Gregor Mendel und das Schicksal seiner Vererbungsgesetze. vol. 22, *Grosse Naturforscher.* Ingo Krumbiegel. Wissenschaftliche Verlagsgesellschaft, Stuttgart, Germany, 1957. 144 pp. Illus. DM. 10.80.

Among the truly great figures of the 19th century, Gregor Mendel will always remain a half-revealed, somewhat enigmatic personality. So little has been preserved for us about him—especially so little relating to his scientific work and achievement. Almost everything known or conjecturable about Mendel, priest and scientist, was put into the classic biography by Iltis (1924). To this Krumbiegel has added just a little that is new, in an appreciation that covers with respect and admiration the years of childhood, teaching, genetic experimentation, and priestly administration.

In his effort to fill out the story, the author has supplied chapters on the historical background of research into the secrets of heredity, on the nature of Mendelian heredity, and on the relations of Mendel's work to that of other biologists, contemporary and later. Here Krumbiegel is not always accurate, particularly in the effort to discuss the chromosome theory of heredity, which in its inception was independent of Mendel's own way of thought and method of experimentation. The author overlooks the role of Linnaeus in beginning the studies of species hybridization in the 18th century; he is not fully informed about the relations between the three rediscoverers—Correns, de Vries, and Tschermak; he over-emphasizes, perhaps, the admittedly great role of Richard Goldschmidt in modern genetics, by overlooking completely other giants in the development of this 20th century science. He is at his best, on the other hand, in the chapters that deal with Mendel's personality, life, botanical work, and scientific activities outside botany—in meteorology and in his efforts to breed and study bees. In numerous places the author emphasizes Mendel's great interest in Charles Darwin's novel theory of evolution by means of natural selection, a theory which Mendel apparently accepted.

All in all, this modest volume is a very worthwhile addition to the far too few books about Mendel. For the English reader, it may also prove a good test of one's command of the German language, since it is written in a characteristic elevated style: "Gregor Mendel war ein Feuergeist, der der Welt gezeigt hat, dass man mit bescheidenen Mitteln unendlich Grosses leisten kann. Einige Tüten Pflanzensamen waren sein Werkzeug, sein Geist seine Waffe, mit der er einer Welt die Stirn geboten und gesiegt hat." Quite a tribute! Somehow I cannot avoid comparing it with the simplicity of Mendel's own way of expressing himself, which achieved a style combining utmost clarity with trenchant insight, as, for example, when he says of the queen bee, in a remark quoted in this volume: "Sie soll sich nun einen ordentlichen Mann aussuchen, denn es ist hier, wie bei den Menschen, traurig, wenn eine gute Frau einen schlechten Mann bekommt."

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Nature and Man's Fate. Garrett Hardin. Rinehart, New York, 1959. xi + 375 pp. Illus. + plates. $6.

Nature and Man's Fate is a book of many faces. It is one of the best accounts yet written of the evolution of the theory of evolution and, as such, reflects the expenditure of much time and scholastic effort. Inevitably it is concerned more with genetics and selection than with the aspects of either nature or the fate of man. Genes, in fact, dominate the theme, and as a lively, vivid, and informative presentation for the general reader of the nature and importance of genes to the present and future well-being of man, Hardin's book is excellent and could hardly be better.

Obviously it has been a labor of love. The first third is mainly an account of the development of the theory of evolution, beginning with Erasmus Darwin—an account in which Charles himself emerges more fully as a complete personality than in any other I have seen. At the same time, the theory of natural selection is discussed both in relation to other concepts current in the 19th century and to present-day cybernetics, all in a most enlightening way. Any student of evolution, lay or professional, would profit from a reading of this section alone, not to mention the following part, which deals with Gregor Mendel and the rediscovery of genetics.

After his introduction to genetics by way of Mendel, Hardin discusses the role of eugenics and the general value of genetic information to human individuals everywhere, both in terms of personal problems and political doctrines. This part contains the only error of fact noted, which was in the reprinting (on page 163) of Scheinfeld's list of "Human Heredity Clinics," where McGill University is located in Toronto—a sin which is equivalent to placing Johns Hopkins University in Pittsburgh and which may account for the absence of inquiries made to the aforementioned clinic. More genuinely disturbing, however, is Hardin's rough treatment of H. J. Muller's past ideological unorthodoxy, included here in a historical account of Lysenko's unfortunate impact upon genetics and geneticists in Russia. Clear vision is of course to be coveted, but hindsight is so much easier to acquire than foresight that it would have been charitable to recognize this fact, particularly since Hardin was in his teens during the period in question.

The last section of the book, dealing with the possible future channels for human evolution, is the most challenging. This is especially true of the final chapter, "In praise of waste," which is a refreshing emphasis upon the primary value of human individuality in a progressively conformist world. Taken all together, with its pervading enthusiasm, its blunt criticism of people and mores, and its innately optimistic outlook toward the long-term future, *Nature and Man's Fate* is a book that every intellectually mature adult everywhere should read and reflect upon.

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Classical Mechanics. J. W. Leech. Methuen, London; Wiley, New York, 1958. ix + 149 pp. Illus. $2.50.

In this brief monograph, Leech gives a broad general review of classical mechanics, which avoids many of the tedious details that so often mask essential ideas. The book is intended to assist the experimental physicist in building up a background for theoretical understanding of classical mechanics and

to stimulate the theorist to study more complete treatises on the subject. Directed at a suitable level for graduates of English normal honors physics courses, it could be read with profit by a senior or by a first-year graduate student at a good American university.

The volume covers many of the advanced topics of classical mechanics, including the Lagrangian formulation, the Hamiltonian formulation, variational principles, transformation theory, Poisson brackets, the study of continuous systems, relativistic mechanics, and fields. The author treats these topics in a straightforward fashion, hitting the highlights of a range of topics which are treated in considerably greater detail by Whittaker and by Goldstein in their classical treatises. In the final chapter on the Lagrangian and Hamiltonian background to field theories, the author confines himself to an outline guide to the subject. His purpose is to emphasize the wide generality of the methods of analytical mechanics, which are developed as an alternative to Newton's laws in describing the behavior of particles. He makes the point that the formulation of field theories is comparatively simple and elegant, although the detailed working-out of the field theories is a long and complicated process. These complexities are intentionally glossed over in an effort to display the essential structure.

While the book is primarily intended as an introductory work in classical mechanics, it could also be used well for review by physicists who have previously sweated through more detailed treatments of these same topics. One should never underestimate the joy of a person in reading or in hearing something that he already knows—or once knew.

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Communist Economic Strategy: Soviet Growth and Capabilities. Alec Nove. National Planning Association, Washington, D.C., 1959. 82 pp. $2.25.

This little volume presents a generally reasonable and sound appraisal of the economic achievements and prospects of the Soviet bloc. It discusses the ideological forces motivating expansion, the resources underlying expansion, the organizational structure of the economy, the economic performance to date, and the prospects both for internal growth and for winning over uncommitted countries. The discussion is generally well balanced and lays before the reader some of the more important differences of opinion among specialists on the Soviet economy. It is, in brief, a praiseworthy book.

The study of Soviet economies is still in a primitive state because of the difficulties in getting a detailed and reliable picture of basic facts. Most questions of fact are still unsettled, let alone questions of interpretation. Hence, all specialists will find something in this book to quarrel about, and some will find more than others. This does not detract from the general excellence of the book. It merely reflects the poor state of the science—and the intensity of feelings on the subject.

It is natural that I have a complaint, since Nove considers and then explicitly rejects my estimate of the rate of Soviet industrial growth. His discussion, beginning on page 39, is to be commended for presenting representative and conflicting estimates of Western scholars. My estimate is dismissed on the ground that it is lower than the others, a seemingly reasonable ground if no other criteria are to be used. One would expect to find Nove also rejecting the highest estimate in his list—one made by Francis Seton of Oxford—as an extreme, but he does not do so. Instead, he accepts it as most probable.

Seton's estimate is based on growth trends for steel and energy alone, on the assumption that industrial growth has been related to steel and energy production in the Soviet Union in the same way that it has been in a number of Western countries over recent decades. There are several cogent reasons for believing that this comparison is invalid and that a more correct one—for instance, with the United States around the turn of the century—would yield a much lower estimate of Soviet growth. But this cannot be argued here. The point to be made is that Seton's estimate of Soviet industrial growth is based on inadequate evidence, which leaves me puzzled as to why Nove accepts it.

It may be appropriate to settle here one factual mistake made by Nove. To support Seton's estimate, he states that Soviet industrial output rose from one-ninth of the United States' level in 1913 to one-third in 1955. Nobody knows enough about recent levels of Soviet production to be able to speak with strong conviction on relative output in recent years. But the evidence is much more abundant for 1913, and there can be little doubt that Nove understates the relative Russian output in that year.

He cites two sources for his figure of one-ninth, the first being a recent work by the elder Soviet economist, Strumilin. Looking to the source, one finds Strumilin is less than certain about the precise fraction, and he gives a range of figures that can be derived in different ways. In recent testimony before the Joint Economic Committee, Allen Dulles interprets Strumilin as having decided on one-eighth as the best estimate, and this is the figure Deputy Premier Kozlov used in his parting speech in this country. One-eighth is significantly larger than one-ninth, and it seems certain, for reasons that cannot be explained here, that one-eighth is still too low.

The other cited source is a publication by the League of Nations. Looking there one finds, first, that the fraction shown is actually one-eighth, not one-ninth as Nove reports. Moreover, the estimate—described by the source as "necessarily rough"—was calculated for 1925–29 and projected backward to 1913 on the basis of production indexes for the two countries. This would not be too important were it not that the official Soviet index (for large-scale production only) was used for the Soviet Union. That index shows Soviet industrial output as increasing by 35 percent between 1913 and 1925–29, whereas in fact it did not increase at all but declined somewhat. Correcting for this alone would raise the estimate for 1913 to one-sixth instead of one-eighth. Using much more direct evidence, I have calculated that the correct fraction probably lies between one-sixth and one-seventh.

It is a pity that Nove did not tidy up this little statistical corner where error is not entirely forgivable. His other figures may all be more soundly based, but one's confidence is not full.

However serious these shortcomings might be, they are more than overcome by other virtues. The book is well worth the reading.

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