science they profess to write about, or imagine that a description of the bones and a few other anatomical facts constitutes physiology so far as the general public are concerned. There are, of course, some books which are notable exceptions to this rule, but we never remember to have seen one before which so admirably fits the purpose for which it is written as the little treatise before us, which the authors have labelled "The Human Mechanism."

A little anatomy has, of course, to be introduced, but this is kept in the background; what comes to the front is the study of function; this is well up to date, and the first half of the book is a clear and succinct account of modern physiological knowledge. It avoids unnecessary details, but omits nothing essential. It is so lucidly written that the wayfaring man will have to be a terrible fool if he does not understand it.

From such a sure bed rock, the authors pass on in the second part of the book to the application of physiological laws, and treat of personal, domestic, and public hygiene in turn. We can award to this part no higher praise than to say that it is as excellent as the preliminary physiological portion. It teems with sound practical common sense; it points out convincingly, avoiding too great technicality, the scientific reason for their faith. If the people at large and their rulers could be induced to act on its precepts, preventive medicine would indeed make a great stride in the battle man is always waging against disease and the consequences of his misdeeds.

Arithmétique graphique. Introduction à l'Étude des Fonctions arithmétiques. By G. Arnoux. Pp. xx+226. (Paris: Gauthier-Villars, 1906.) Price 7.50 francs.

ASSISTED by M. Laisant, the author has put into an interesting and occasionally novel form the elementary theory of congruences, indices, and residues of powers. He has also given various examples of the use of Galois's imaginary units, and of the solution of cubic congruences by means of Cardan's formula. There is nothing essentially new in the book, but it is entertaining as the work of an amateur who has looked at the subject in an independent way, and has occasionally put the facts into an unusually vivid form, for instance when he gives a chess-board diagram showing the solutions of $x^2+y^2 \equiv 2 \pmod 5$, and so on.

Familiar Trees. By Prof. G. S. Boulger. Pp. vi+160. (London: Cassell and Company, Ltd., n.d.) Price 6s.

As the author informs us in his preface, the book is an endeavour to describe the beauties of our familiar trees. He further points out that "Their many associations have interests that appeal to the historian and the moralist, to the student of literature and of folk-lore, but little less than to those interested in botany." . . . "The time has gone by when we could be content to stand agape at the wonders and beauties of the world of Nature; we require now some attempt, at least, at an analysis of the origin, purpose and significance of the objects of our admiration." Mr. Boulger has certainly given a fairly interesting account of a few of the commoner trees and shrubs. In his introduction he defines trees as perennial plants with a principal stem of some considerable diameter, rising from the ground and forming wood. Their woodiness distinguishes them from all herbs, and their one principal stem from shrubs. In spite of this, however, he includes in his book of familiar trees shrubs and even climbers, while such familiar trees as the oak, beech, and the lime are omitted and the Scots pine dismissed with a passing reference.

The author has, however, brought together a considerable amount of interesting material concerning the species with which he deals, and the value of the book is greatly enhanced by the many beautiful coloured plates and photographs. The appearance of the cross-section of the wood of the various species is well illustrated by selections from Mr. J. A. Weale's unique collection, and these, like the other plates and figures, do great credit to the artists by whom they were produced.

LETTERS TO THE EDITOR.

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Radium and Geology.

AFTER reading Arrhenius's vivid account[1] of the bombardment of the earth by electrically charged solar dust, one is prepared to appreciate Prof. Joly's hypothesis as set forth in his letter in NATURE of January 24. On the other hand, Mr. Strutt's analysis of granite affords strong support to the view that the radium it contains is of terrestrial origin. The concentration of this constituent in the biotite might conceivably be due to the absorption of percolating water containing radium in solution, but not in the zircon, a mineral which is as impermeable as quartz. A mineral analysis of Cornish granite from Penrhyn, made by Miss Davies in our geological laboratory, gave the following results:—orthoclase, 24·62 per cent.; albite, 13·42 per cent.; quartz, 40·23 per cent.; muscovite, 10·05 per cent.; biotite, 11·46 per cent.; magnetite and zircon, 0·16 per cent. The heavy portion of the Cornish granite analysed by Mr. Strutt, which was insoluble in hydrochloric acid, consisted of silica hydrate and zircon, and if the latter mineral was present to the extent of 0·16 per cent. only, it must have contained, judging from the analysis, $0{\cdot}637 \times 10^{-12}$ gram of radium per gram, or a little less than was found in crystals of zircon from North Carolina. In the consolidation of granite, the zircon crystallises out first, then the biotite, next the muscovite, afterwards the albite, and, finally, the orthoclase and quartz; but the concentration of radium diminishes in a similar order, a correspondence that can hardly be the effect of chance.

In the formation of granite, water has undoubtedly played a large part, and may have had a good deal to do with its differentiation from the parent magma. Water forms one of the constituents of biotite, sometimes to the extent of 10 per cent. Thus it is possible that the richness of granite in radium is due to the removal of this constituent in solution from the general mass of a magma and its concentration in certain portions which were converted by hydration into granite.

But if this be true of granite, may it not be true as well of basalt and other basic rocks in which also water plays its part, though to a less extent? All the igneous rocks to which we have access are very superficial parts of the earth's crust, and it is unsafe to reason from them to the deeper underlying regions. There may be other causes, apart from solution, by which electrically charged atoms like those of disintegrating radium have found their way up from below to enrich the outermost layers of our planet. In any case, the assumption that radium is uniformly distributed through a crust forty-seven miles in thickness seems to require support from independent evidence, and until that is forthcoming it is equally open to us to assume a thick crust, 800 miles, consisting of silicates, with radium distributed through it according to some unknown law, but with a rapid increase towards the zone affected by highly heated waters.

January 26. W. J. SOLLAS.

1 Arrhenius, "Lehrbuch der kosmischen Physik, 1903," p. 149. (Leipzig.)