There is a further important and, indeed, fundamental conclusion of current cytogenetics, negatived by the facts derived from the objective study of chromosomes by the improved and revealing methods outlined in an earlier paragraph. It has been assumed for several decades that the determination of sex may be brought about by male- and female-producing sex chromosomes, usually designated X and Y chromosomes. These are supposed to make their appearance in the meiotic stage and to persist throughout the somatic or body cell divisions. They have also been described and figured in the somatic divisions of *Drosophila* and other dipterous insects. The present writer has called attention to the erroneousness of this conclusion in such relatively favorable dipterous species as the mosquito (*Culex*) and the blackfly (*Simulium*) (*1*). This fallacy is obvious from a study of the course of chromosomal division in the cells of the body in the two-winged flies or Diptera, which makes it clear that the so-called sex chromosomes originate by division from the same mother chromosomes, exactly as is the case with the other chromosomes of the body. They are thus of identical origin and organization and consequently cannot be in any sense regarded as sex determinants.

The recent course of cytological investigation appears to make it clear that, as in the inorganic world, fundamental characters are concealed in atomic and molecular structures beyond the range of vision of our present visual and even electronic microscopes.

It may also be added that the supposed genes revealed in imperfectly preserved, reproductive chromosomes are merely the crossing points of the double spirals of chromatin, present in all chromosomes. A serious criticism of them in the capacity of structural bases of genetical genes is supplied by their insufficient number. Further, the crossing points of the chromosomal spirals are much more numerous in the earlier stages of the meiotic divisions and become still fewer and fewer as the development of the gametic cells progresses.

Reference

1. JEFFREY, EDWARD C. *Science*, 1945, **102**, 653–656.

Poland in the World of Science

Ignace Zlotowski

Polish Representative to the United Nations Atomic Energy Commission

SCIENTIFIC KNOWLEDGE REPRESENTS A product of multilateral international cooperation. By pooling their individual contributions, scientists of various countries have made possible the developments in science and technology which constitute the foundations of our present civilization. In the course of their work, they are inspired by the thought that they are collaborating with other researchers of the world to solve scientific problems. In fact, international cooperation has always been a powerful stimulant in advancing human knowledge.

That the scientific world is truly a 'one world' has been triumphantly demonstrated by the release of atomic energy. This brilliant achievement in nuclear physics could never have been attained without the scientific and technological knowledge laboriously accumulated for the five decades since the discovery of radioactivity by the French scientist, Becquerel, and the separation of polonium and radium by Marie Sklodowska-Curie. Today it is in the best interests not only of science but also of human welfare to continue assuring close cooperation between the scientists of the world. Science is no longer a complementary element in each country's economic and political life but an indispensable part of it. In this atomic age, scientific progress constitutes the foundation of every nation's future; it is, in fact, the cornerstone of modern democracy.

Unfortunately, many countries devastated by the war are unable today to take an active part in advancing science and technology. Despite their long scientific tradition, they are practically left out in the scientific race toward a better and happier tomorrow. Perhaps the most tragic example of devastation that was brought about by the Nazi barbarians in the field of science was the destruction of scientific and cultural life in Poland. The Nazis pursued a ruthless policy of systematic extermination of intellectuals. Seventy members of the Polish Academy of Sciences perished, while 40–70 per cent of the total membership of university staffs were lost. One recalls here the case of Prof. Kalandyk, of Poznan, who served as a target for bottles thrown at him at a party for SS men. Hand in hand with the destruction of intellectuals went the eradication of Polish cultural life. Six thousand and four hundred schools, 3,350 cultural institutions, 16,000,000 books, and 700,000 collections and maps were destroyed by the Nazis.

In spite of this overwhelming destruction, Poland is making tremendous progress in restoring higher education. Most of the universities that existed in prewar Poland have been reopened, and seven new ones have

come into existence since the end of the war. Several universities and cultural institutions previously located in the eastern territories, which formerly belonged to Poland, have been transferred to Poland proper. The Jan Kazimierz University of Lwow, for example, has become the University of Wroclaw, and the Stefan Batory University of Wilno is now the Mikolaj Kopernik University of Torun. Among the present universities, there are a number of private institutions such as the Catholic University of Lublin and the School of Political Sciences at Warsaw. In fact, the total student enrollment at private universities in the school year of 1945–46 was 7,142, as compared with 6,022 in 1933–34. In addition to the universities, there has been a revival of the so-called "nonacademic schools," which grant certificates or professional diplomas upon graduation but do not issue degrees. In this category belong normal schools and higher agricultural schools.

What are the problems that now confront the universities of Poland? Perhaps the following figures will help to answer the question. Nine hundred and eighty-two university chairs are occupied, while 630 are still vacant. Twenty-five per cent of all laboratories are still closed because of lack of personnel and equipment. There are present in Poland only 739 permanent professors and as many as 1,453 so-called "temporary professors" who either rotate among a few universities or teach simultaneously at a number of schools. It is interesting to note the great discrepancy in numbers between undergraduate and graduate students. In 1946–47 52,000 undergraduate and only 200 graduate students were enrolled. This lack of proportion is, of course, a result of the war. During that time the schooling of a great many young people was interrupted, and only now are they able to start where they were forced to leave off. Thus, in the school year 1945–46, 1,850 undergraduate and only 211 graduate students received diplomas. Another striking fact is that out of those 1,850 undergraduate students, only 445 were women; out of 211 graduate students, only 16. This is, of course, also due to the conditions produced by the war.

It must be remembered, however, that the blow dealt by the Nazis to Polish science is not the first one that Poland has suffered. The rich Polish scientific tradition was interrupted more than once during the last 150 years. It has been the strange fate of the country that so many of her outstanding scientists lived abroad. Prior to World War I, national persecutions forced numerous Polish scientists, among them Marie Sklodowska-Curie, to leave their native land. Between the two wars, the Fascist regime ruling Poland caused many scientists to emigrate abroad, and, with the outbreak of World War II, more scientists sought refuge in foreign countries. The largest damage to Polish science was brought about by the planned extermination of scientists pursued by the Nazis.

If the world wants to benefit from the contributions of Polish scientists as it has done heretofore and at the same time revive Polish science, certain definite steps can be taken. First of all, contacts between Polish scientists and those in other countries must be renewed and maintained. This would involve supplying Polish scientists with books, periodicals, and other scientific publications as well as much-needed equipment. Secondly, the new crop of young scientists emerging from all classes of Polish society should be assisted. For the first time in Poland's history, the universities are open to all classes, in contrast to the prewar policy when higher education was available only to privileged groups. In this respect a number of scholarships might be established to enable promising Polish students to study abroad. Of course, aid coming from abroad would not solve all the problems which are confronting Poland. There is a large area of endeavor where the burden falls entirely on the Polish scientists themselves. Fully aware of this obligation, those who survived Nazi brutality are utilizing their knowledge and ability to build Polish science on a real democratic foundation.

The problem of helping devastated countries to revive their national scientific life ought to be solved by all scientists of the democratic world, in order that the international community of scientists may become a living reality. Poland is only one example of a country with new possibilities for scientific work and scientific culture in need of help to develop its potentialities. Such help not only will prove to be of great importance to Poland but will also bear scientific fruits of benefit to humanity.

Everyone, and particularly the scientist, realizes to what extent modern science can be used for destructive purposes. The bright opportunity to use science constructively by rebuilding destroyed countries now presents itself. By so doing "the brotherly spirit of science which unites into one family all its rotaries of whatever grade and however widely dispersed throughout the different quarters of the globe"—as Thomas Jefferson pointed out—will manifest itself by utilizing science to create conditions favorable for a free, full, and happy life for peoples all over the world.