

Soviet Genetics and World Science, Lysenko and the Meaning of Heredity.
By JULIAN HUXLEY. Chatto and Windus, London, 1949, 8s. 6d.

DR. JULIAN HUXLEY has expanded his account of the Soviet genetics controversy, published in *Nature* in June, 1949, into a 245-page book. Although the book is a more coherent presentation of his case against Lysenko, the substance is the same. It ends too with the same call for the defence of science from "totalitarianism" and with the same suggestions for persuading the U.S.S.R. to alter its policy towards science, so the political implications of his case are underlined. The book can be regarded as the most powerful attempt so far to discredit the Michurin trend in Soviet biology. In measuring Huxley's success in this respect we therefore have a means of testing the new Soviet biology and for that reason the book merits something more than the customary short review.

In essence the attitude adopted by Huxley is the same as that of Darlington, Fisher, Harland and Ashby. It is that the Soviet Academy, basing itself on the patently untrustworthy claims of Michurinist biologists, has rejected a branch of science, Mendelian genetics, resting

on "large numbers of facts and laws which have been repeatedly and independently verified by scientists all over the world" (p. 21). In place of Mendelism, Michurinism, "essentially a non-scientific or prescientific doctrine" (p. 23) based on "results not capable of verification by scientists outside Russia" (p. 21), has been installed as the official Soviet biology. According to Huxley, this has been done, not after scientific discussion as we understand it in this country, but under ideological pressure, and this in his view is the major issue: "There is now a party line in genetics, which means that the basic scientific principle of the appeal to fact has been overridden by ideological considerations" (p. 35). However, Huxley's notion of what constitutes a fact is, to say the least, a loose one. Apparently he regards as fact the elaborate hypothetical system which Mendelian geneticists have construed to interpret, not only their own observations, but evolution, embryology and practical breeding as well. He seems unable to grasp that Lysenko and his colleagues are not denying facts, but disputing the significance attached to a particular class of facts and one particular interpretation of these facts. Therefore, it must be said at the outset that Huxley's "major issue" is no more than an incident in the game of nine-pins which he and those who think like him have been playing ever since Michurin biology first received publicity in this country. For that reason, his book cannot be regarded as a serious contribution to the discussion of the issues raised by Lysenko. Its main interest comes rather from the light it throws on Huxley's own outlook and, in so far as he represents current Mendelian thought, on what Mendelian geneticists really believe.

One looks in vain in Huxley's book for evidence of objective study of the material published since 1948, especially the verbatim report of the Academy session which sheds so much light on the real issues and attitudes of individuals involved. He is not impressed by the fact that the report includes contributions by some fifty practising biologists and agronomists who use the Michurin teaching in their work and testify to its value. Nor has he noted the abundant evidence that the Michurinists are familiar with the latest work abroad, as shown by the many references to recent publications. Nor has he attempted to explain the ineffectiveness of the Mendelians in open session except to imply that they were terrorised and frightened men, a view that is belied by the spirit in which several of the Mendelian contributions were made. Evidently these are facts which do not appeal to Huxley. For him, the report simply provides examples of the "scientific illiteracy" of Lysenko and his colleagues (by which he really means their refusal to use the Mendelian terminology and approach) and the intrusion of ideological considerations into the discussion.

This boggy of ideology is important because Huxley presents himself to his readers as an objective student of the question ("I at first imagined

that there must be something in Lysenko's claims," p. viii), making up his mind after impartially sifting the evidence. In fact, he is never able to comprehend that there are fundamental assumptions in the Mendelian approach—the identification of processes with substances to mention one—and that these are being called in question. The reason he cannot grasp this point is that ideological considerations enter into his own attitude just as much as they enter into Lysenko's. But whereas Lysenko's ideology is a set of declared principles consciously applied to test ideas and interpretations, Huxley's is a set of undeclared assumptions applied so unconsciously that he would deny their existence altogether. His is the ideology of the empirical scientist expressing itself in the illusion that he is untainted with ideology, that he deals only with facts. By failing to recognise that in the long run ideological considerations determine what significance is attached to facts and how they are interpreted—often what facts are looked for and discovered—the empirical scientist misses a truth which stands out beyond all others in the history of science. Nowhere is this clearer than in the field which Huxley regards as his special province, evolutionary biology. The main facts of the fossil record, geographical distribution and comparative anatomy, which provide the chief evidence for evolution, were known from fifty to a hundred years before Darwin's *Origin* was published. Yet ideological considerations prevented recognition of their true meaning. When their evolutionary meaning was recognised at last it was expressed by Darwin in a form which reflected the new ideology of the Victorian bourgeoisie, in terms of competition and victory to the strongest, an ideology to which Huxley himself is still tied. This relation between science and ideology does not mean that science must be purged of ideological considerations, as Huxley imagines he has done. That is impossible. The correct lesson is that science must be provided with a conscious scientific ideology in place of the unconscious and unscientific ideologies of the past. That is the claim that Marxists make for dialectical materialism, and that is why, along with facts and observations, it enters into all scientific discussions in the Soviet Union.

I hope that readers of Huxley's book will read those sections where he expounds Mendelism as closely as those in which he gives his views on Michurin biology. If so they may be surprised to learn what they are asked to accept as demonstrable truth. For instance, there are many references to the "organ of heredity," by which is meant the chromosomal genes and the plasmagenes (the latter only rate a footnote). Huxley develops this idea as follows: "Its chief achievement [i.e. of Mendelian genetics—D. M. R.] is the discovery of the physical basis of heredity. There does exist a specific organ of heredity, as there are specific organs of digestion, or of bodily movement; and it is just as distinct and separate from other organs as are the stomach, or the

skeletal muscles, although being microscopic, it is not so obvious" (p. 5). He dismisses as "naïve and unscientific" Lysenko's remark on this matter: "There is no organ of heredity. . . . There are organs of reproduction, but no organs of heredity" (p. 102). Clearly this is a crucial question and worth considering further.

The term "organ," as any elementary student knows, applies to any part of an organism that carries out some special *localised* task in the overall functioning of the organism. Thus the stomach carries out the preliminary digestion of proteins, the testis produces male reproductive cells, and so on. But not all the activities of the organism can be localised in this way. There are functions and activities of living things that are so universal and fundamental that they are a feature of every living cell. You cannot speak of an organ of respiration since every cell respire. You cannot speak of an organ of metabolism since every cell carries on metabolic activities. You cannot speak of an organ of growth, since growth is a property of every cell under certain conditions. Clearly, only subsidiary and specialised functions are localised in organs, the fundamental activities are features of the whole organism. Can we decide to which of these two classes of activity, subsidiary or fundamental, the property of heredity belongs? I think we can. If the concept of an organ of heredity has any meaning, it applies chiefly to the fertilised egg cell, the bearer of heredity in the young organism beginning its existence. Such a cell will have cellular organs where particular functions are localised, and about some of these, such as the cell membrane across which exchanges of ions and dissolved substances take place, we know a fair amount. But I think no one would suggest that the egg cell possesses an organ of metabolism, of respiration, of cell division or of development. All these are features of the egg as a whole. Yet they are only different aspects of the inheritance which the egg has received from its parents. Since it is unthinkable that these activities could ever be localised in cellular organs, how much more unthinkable is the notion that heredity itself, the higher unity which embraces all these activities, could ever be localised, like a subsidiary activity, in any one region of the cell.

Lysenko is right. The conception of an organ of heredity is preposterous and arises from a failure to distinguish between qualitatively different levels of activity in organisms, to realise that an organism's heredity is one of its fundamental aspects that cannot reside in any one part of the cell any more than metabolism can reside in any one part of the organism. Yet for Huxley, who can ridicule the Michurinists for looseness of thought and false analogies, this notion of an organ of heredity is the proudest achievement of Mendelian genetics!

To deny the existence of an organ of heredity residing mainly in the chromosomal genes is not to say that the nucleus and chromosomes are

not involved in heredity at all. Of course they are, and Huxley is misleading his readers, as do all critics of Lysenko, when he implies throughout the book that the Michurinists would deny the nucleus and the chromosomes any role in heredity and would reject the facts discovered by Mendelian cytogenetics. How many times must it be repeated that what the Michurinists deny is any exclusive or special hereditary role for the nucleus. And it was well said by Gluschenko on his visit to London last year that not until we get away from this notion that the chromosomes function as the substance or organ of heredity shall we begin to find out what their real functions are.

In other places Huxley allows one to see the reality behind Mendelian interpretations of living nature and especially the Mendelian view of evolution as the selection of random mutations. Of course, Huxley has long opposed the idea of the inheritance of acquired characters, without which, according to Lysenko, evolution is unthinkable. As an example where the concept of inherited adaptive modifications breaks down as a possible factor in evolution, Huxley cites the mammalian tooth. He is fond of this example, as he used it in his earlier work, *Evolution: the Modern Synthesis*. I quote (p. 130): "The only modification which use can effect in our teeth is to wear them down. It is therefore impossible that the structure of teeth, which is often obviously adapted to the work they have to do . . . could owe anything to Lamarckian inheritance." What is wrong here? He forgets that teeth are set in jaws, the jaws attached to the skull and operated by and associated with muscles, sense organs and part of a whole complex unity, including the face and muzzle, which is subject to a great variety of possible modifications in accordance with different uses and habits. Certainly the dimensions and position of the teeth will reflect the size and shape of the jaws in this whole adaptive complex. Moreover, Huxley imagines teeth as static preformed structures. In fact, they are structures with a very special history—indeed with two histories: a set of milk teeth preceding the permanent dentition. This circumstance gives rise to the possibility that use and habit in the former can influence the development of the latter. Again, many mammals have some teeth with open roots which grow throughout life, thus opening up still other possibilities of modification through use and habit. On all counts, this example only shows up Huxley's own narrow approach to the question. But it is important because it is typical of the tendency in Mendelian genetics to see the features of an organism in isolation and to treat them as scholastic abstractions divorced from the rest of the organism and the environment in which it lives. From this it is a short step to the interpretation of evolution as a process involving only the selection of preformed differences, an approach that explains everything except the only thing that matters, the origin of the preformed differences, the mutations, that are selected.

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This is an important book. It has had a big sale and the author's reputation as a scientific publicist with liberal views has ensured its acceptance by many misguided readers as a trustworthy account of the issues at stake in the genetics controversy. In fact, it is a weapon in the cold war, as delighted reviewers in the right-wing Press have testified. It deserves particularly close study by all those who remain loyal to socialist principles and believe that these principles are being applied in the Soviet Union, and who yet retain reservations about Lysenko's biology. Huxley's book will show such readers that if one rejects Michurin biology because all the facts support Mendelism, one must in consequence believe that the leadership of Soviet society is entrusted to a group of incompetent, perverted, ignorant, unscrupulous and ambitious men. In other words, to reject Michurin biology for any of Huxley's reasons is to believe in the thirteen wicked men of the Kremlin. It is good that serious socialists should be presented in this way with the implications of accepting any of the usual arguments against Lysenko.

The book is important for another reason. It parades before the discerning reader the ideological limitations which bourgeois society imposes on the minds of those who are bound to its conceptions of nature and science. Huxley's inability to distinguish between fact and interpretation, his refusal to question basic ideas or examine their origins, his failure to recognise the differences between fundamental and subsidiary activities of organisms—all these are typical of the ideological confusion of the bourgeois scientists in our time. Indirectly, Huxley demonstrates the need for a fresh approach in biology, an approach which does not distort underlying realities like the unity of the organism and its wider unity with the environment, which takes into account the organism's developmental and evolutionary history. In that sense, for the critical reader, Huxley unwittingly strikes a blow for, not against, Michurin biology.

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