U.S.S.R.—the subservience of science to social and political philosophy. It is important that this aspect of Soviet science should be generally known and understood because it is not confined to Russia. It could happen here.

The work of Russian geneticists, plant breeders and cytologists, during the early years of the Soviet régime, deserves the highest praise, as does the Soviet government for providing such generous support for scientific work. About ten years ago the influence of Soviet political philosophy began to appear in biological science, culminating in a public controversy regarding the relative roles of environment and heredity in 1939. Much of this controversy has been published in this country,[2] and a more damning indictment of the new Russian biology would be difficult to imagine. Vavilov, while recognizing the effect of environment on development, emphasized the progress of genetics and the role of heredity in plant breeding. Lysenko, on the other hand, upheld the Lamarckian (in his words "Darwinian") concept of variation, and rejected Mendelian heredity and genetics as a science. He also claimed that "any hereditary properties can be transmitted from one breed to another without the immediate transmission of the chromosomes." His discussion of "vegetative hybrids" resulting from grafting might well have been written in 1800; his views are neither original nor heterodox, but merely archaic.

Lysenko's attitude towards genetics presumably was influenced by his earlier work on vernalization. A winter wheat, which differs from a spring wheat by a single genetic factor, can be grown as a spring wheat if the seed is moistened and chilled for several weeks before planting. This discovery was made in the United States before the Civil War. Vernalization is also said to hasten the maturity of other crops. This technique has been tried in many other countries without sufficient success to warrant commercial utilization, but it has been used extensively in Russia.

Lysenko and his associates seem to have convinced the political authorities that only environmental effects are of value in plant improvement. Since 1939 the Soviet plant-breeding journals have been filled with articles by Lysenko's disciples, but we hear nothing from Vavilov, Karpechenko, Navaschin and the many other able scientists who are responsible for building the foundations for Russia's plant-breeding program. A few examples of the recent plant-breeding methods are typical of the new order. In one case scions of a yellow-fruited tomato variety when grafted on a red-fruited stock are said to produce progeny segregating for fruit color. Dolgusin claims that halves of the same plant, when grown under different environmental conditions and then crossed, produce progeny of increased vigor and fertility. The ovules are supposed to select the pollen grains most favorably affected by the environment. This selective power of the gametes is referred to by Lysenko as "marriage for love."

There are several reasons for the suppression of genetics in the U.S.S.R. A nationalistic attitude is reflected in Polyakov's[2] reference to genetics as a "foreign science." Another factor may have been a reaction to the distortion of genetic principles by the Nazis in their myth of racial superiority. The primary factor, however, appears to have been based upon political philosophy. It is particularly significant that the Lysenko-Vavilov controversy was reviewed by Mitin, head of the Philosophical Institute of the Academy of Science, and that he "more than other commentators" expressed "the attitude of the Soviet government."[2]

Our admiration for the Russian people and the military might of the Soviet Republic should not blind us to the fact that science has not been free in the totalitarian states where science must conform to political philosophy.

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NEWTON ON HEAT AS A MODE OF MOTION

IN reading lately Query 28 in Newton's "Opticks," I noticed a remark that gives his views on the nature of heat. It was new to me, and perhaps it will be interesting to other physicists. The passage in part is as follows: "A dense fluid can be of no use in explaining the phenomena of Nature, the motion of planets and comets being better explained without it. It serves only to disturb and retard the motions of those great bodies, and make the frame of nature languish: and in the pores of bodies, it serves only to stop the vibrating motions of their parts, wherein their heat and activity consists."

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SCIENTIFIC BOOKS

THE PLASMODIOPHORALES

The Plasmodiophorales. By JOHN S. KARLING. ix + 144 pp. 17 plates, 11 text figures. Published by the author. New York. 1942.

THIS book is based upon a "series of lectures presented to graduate and research students of mycology at Columbia University." Accordingly, the author attempts to present all sides of controversial questions

[2] *Science and Society.* A Marxian Quarterly. Summer, 1940.

with extensive references to the works of various investigators in the field. He points out obvious errors and misinterpretations of observations, but in cases of doubt leaves it to the reader to decide what conclusions he should draw from the reported facts. Constantly the author points out where further investigations are necessary before the final decisions can be made. This group of organisms is regarded as consisting of but one family, the Plasmodiophoraceae, with eight or perhaps nine valid genera and twenty-three species, besides possibly four genera doubtfully belonging to this family each with a single species. Four genera that have been ascribed to the group are definitely excluded as are a number of species from the accepted genera. *Woronina* of Family Woroninaceae is discussed, but for the present is left in that family until further cytological studies may cause it to be transferred to the Plasmodiophoraceae.

A chapter is devoted to the cytology of the Plasmodiophorales in comparison with that of various Protozoa. The reported phenomena are so contradictory that it seems unwise to base decisions as to relationship on cytology until there is better agreement as to the presence or absence of "promitosis," "wheel type" of resting nucleus, "saturn" stage, "akaryote" stage, type and location of meiosis, "schizogony," etc. Another chapter is devoted to "Sexuality and Alternation of Generations." Here, again, the disagreements are more pronounced than the agreements. In some species sexual union of cells is unknown; in *Plasmodiophora brassicae,* the longest known and most intensively studied species of the family, sexual union has been reported outside of the host tissues, early after entry into the host and close to the end of the life cycle just before the resting spores are formed. In general the more typical life history in the family is as follows: The resting spore germinates to set free an anteriorly biflagellate heterocont zoospore. This infects the host cell and with or without further cleavage becomes, by growth accompanied with mitotic division of the nuclei, a multinucleate plasmodium. This cleaves into uninucleate segments, each of which is invested with a thin wall and becomes a zoosporangium whose zoospores are similar to, but sometimes smaller than, those produced by the germination of the resting spores. These reinfect other cells of the host and produce plasmodia which eventually cleave into resting spores. Cytogamy and karyogamy are described by some authors between the products of the resting spores, by some between the zoospores emerging from the zoosporangia, while karyogamy followed by meiosis is claimed by still others as occurring in the nearly mature plasmodium just before it breaks up into the resting spores.

Chapter IV takes up the "Classification and Description of Species." In the main the author follows Schroeter's arrangement with full recognition of its faults and artificiality. Until satisfactory life history studies have been completed in all the genera these undesirable conditions must remain. The first genus to be described was *Plasmodiophora* by Woronin, in 1877, and the last genus to be proposed was *Octomyxa* in 1939. With the exception of *Ligniera* and of *Polymyxa* all known species of the family cause hypertrophy and often hyperplasy of the host tissues. With the exception of *Octomyxa achlyae,* which is parasitic in *Achlya glomerata,* and of *Sorodiscus karlingii,* parasitic in *Chara,* the species are found in the roots and stems of vascular plants. The production of zoosporangia in the life history of the organism has been demonstrated for *Plasmodiophora, Octomyxa, Sorosphaera, Spongospora, Ligniera* and *Polymyxa.* It has not been recorded in *Tetramyxa, Sorodiscus* and in *Membranosorus* whose status as an independent genus is uncertain. Indeed, according to Palm and Burke, the validity of many of these genera is very doubtful. Their distinction is based on the manner of clustering or separation of the resting spores at maturity, and this appears to vary considerably in the same species.

All the genera and most of the species are illustrated by redrawings from the original publications, as are also the doubtful and the excluded genera.

Chapter V discusses the "Phylogeny and Relationship of the Plasmodiophorales," especially with reference to their possible relationship to the Myxomycetes or to the Chytridiales or to the Proteomyxa and other Protozoa. The author gives a very fair discussion of the various claims that have been proposed by various authors.

The final chapter discusses the two diseases of cultivated plants that are of economic importance: Clubroot of cabbage and other Crucifers, caused by *Plasmodiophora brassicae,* and powdery scab of potatoes, caused by *Spongospora subterranea.* The known hosts are listed, the types of lesions and damage are described, the resistance and susceptibility of different host varieties and the geographical distribution are discussed rather fully. The methods of control are given considerable space. A rather complete bibliography completes this chapter.

The book is unfortunately marred by rather numerous typographical errors, a few of spelling but most of incorrect dates, page and figure references, etc. The appearance is that of extreme haste in the proofreading. In spite of this minor annoying feature the student of the Plasmodiophorales and related groups will find in this book a mine of information which will

save him a tremendous amount of searching the literature, which is, in many cases, rather inaccessible. He will have the main facts before him even on controversial points and will know where further research is necessary. He will perforce have to draw his own conclusions on many things, so fairly have the various sides of the subject been presented. This is perhaps the greatest compliment that a book of this type can receive.

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INORGANIC CHEMISTRY

A Textbook of Inorganic Chemistry. By FRITZ EPHRAIM. English edition by P. C. L. THORNE and E. R. ROBERTS. Fourth edition, revised and enlarged. 921 pp. New York: Interscience Publishers, Inc. $8.75. London: Gurney and Jackson. 28 shillings net. 1943.

THIS well-known text now appears in a fourth edition with only minor revisions and the addition of a dozen pages of new material. The recent work on radioactivity and isotopes has been included and descriptions of new compounds and reactions have been given. The progress in the field of artificial radioactivity is so swift that the discussion (p. 90) on nuclear fission, while it reflects opinion in 1940, does not correspond with the judgment of 1943 concerning the possibility of an era of atomic energy, which now appears not too far distant.

The outstanding advantage of this text is that it presents the field of inorganic chemistry in all its varied aspects from a consistent logical standpoint with a mode of presentation which departs refreshingly from the multitudes of inorganic chemical texts that have been written around a single traditional pattern. Ephraim's text is exactly suited to the senior student who wishes to refresh and refurnish his mind concerning basic inorganic chemistry in preparation for advanced examinations. It should be required reading for all professors of general chemistry, the exercise to be repeated as each new edition appears. The English editors deserve our best thanks for continuing to make this text accessible a decade after the original author's death and for their care in compilation and revision.

HUGH S. TAYLOR

REPORTS

THE AWARD OF GUGGENHEIM FELLOWSHIPS FOR 1944

THE sum of $200,000 has been appropriated this year by the John Simon Guggenheim Memorial Foundation for fellowships exclusively for men and women who are serving the nation in the war effort, in addition to sixty-nine fellowships with stipends of $155,000 to Americans and Canadians to assist their work of scholarship and artistic creation. All the fellowships are awarded, in wartime, subject to any national service to which the recipients may be called; but if any fellow is called into such service the foundation will make his fellowship available to him when he receives his discharge.

The appropriation of $200,000 for post-service fellowships is in addition to the usual budget. These funds will be used to grant fellowships to young scholars and artists who are serving the nation in the armed and other governmental services, including those doing war research under contracts made by the Office for Scientific Research and Development and similar agencies. They will be granted upon the same basis as the other fellowships, to persons who have demonstrated unusual capacity for research and artistic creation. They will be granted before the end of the war and will be made available to the recipients as soon as they are discharged from service. Five such fellowships have been awarded. They include one to Joseph Hickey, ornithologist, engaged upon war research at the University of Chicago. Mr. Hickey, who is the author of "A Guide to Bird Watching," proposes to make an analysis of approximately 250,000 records of banded birds to learn their life expectancies in the wild, their population turnover in nature and other facts of value to conservationists, and the mapping and charting of migration routes, especially for those species that are becoming endangered by civilization.

Awards of fellowships for the year 1944–45 include in the sciences:

DR. T. C. SCHNEIRLA, associate professor of psychology, New York University, and associate curator of animal behavior, the American Museum of Natural History, New York City: A study of the relationship between instinct and learning in insect psychology. The work will be based chiefly on his study of the behavior of army ants on the Isthmus of Tehuantepec, Mexico.

DR. R. A. STIRTON, lecturer and curator of fossil mammals, Museum of Paleontology, University of California at Berkeley: Exploration for fossil vertebrates in the Panamanian region of South America to obtain evidence concerning the date and position of water barriers between the American continents in prehistoric times.