

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 ex-

pansion, 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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