction invariably resulted, some students positively refusing to dissect these forms and even dropping the course. To eliminate this friction, search was made for other forms, the little vinegar eel, *Anguillula aceti*, being finally selected for type study. This nema yielded such satisfactory results that it was subsequently adopted by the writer for use in his general biology, zoology and parasitology classes.

The following reasons induced the above selection of *A. aceti*.

(1) It arouses real interest in and elicits favorable comments from the students.

(2) It may be procured at any time of the year from a corner grocery by asking for bulk cider vinegar.

(3) It will live indefinitely in the laboratory if transferred to fresh vinegar every two weeks.

(4) It is a simple nematode with a simple life history. The entire life history can be worked out in a single two-hour exercise.

(5) Being viviparous and transparent, all stages of development may be examined *in utero*.

(6) Anatomical details, such as alimentary tract, nerve ring, spicules and sperms of male, uterus and uterine development in female and all young and intermediate stages can be worked out with a 4 mm objective.

(7) Very spectacular effects can be produced by

placing living nemas in a well slide and projecting on a daylight screen with a microprojector. Under suitable magnifications many of the anatomical features may be shown on the screen in this way.

Individual studies were carried out from living and preserved material. This last was prepared by the writer in the following way: With a pipette, the vinegar eels were collected into a graduate until 50 ml of solution was obtained. This was then poured into an Erlenmyer flask containing 10 ml formalin and quickly heated over a Bunsen burner. The heat promptly kills and straightens the nemas and after about a minute they are removed from the flame and allowed to stand in the formalin for one hour. Subsequently they were filtered through a piece of silk cloth, placed in 50 per cent. alcohol for one hour and in 70 per cent. alcohol, to which last some Delafield's hematoxylin stain was added (5 ml of the stain to 50 ml of the alcohol). In this they may be kept indefinitely. For use a drop of the solution was given to each student on a slide. In such material all the forms indicated in the above outline could be found by every student. The nemas show no distortion, and all of the structures stand out clearly. If desired, this material may be further dehydrated and mounted in balsam, although the optical effects in this last medium are not as satisfactory as when examined in alcohol.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

SOME LABORATORY USES FOR CROWN SEALED MILK BOTTLES[1]

THE Crown Seal used for milk bottles is a metal cap similar to those used for beverage bottles, except that the milk bottle cap is larger. The cap is crimped tightly over the neck of the bottle and, with a suitable lining, is air tight.

In most bacteriological laboratories the storage of media is a problem. It is customary to sterilize media in large flasks plugged with cotton and to store these in the refrigerator. The flasks are relatively expensive and easily broken. To avoid boiling over of the media during sterilization and wetting of the cotton plugs the flasks may be filled only about two thirds full. They require a great deal of refrigerator space. Through the cotton plugs the media evaporate and are exposed to oxidation by atmospheric oxygen. In time molds may grow down through the cotton plugs. The use of milk bottles with cork-lined Crown Seals (Fig. 1) eliminates these difficulties. The bottles may

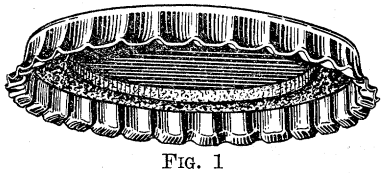

FIG. 1

be filled with media to within about two inches of the top. The caps are firmly crimped on by means of a suitable capping machine (Fig. 2) before the bottles are placed in the autoclave. During autoclaving the pressure outside should equalize that within the bottles and there is no leakage or boiling over if ordinary care is used in allowing the steam pressure to drop slowly at the end of the autoclaving period.

[1] From the Department of Pathology and Bacteriology, Johns Hopkins University, Baltimore, Md.

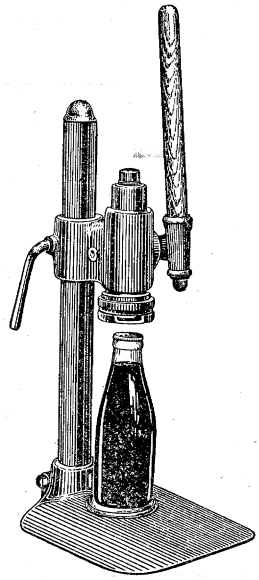

FIG. 2

The bottles of sterile media may be stored at room temperature in any convenient place. They require relatively little shelf room. There is no evaporation. There is little opportunity for oxidation since the air is excluded except for the small amount remaining over the media when the bottles are sealed. The bottles of media may be handled and shipped with no danger of leakage or contamination and little danger of breakage. The quality of glass obtainable in the milk bottles is fair. We have noted little chemical action on the glass. Occasionally a bottle may break under the influence of heat in the autoclave, especially if the bottles have been filled with cold media. Efforts are being made to procure Pyrex bottles for this purpose. The cost of the milk bottles is very low as compared with that of laboratory glassware.