Letters

Sex Chromatin

In a recent article (*1*), I favored the view that the sex chromatin represents heterochromatic regions of the two X chromosomes of female cells. The assumption of somatic pairing of the X chromosomes is an unsatisfactory aspect of this hypothesis. Somatic pairing of chromosomes is well known in many species of insects and has been described in the newt and frog (*2*). But evidence for such a relationship between the X chromosomes or other homologous chromosomes in somatic cells of mammals is admittedly scanty and inconclusive. For example, Ohno *et al.* (*3*) found evidence in the mouse for somatic association of the X chromosomes in epithelial cells of ovarian follicles and the mammary gland, but not in other types of cells that were examined. A possible way out of the dilemma is suggested by two important observations that have come to my attention. They demonstrate, at any rate, that the precise relationship between the sex chromatin and chromosomes is an unsolved problem that challenges the resources of cytologists.

Kosin and Ishizaki (*4*) showed that the presence of sex chromatin in somatic-cell nuclei is a female characteristic in the domestic chicken. Since the female is here the heterogametic sex, the sex chromatin cannot in this instance be a derivative of homologous sex chromosomes. Further, it is stated that the sex-chromatin complex for the female chicken is ZO (*5*). It seems, on this basis, that the sex chromatin in fowl is a derivative of the single Z chromosome, unless it bears no direct relationship to the sex-chromosome complex.

Related to the foregoing observation is the study by Ohno *et al.* (*6*) on nuclei of regenerating liver in the rat. A distinctive chromocenter was seen in interphase nuclei of females but not of males. In prophase nuclei, neither the X nor the Y chromosome of the male seemed to demonstrate positive heteropycnosis. But in prophase nuclei of females the surprising observation was made that one X chromosome was positively heteropycnotic while the other X chromosome was isopycnotic with respect to the autosomes. Ohno and his collaborators suggest that the positively heterochromatic X chromosome may be of paternal origin. It was folded back on itself in early prophase nuclei; this could explain the occasional clearly bipartite appearance of the sex chromatin. Ishizaki (*7*) states that a bipartite structure has also been detected in the sex chromatin of the chicken.

Confirmation of this work, and particularly its extension to the nuclei of man, would be of first importance in interpretation of the chromatin pattern and sex-chromosome constitution of patients with anomalies of sex development. Exact knowledge of the basis of nuclear sexual dimorphism is also needed for an explanation of the female chromatin pattern that is found in some teratomas in male hosts (*8*). We are now passing from the descriptive to the more difficult analytical phase in the study of the sex chromatin. The work of cytogeneticists and students of chromosome morphology is likely to play a decisive role in establishing the basis of sexual dimorphism in interphase nuclei.

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References and Notes

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4. I. L. Kosin and H. Ishizaki, *Science* **130**, 43 (1959).
5. R. A. Miller, *Anat. Record* **70**, 155 (1958); E. Witschi, *Science* **130**, 372 (1959).
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Position of the Catholic Church

It is very distressing to a scientist who is a Catholic to see in your columns a review such as that given by M. Edward Davis to Sulloway's *Birth Control and Catholic Doctrine* [*Science* **130**, 559 (1959)]. This distress comes *not* from the fact that Sulloway, Huxley, and Davis agree that contraception is the best method of controlling the birth rate—a position with which I heartily disagree—but from the fact that evidently neither Davis nor the editors of *Science* understand the basis upon which a review of such a work must be written.

Assuming that Davis has correctly presented the facts as assembled by Sulloway, it is also evident that Sulloway is too deficient in philosophical and theological background to have undertaken the task he set himself. This, of course, is not the responsibility of Davis or of the editors of *Science*. It is your responsibility to see that your reviews do not give a distorted picture of the situation. In what follows I shall concern myself solely with the review.

The first question that must always be considered in reviewing a book like

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