

as well as for the more immediate needs of examinations.

Following a very able presentation of the behaviour of materials under stress, there is a useful chapter on the production of metals and on the various treatments by which steel, in particular, can be improved or developed in certain desired directions. Besides familiarizing the student with the metals, this will assist him in understanding their specifications. A lengthy chapter on testing contains much information regarding the recognized tests and test-pieces, and describes various testing machines and appliances, the text being supplemented by diagrammatic sketches illustrating their principles. The latter part of the book is devoted to structures, and treats of framed structures, influence lines, deflections, suspension chains and bridges, and finally masonry. As a concise and educative statement of the theory of structures, this section can be confidently recommended to the student to whom the subject is as yet unfamiliar.

In contrast to the volume just described, Dr. Stewart's book deals with the practical design of some of the more simple structural details. In its earlier chapters it provides information regarding the rolled sections used, drawing office practice and procedure in relation to estimates and tenders, specifications and the ordering of material—all extremely useful information to the uninitiated. Equally so is the description of the template loft, the works and the machines and processes which are to be seen there.

The designs which are dealt with in this first volume of the series are of simple riveted fastenings and splices for various purposes and of beams. The complete design of a 20-ft. span gantry girder forms the tail-piece. As compared with the earlier edition, several new features have been introduced in the form of amendments to bring the text into line with the latest specifications, fresh material has been added, and an innovation is made in the arrangement of the text on the final design so that the calculations and explanatory notes are kept apart on opposite pages, thus giving a greatly improved presentation of the subject in its two aspects, instruction and example.

WORK OF PIERRE DUHEM

The Methodology of Pierre Duhem

By Armand Lowinger. Pp. ix+184. (New York: Columbia University Press; London: Oxford University Press, 1941.) 15s. 6d. net.

IN a prefatory note the author states that his aim is to provide a summary in English of the work of Prof. Pierre Duhem (1861–1916) on scientific methodology. The greater part of the book consists of extracts from his papers and from his book "La Théorie Physique", published in 1906 and 1914, with connecting passages supplied by the author. In the last chapter the author offers some criticisms.

It is rather difficult to assess the value of a book published in these conditions. At the present time there is little in it that is not familiar to workers in the subject, many of whom will emphatically accept it and others equally emphatically reject a great deal of it; to them the only question will be whether Duhem anticipated work that has been generally attributed to others. It does not appear to me that he did. His approach is substantially

that of Mach, except that he does not wholly reject metaphysics; he only draws a line distinguishing it from science. But this distinction involves the rejection of "models" and explanations from science; he insists on abstract formalism. I should say that the latter is very good if it can be done, but before accepting it as a general principle I should like to see the facts of geophysics represented without the aid of the model that we call 'the Earth'. He accepts Mach's view that the whole aim of scientific theories is economy of statement. He agrees that we make inferences from them beyond the original data, and expect the results to be verified, but says that this has no logical justification and is not science. I should say, so much the worse for such a narrow logic.

There is no mention in the book of Karl Pearson's "Grammar of Science", published in 1892, which does face this problem; and I consider that any later work on methodology that omits reference to the "Grammar" is like one on gravitation that omits Kepler's laws or one on the theory of the complex variable that omits Cauchy's theorem. Duhem actually insists at a much later stage that we must accept testimony; but we could not even arrive at the meanings of words without the process that he has rejected.

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MAINLY ON WILD GEESE

Through the Air

Adventures with Wild Fowl, and Small-boat Sailing. By Michael Bratby and Peter Scott. Pp. 128+21 plates. (London: Country Life, Ltd., 1941.) 10s. 6d. net.

THIS is a reprinted account of a series of broad-casts which Michael Bratby has made, mainly upon wild geese, and there are a number of black and white illustrations by his friend Peter Scott. There are also two excellent photographs of a pink-footed goose on her nest, evidently in Iceland or Greenland, and a magnificent photograph of an Arctic hare. Unfortunately, we are left in the dark as to who took these outstanding photographs. There are two very good photographs (facing pp. 57 and 60), taken, we are told, in Icelandic waters. Judging from the icebergs the climatic conditions that season in Iceland must have been exceptionally severe, and the conditions recorded resemble, rather, Greenland or Spitsbergen. There is a most interesting account (pp. 29, 30) of a flight of blue snow geese descending on the water on migration in dense mist and being swept over Niagara Falls. Most were killed during that tremendous descent, but a few survived, and were brought to England.

Another interesting record (pp. 66–68) is of a pink-footed goose which had been shot and slightly 'winged'. This bird became very tame, a mate was provided for her, and seven years after she was 'winged' the goose nested in a flower bed in the garden and reared a family. There she lived for twelve years, and then, as circumstances had altered for her human friends, she was given away. She was less happy in her new surroundings, and being full-winged, joined a skein of wild pink-footed geese, and was not seen again.

By the way, the author is wrong when he writes of the wings of the lesser black-backed gull (p. 80) as being "as black as coal". The wings of the British lesser black back are soot-grey, but the wings of the Scandinavian lesser black back are black.

SETON GORDON.