Chapters xxiv. to xxxiv. may be said to contain descriptions of the construction and design of the principal parts of steam engines. Some formulæ are given, as well as a few maximum pressures allowable on the different parts. On page 428, the author says that the pressure of 80 lbs. per square inch of bearing surface is allowed in locomotive practice between the slide blocks and bars, *when both surfaces are of hardened steel.* It is not the usual practice to make the slide block surfaces of hardened steel, and in engines built years ago, the pressure per square inch very much exceeded this limit. In most recent practice with cast-iron bars and slide blocks, this limit may be safely used. The taking of indicator diagrams is always one of interest. Chapter xxv. deals very thoroughly with this subject. Trials in connection with the power and efficiency of engines and boilers naturally follow the indicator, and very complete instructions are given for carrying these out, including precautions in advance of the trial. The concluding chapters of this work deal principally with mill work in its many branches. Friction and lubrication are explained, and many valuable hints are given. This book should prove of assistance to the steam user. The information given is of such a nature which will appeal to his partial knowledge of the subject, and render him more capable of understanding machinery generally.

N. J. L.

LECTURES ON DARWINISM.

Lectures on the Darwinian Theory. Delivered by the late Arthur Milnes Marshall, M.A., M.D., D.Sc., F.R.S., Edited by C. F. Marshall, M.B., B.Sc., F.R.C.S. (London: David Nutt, 1894.)

ALL the characteristics of the late Prof. Milnes Marshall are strikingly apparent in these lectures. In dealing with the many aspects of a subject which is often imperfectly understood, these lectures are clear and forcible, and the metaphors apt and convincing.

The first lecture deals with the history of the theory of evolution, and contains a concise and interesting epitome of the growth of this great conception, together with a brief account of the chief writers on the subject. The relationship between the process of evolution and the causes upon which it depends are perhaps liable to misinterpretation, the want of any feasible suggestion as to the latter being spoken of as a "fatal flaw" in, or a "fatal objection" to the former. Undoubtedly the want of some efficient cause at first prevented a wide belief in evolution, but logically the two questions are entirely distinct, and the evidence for evolution itself would stand undisputed, even if every one of the causes which now find acceptance were to be abandoned for ever. We know that Darwin himself was a convinced evolutionist long before his discovery of the principle of natural selection.

The second lecture treats of artificial and natural selection, and is accompanied by useful figures showing some of the changes which man has been able to accomplish in the creation of his domestic breeds. The whole lecture is clear and telling, the last paragraph being alone liable to possible misconception. In stating that "every species is for itself and for itself alone," it would have been advisable to bring forward instances in which a species benefits itself by benefiting others. It is most probable that such cases were described in the actual delivery of the lecture.

Then follow the arguments in favour of evolution, palæontology being first considered. We here meet, as in many of the other lectures, with exceedingly apt quotations from Darwin, Wallace, and others. It is an unfortunate omission that references are not given. In the delivery of the lectures to a general audience they may have been out of place, but there could have been no difficulty in their insertion in the present volume. Here, too, we find many useful figures of some of the extinct forms which are of the highest interest to the student of evolution. The reasons for the imperfection of the geological record are very excellently, and yet briefly, surveyed; and the same may be said of the sketch of the argument from geographical distribution, in which, however, by an obvious slip, the forest region of Brazil is spoken of as "south of the river La Plata" (p. 75).

The argument from embryology was probably the most congenial to the lecturer. This chapter is well illustrated, and contains more detail than the others. The term "acquired or larval characters" (p. 103) is open to exception, and the statement that rudimentary organs must be "inherited, for in no other way can their presence be explained" (*loc. cit.*), is too brief to be clear. It is probable that this sentence served as a note to be expanded by the lecturer; but it also required expansion by the editor. The chapter will be found extremely interesting and instructive by those who wish to read a popular account of the bearing of embryological facts upon the Darwinian theory.

The chapter on the colours of animals and plants, although containing much information in a little space, is not worked out in so complete and balanced a form as the other chapters, and in large part consists, apparently, of notes for the lecturer's use. It is erroneously stated that the colours of certain lepidopterous larvæ are due to their food, and some of the supposed examples of the direct action of environment are by no means proved to be caused in this way.

Then follows an interesting lecture on the "objections to the Darwinian theory." The figures of Pteropus on p. 165, although sufficient in themselves, are clumsily arranged. Here, too, many aspects of the subject are only treated in brief lecturer's notes, although these frequently contain trenchant remarks.

The "origin of vertebrated animals" is next considered, and the series concludes with an excellent epitome of "the life and work of Darwin."

It will be seen that the sequence of subjects is a very natural one, and well calculated to lead a general audience to follow and understand the most prominent and important aspects of the Darwinian theory.

E. B. P.

OUR BOOK SHELF.

My Climbs in the Alps and Caucasus. By A. F. Mummery. Illustrated. (London: T. Fisher Unwin, 1895.)

MR. MUMMERY is a bold man. Not only has he dared greatly among peaks and glaciers, but also he does not scruple to declare that he enjoys mountain