

Book Reviews

Soviet Biology and the Powers That Were

The Rise and Fall of T. D. Lysenko. ZHORES A. MEDVEDEV. Translated from the Russian by I. Michael Lerner, with the editorial assistance of Lucy G. Lawrence. Columbia University Press, New York, 1969. xx + 284 pp., illus. \$10.

This thoroughly documented description of the persecution of genetics in the Soviet Union is melancholy, yet engrossing, reading. Misery, and indeed martyrdom, was inflicted on many, although nobody knows exactly how many, scientists whose only misdeeds were refusals to accept a congeries of old wives' tales masquerading as discovery and innovation. This book nevertheless leaves one with a feeling of relief, and even encouragement, and this not only because the book has a happy ending—the science of genetics is vindicated and rehabilitated. The knavery and stupidity of some fade before the honesty and fortitude of others. There still exist scientists who refuse to sacrifice their integrity for their careers!

The story of the so-called genetic controversy in the Soviet Union is, of course, not altogether new. Bewildering reports about it have appeared in newspapers from time to time for the last thirty years. The book under review is, however, unprecedented. Its author is the head of a Laboratory of Molecular Biology at the Institute of Medical Radiology in Obninsk, near Moscow. He was close enough to some of the events he describes to have first-hand knowledge of their nature, and he has consulted published materials not easily accessible. His book has not been printed in the Soviet Union, and the publishing house of the Soviet Academy of Sciences refused to supply a manuscript for translation. Draft manuscripts, written at different times, have nevertheless gained some currency among Soviet scientists. I. M. Lerner came into possession of some of them, and, of course, perceived their unique value as historical documents eluci-

dating the weird and tragic chapter of the development of science in the U.S.S.R. In his foreword, Lerner writes:

It appeared to me that, if the book was to be banned in the Soviet Union, it is all the more important that it be published elsewhere. The decision to do so was not an easy one. . . . The possibility of reprisals against its author exists. It appears, however, that Medvedev is willing . . . to take whatever risks are involved in publishing the book here, for the good of his country.

The book makes it clear that there really never was any "genetic controversy" among Soviet scientists, in the sense of a serious discussion of the pros and cons of scientific issues. A canny charlatan was given the power to impose his "progressive Michurinist biology" as an obligatory creed. Several make-believe public disputes were organized (in 1936, two in 1939, and the grandest in 1948); geneticists, the foremost among them Nikolai I. Vavilov, were summoned to defend themselves, or to recant their errors. But, like the accused in the political show trials of the same period, the geneticists knew that the outcomes of the disputes were settled beforehand. The official press opened its pages to Lysenko and his partisans, who made the most of the privilege. Here is a specimen of the publicity with which the geneticists had to contend:

The Soviet public now well knows just who are the anti-Michurinists, such "scientists" as academicians Koltsov and Serebrovsky, and the various "Knights of the Gene," jealously guarding the special and monopolistic role of the genes. Yet the fact that the enemy of the people, Bukharin, fought Darwinism together with these "Knights" is passed over in silence. Indeed, this looks like a fox, but smells of a wolf!

Given these circumstances, the speeches of Vavilov and his colleagues are remarkably dignified and firm. By about 1936, if not earlier, these people probably knew what was in store

for them. The epigraph of the book is Vavilov's declaration, "We shall go to the stake, we shall burn, but we shall not renounce our convictions." And this was no empty rhetoric. Vavilov was gradually stripped of his administrative posts and occupied himself with research and writing. On 6 August 1940, he was arrested and imprisoned; on 9 July 1941, he was found guilty of belonging to a rightist conspiracy, spying for England, and sabotage of agriculture. The sentence was death; however, it was not carried out immediately, because "apparently higher approval was necessary." Because of the advance of the Nazi armies, Vavilov was transferred in October 1941 from Moscow to a death cell of a prison in Saratov. Commutation of the death sentence came in the summer of 1942, and Vavilov was moved to a general cell block. It was too late; by then Vavilov was seriously ill, and he died on 26 January 1943, of pneumonia, according to the official death certificate. He remained an "unperson"—a jubilee volume of the Academy of Sciences of the U.S.S.R. published in 1945 contained no mention of Vavilov, among either the living or the deceased members. Posthumous rehabilitation came in 1955; not only his works and his biography (written in a hagiographic style but reticent about the circumstances of his end), but even a postage stamp with his portrait were published. G. D. Karpechenko, G. A. Levitsky, L. I. Govorov, K. H. Flyaksberger, S. G. Levit, and I. I. Agol are among other geneticists who lost their lives, but Medvedev's book gives no detailed information about them.

How could all these ghastly events have happened? A rather ingenuous explanation has gained currency in Western countries—genetics is allegedly incompatible with the communist world view, which can only be sustained by a belief in the inheritance of acquired traits. This explanation is undermined by the fact that some eminent geneticists who were also members of communist parties seemed to find no contradictions between their scientific knowledge and their political beliefs. And after all, genetics is now restored to favor in the Soviet Union. The book uses a frontispiece to suggest a solution of the puzzle; this shows a photograph of a bronze sculpture of Stalin and Lysenko, seated facing each other, engaged in earnest consultation. The sculpture graced a square in the ancient city of Ostrog from about 1950 to

1961, when it was removed. Stalin's exclamation: "Bravo, comrade Lysenko, bravo!" uttered in 1935 after Lysenko's speech at a congress of Collective Farmers, made Lysenko a VIP. But it was only a beginning. The punch line of Lysenko's peroration at the 1948 "discussion" was the announcement that he had received a prior approval of the Politburo, hence of Stalin personally. And in Stalin's obituary in *Pravda* on 8 March 1953, Lysenko wrote that Stalin "personally edited the draft of the report 'On the situation in biological science,' explained to me in detail his corrections, and gave me instructions on delivery." Incredible as it may seem, Stalin was interested in and regarded himself as competent in genetics.

Khrushchev did not fancy himself a geneticist, but he was taken in by Lysenko's showmanship, a talent which the latter undeniably possessed. He became sincerely convinced that

The attainments of Michurinist biology are the result of the persistent struggle of scientists and practitioners; they are our national property and the property of the Communist party. These practical achievements aid in the creation of abundance of agriculture products and in the solution of the problem of Communist construction in our land.

As late as February 1964 he believed that

Who wishes to use Lysenko's method cannot lose. Go this year and look at his wheat. I am sure that as always he will have a good crop. Look at the corn on his farm, look at the sugar beets. . . . It is from such scientists that we can learn.

An unheard-of insubordination happened, however, in June 1964. Lysenko decided that it was time to have his devoted follower Nuzhdin (one of two former geneticists who became Lysenkoists) made a member of the Academy of Sciences (of which he himself had been a member for many years). The Biology Section of the Academy obediently voted for Nuzhdin; a confirming vote by the general assembly of the Academy is usually a formality for candidates endorsed by the sections. Yet in this instance, the physicist A. D. Sakharov objected, saying,

I call on all those present to vote so that the only "ayes" will be by those who, together with Nuzhdin, together with Lysenko, bear the responsibility for the infamous pages in the development of Soviet science, which fortunately are now coming to an end.

Nuzhdin's candidacy was rejected by a secret vote of 126 to 24. Khrushchev flew into a rage, stated that the Soviet people do not need such an Academy, and ordered the formation of a commission to study the possibility of transforming the Academy into a "Committee on Science." Before this commission had time to submit its recommendations, Khrushchev himself resigned, on 14 October 1964.

At last, Lysenko had no support decreed by the highest authority in the government. Medvedev relates a dramatic incident, the geneticist Rapoport's being asked on 13 October to prepare within 24 hours a full-dress report on the achievements of genetics for the Central Executive Committee and for subsequent publication. In November, the press carried articles on genetics instead of Lysenkoism, and "neither Lysenko nor his associates, who had previously reacted so tempestuously to even indirect criticism, wrote a single reply to the great number of exposés and critical articles published." In January 1965, a commission was created by the Academy of Sciences and the Ministry of Agriculture to review some of Lysenko's pretended discoveries in practical agriculture. Lysenko refused to attend the discussion of the report of the commission, which uncovered deliberate falsification of data (though possibly by his assistants rather than by Lysenko himself). Another commission was created to revise school curricula, which were permeated by Lysenko's teachings. New textbooks of biology, at college as well as high school levels, had to be speedily prepared. Some 70 Soviet geneticists attended the celebration of Mendel's centennial in Czechoslovakia; Mendel, systematically vilified for three decades, was rehabilitated. A new journal, *Genetika*, started publication.

Lysenkoism was over, but Lysenko and his partisans were spared the treatment which they so vengefully had meted out to their opponents. Perhaps the bitterest pill Lysenko had to swallow was the desertion of nearly all his adherents. Some of the latter became, *mirabile dictu*, geneticists; a number of them are even publishing research papers in genetics, rather undistinguished and yet acceptable. Medvedev points out "the derision and lack of respect on the part of the majority of the scientific community" for Lysenkoists. This certainly prevailed through-

out the decades of Lysenko's overlordship; enough competent biologists lived in the Soviet Union who knew full well that the king's alleged beautiful dress did not exist. Lysenkoism rested on the support of the powers that were, and it collapsed in ridicule as soon as the support was withdrawn. This is not to say that there were not, or are not, sincere believers. A whole generation of students was indoctrinated in "Michurinist biology," and it would be too much to expect all of them to possess enough critical judgment to distinguish the counterfeit from genuine science. This reviewer is persuaded that the greatest damage that Lysenko inflicted on his country is precisely the miseducation of a generation of agricultural and biological specialists, which cannot fail to obstruct the economic development.

The damage more directly caused by Lysenko's pretended inventions and discoveries is not easily assessed. These "discoveries" were always given wide press publicity, and hurriedly passed for large-scale application in agricultural practice. Medvedev's book contains only general statements and no precise data. One is tempted to suggest that here is a mine of topics for Ph.D. dissertations; however, these dissertations will probably never be prepared or published. The earliest "discoveries" were vernalization of cereals and summer planting of potatoes, promoted in the 1930's and then quietly forgotten. "Renewal" of wheat varieties by intravarietal crossing had a similar fate. The possibility of obtaining hybrid wheats with increased yields is, to be sure, a real one; experiments in this direction are now under way in several countries, using sophisticated techniques of modern genetics; Lysenko went at it with methods which could only lead to failure. Then there were "inventions" of winter wheat in Siberia, sugar beets in central Asia, cluster planting of trees based on "abolition" of intraspecific competition, methods of fertilizer application, branched wheat, and finally the increase in butterfat content of milk which so deeply impressed Khrushchev.

The enterprise of science is based on confidence of scientists in each other's integrity. When a scientist anywhere publishes results of observations or experiments that seem doubtful, one surmises that he may have made a mistake, not that he has faked the data. It is established that some of the "dis-

coveries" made by Lysenko's followers were forgeries. My personal opinion (Medvedev does not raise this issue) is that Lysenko himself was not a deliberate faker—he was a fanatic who deluded himself as well as others. Some of his "discoveries" were too far-fetched and useless to be worth forging. An example is his declaration that cuckoo chicks arise by a kind of mutation from songbird eggs. He cannot, however, escape the responsibility for having created a milieu which invited and glorified forgeries. This is what academician Sakharov meant by "infamous pages in the development of Soviet science." Medvedev deserves admiration for his courageous and scrupulous recording of the contents of these pages for his contemporaries and for history. Those who fail to learn from history are bound to repeat it.

THEODOSIUS DOBZHANSKY
Rockefeller University, New York City

Epiphysis Cerebri

The Pineal. RICHARD J. WURTMAN, JULIUS AXELROD, and DOUGLAS E. KELLY. Academic Press, New York, 1968. xii + 204 pp., illus. \$11.50.

Although it has photosensory capacities in some lower animals, an embryological derivation primarily from the central nervous system, and endocrine characteristics among adults of many higher vertebrate animals, the pineal has received scant attention from specialists in sensory physiology, vertebrate neurology, or endocrinology. A wealth of diverse discoveries during the past 15 years reveals the pineal organ, or epiphysis cerebri, to be worthy of attention as probably functionally significant within these three realms. The present review by Wurtman, Axelrod, and Kelly "attempts to summarize the present state of knowledge on pineal organs, and to suggest areas where further investigation might be profitable." Each of the authors has contributed notably to the investigation of the pineal, and in the present volume they organize their own related discoveries into a compact survey. The authors state in their preface, "Although most of the chapters are the creation of a single author, each of us has reviewed the work as a whole and accepts responsibility for its contents." Nevertheless, the contents and presentations of the chapters are

strongly influenced by the interests and opinions of the individual authors.

A brief review of pineal anatomy and evolution with major attention to results from descriptive electron microscopy forms the first chapter. Terse-ness and specialized descriptions may pose difficulties here for the less well prepared reader. Eleven full-page electron micrographs in this chapter are all of excellent quality and manifest significance.

Pineal biochemistry, pharmacology, and photic relations, which constitute the area in which the greatest advances and some unresolved disagreements have occurred in recent work, are the subjects of the next three chapters. The accent is on the pineal's content of 5-hydroxytryptamine, melatonin, norendrenaline, and related amines. Although some errors (as in table 2, p. 57) of citation, statement, or implication can be found, the overall result remains a stimulating and logically developed account.

Pineal physiology and the human pineal and its diseases are the subjects of the last two chapters. These are the briefest and weakest ones, and ones on whose subjects important findings have been more fragmentary and have been made at a slower rate. These final chapters also epitomize the relatively scant attention paid by the authors to articles published in languages other than English. Extensive work by several European schools deserves better coverage.

As a summary of present knowledge of pineal organs this book is far from complete or definitive. It is, however, in many respects more detailed and more likely to be conducive to further research than other books on the subject. For these reasons its utility should become evident, and it should acquire a grateful readership.

W. B. QUAY

Department of Zoology,
University of California, Berkeley

Life in the Cold and Wet

The Biology of Marine Mammals. HARALD T. ANDERSEN, Ed. Academic Press, New York, 1969. xiv + 514 pp., illus. \$21.50.

The sea is a hostile environment for warm-blooded, air-breathing mammals. The chilling power of cold water is readily appreciated by anyone who has

fallen into winter seas, and air breathing is a decided inconvenience to a predator seeking its prey in a three-dimensional world of water. A biologist who had studied only terrestrial species might conclude mammals could not live in the sea, but there they are in both diversity and number. And it is inevitable that they should receive attention both from scientists and from publishers.

Porpoises and whales in particular have a popularity which spans a period from early mythology through Moby Dick to modern television. This has resulted in a copious fringe literature which entertains the public and annoys scientists. We must frequently admit to disappointed questioners that we really don't know if porpoises can play chess. This separation of fact from hypothesis, both reasonable and wild, will continue to be a problem for the general reader. It is even a problem in the serious scientific literature.

The Biology of Marine Mammals edited by Harald Andersen has the strengths and weaknesses of a volume with many contributors. The chapters are as illuminating as the individuals writing them. Several of the chapters show little change from previous treatment of their subjects by the same authors. This is probably inevitable, but one should realize that perhaps only half the material in this book is original. In spite of this it is a pleasure to read again such repeats as Irving on temperature regulation.

Porpoises are very different from man. Only by extended observation and experiment can one perhaps begin to think like one. A chapter on the general aspects of communication (Evans and Bastian) shows the fruitful results of such extended looking at pinnipeds and cetaceans.

Hertel attempts a treatment of swimming based on modern tow-tank hydrodynamics. From the usual grist of models and Reynolds numbers, he "shows" that a porpoise shape has a lower drag than that of a tuna fish. In the real world the tuna apparently doesn't know this and swims twice as fast as the supposedly better-designed porpoise. The extrapolation from a towing tank to a live swimming animal in nature is a great one, and Hertel's treatment, although learned, does not illuminate the subject significantly. Final answers may come only from instrumented animals.

The rarity of solid data on marine