EVOLUTION—GENETICS

X-Rays Imperil Heredity

X-ray treatments of certain types may be laying a terrible curse on the descendants of patients now receiving them. Horrible defects and malformations may be visited upon their children far beyond the scriptural third and fourth generations.

Yet the same kind of X-ray treatments can speed up a hundred-fold the rate of the controlled evolutionary processes used by breeders to produce improved kinds of animals and plants.

This sensational paradox of science may be looked to for hitherto little suspected perils in the field of medicine and for revolutionary effects in agriculture, if the findings made by Prof. H. J. Muller of the University of Texas, on tiny fruit flies, hold true for other living things.

It has been proved in his experiments that in the germ-cells of the flies, X-rays affect the little particles responsible for heredity in much the same way as a shot-gun fired at a pile of pebbles would affect the pebbles. The hereditary particles become permanently transformed in all sorts of unexpected ways and the sudden changes known as "mutations" are produced in them.

Not all of them mutate at once, Prof. Muller explains, but here one, there another, they change in quite a random fashion. Sometimes also they are dislodged into new arrangements. Since these hereditary particles, which are known as "genes," are handed down from parent to offspring, and determine the characteristics of the next and later generations, all kinds of new traits are likely to arise among a group of offspring or grand-offspring from parents that were treated with X-rays. These new traits are permanent, as they are inherited by succeeding generations.

It has long been known that such mutations occasionally happen without X-ray treatment, and so give a chance for the breeder to improve his stock, by breeding from animals that have desirable mutations. In the same way in nature, the "survival of the fittest" mutations is thought to have brought about evolution. But the mutations that happen without X-ray treatment are exceedingly rare and it has never previously been found possible to make them occur oftener. That is why animal and plant improvement has been so slow, and why it has been necessary to raise countless thousands of ordinary individuals for each advantageous mutation that has turned up.

Now, if mutations can be produced at will, all this will be changed, and the production of new plant and animal varieties will go as far forward in ten years as it formerly did in a century.

But mutations, whether produced by nature or by X-rays, are bad oftener than they are good. The plant or animal breeder simply throws away a hundred bad new varieties and keeps one good one. It is here that Dr. Muller sounds his warning as regards human beings. We do not make a habit of throwing away undesirable babies, and anything that might tend to produce a crop of unfortunate human freaks or cripples should be used on human beings with extreme caution. This does not mean, he emphasizes, that all X-ray examinations or treatments are dangerous, but only those that expose the reproductive organs to prolonged or intense doses of the rays.

In particular, X-ray treatments applied for the purpose of deliberately producing temporary sterility are frowned upon. Five years ago, at the London meeting of the Birth Control Congress, Dr. C. C. Little, then of the Department of Genetics of the Carnegie Institution of Washington, and now president of the University of Michigan, characterized the practice as "little short of a calamity." At that time Dr. Little described experiments of his own on rats which had been subjected to this treatment. Young born to them subsequently appeared to be normal, but the third and following generations were marred by the frequent occurrence of repulsive physical defects and monstrosities.

Important as the possible human and practical consequences of his study may be, Dr. Muller states that the work so far constitutes only a beginning of the possibilities that lie along this line.

To scientists, he says, the most interesting aspect of the work will probably be the insight which it may give us into the causes of evolution and into the nature of the genes themselves. In fact, certain conclusions regarding the structure of genes have been drawn from the work that has already been done. These will be presented by Dr. Muller in a technical paper before the International Genetics Congress, to be held in Berlin this September.

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HYGIENE

Fight Heat Deaths

The New York City Health Department is fighting the annual ravages of the hot weather among the babies shut in by the brick walls of crowded tenements. As many mothers know only too well, young children cannot stand extremes of heat or cold nearly as well as adults can. So with the arrival of summer the health departments of all large cities look sharp where the babies are concerned.

The inability of babies to cope with extremes of temperature Dr. J. L. Blumenthal, director of the Bureau of Child Hygiene of the Health Department, explains by the fact that their systems are not yet adjusted to the rigors of the life into which they have been born. This adjustment is part of the process of growing up. To some extent it concerns the sympathetic nervous system, a network of white nerve fibers connected with the spine and differentiated from the nerves by which we feel and move. The sympathetic nervous system controls such involuntary processes as digestion. In babies the balance of these processes and systems is extremely delicate and easily upset by varying external conditions.

Further, babies are more susceptible to infection, according to Dr. Blumenthal, because they have more surface area than adults in proportion to their size and many infections enter through the skin.

To meet the needs of the babies as the mercury rises New York City enlarged the facilities of its Baby Health Stations. These stations maintain clinics in congested districts throughout the city. With the closing of the schools physicians who during the winter supervise the health of the school children were assigned to these clinics to hold office hours in addition to the regular winter clinic hours. Thus many more babies may be taken care of.

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A Danish invention makes it possible to transfer photographs to porcelain.

Paris traffic policemen must learn how to drive automobiles in order to direct traffic intelligently, a new police regulation has decreed.