

SUNDAY, JANUARY 22, 1967

Chromosomes and Crime

By Joshua Lederberg

THE WONDERFUL machinery of human reproduction inevitably slips a cog now and again. At least one conception in six now fails short of delivery, even in an environment of first-rate prenatal care. Indeed a large proportion of

Science
and
Man

reproductive failures would be monstrosities if they could be carried to term, and they cause far less anguish as stillbirths than they would as seriously deformed children. The ultimate cause of these biological accidents is rarely known. Some of them involve the most fundamental processes of chromosome distribution: about a fourth of stillborn fetuses, and perhaps one per cent of liveborn infants show some anomaly of their chromosomes. These deviations are not only a great challenge to medical care, they are also beginning to give us important insights into the biology of human nature.

Starting with Dr. J. Lejeune's discovery that mongolism is an overdose of the tiny 21st chromosome, many investigators have been searching for derangements of other specific chromosomes, including the sex chromosomes X and Y. Normal females are XX, normal males are XY.

We are now told of the interesting characteristics of anomalous males who have two Y's, that is, are XYY in chromosome constitution. Figuratively speaking, these might be super-males, but those so far reported have apparently normal sexual development.

They are, however, all very tall, generally six feet or over, and many of them show dampened intelligence.

The most extensive studies have been reported by a group from Edinburgh headed by Dr. Patricia A. Jacobs, seven examples of XYY males having been found among just 197 "mentally subnormal patients with dangerous, violent or criminal propensities in an institution where they are treated under conditions of special security."

When stature is taken into account, the concentration of the XYY anomaly is particularly remarkable, "in this particular group a man more than six feet tall has an approximately 50 per cent chance of having an XYY constitution." In the general population, the incidence of XYY is probably well under one per thousand.

THE XYY ANOMALY results from an accident in the development of the sperm cell, two Y chromosomes moving into the same cell, when the normal mechanism would separate them into two cells. The anomaly might also be the result of a later accident of chromosome separation in the developing egg.

Finally, an XYY male might well generate abnormal sperm as a secondary result of his extra Y chromosome, but so far there is no authenticated example of a second generation of XYY anomaly.

The very first example of XYY was reported by Dr. Theodore S. Hauschka of Roswell Park, N.Y. His patient was a fertile male of average attainment and no criminal history. But he was very tall and had several abnormal offspring, though none of them XYY.

The association of the XYY chromosome makeup, who is also a tall inmate of Lanarkshire State Hospital is an impressive example. It justifies the speculation that the extra Y chromosome engenders aggressive behavior

as well as height. If confirmed, this work is almost the first scientifically valid entry in the field of the genetics of social pathology. This arena is now all too crowded with unfounded speculation and prejudice, and the battleground of the racists versus the environmentalists.

Scientific caution, which must whisper that we simply have no useful reliable information on the most important aspects of human biology, has been drowned in this invective.

Class and racial differences, its usual subject, are in practice too confounded with environmental ones to support the rigorous analyses needed to give useful answers.

THE FIRST reports, in "Lancet" and "Nature" magazines, must be followed by more details. It may be hard to secure the necessary cooperation of the patients and their families. We surely need a more detailed characterization of their history than "A preliminary review of their records did not suggest that their crimes differed from those of the other patients at the hospital; but their behavior had often been aggressive and violent."

We will be particularly concerned to find XYY cases as young boys, so that the development of their potentially aggressive behavior

can be followed and more deeply understood.

We can still only speculate on the way in which the extra Y might influence their brains, or their hormone balance, or both, to contribute to their pathology; and we must particularly study how these individuals have related to their families and their community to find the immediate roots of their aberrant behavior.

In many ways, the patterns of XYY males who then do not develop such serious maladaptions will be of the acutest interest.

Unfortunately, we have no factual numbers for control purposes on the incidence of XYY among tall men who are socially perfectly well adjusted. It would be astonishing if half our basketball players showed this anomaly, but they have yet to be studied as a special group.

Studies like these open a new chapter in human biology. Even the racists do not believe that skin color per se has anything to do with social performance; they impute a set of other genes coincidentally present in backward ethnic groups, whose action they perceive only by the result the genes are supposed to explain — poverty and cultural disorganization.

An extra Y chromosome is an undeniable object that can be seen under the microscope independently of the effects it is supposed to produce. Nature's malfunction may thus be the route to our own disciplined vision of human nature.

©1967, The Washington Post Co.