intra-corporal. We are surprised also to find no reference to amoebic dysentery; with many cases now coming from abroad the practitioner is quite likely to meet with this disease. While pointing out these few slight blemishes, we can cordially recommend this book as on the whole a simple and reliable guide to clinical bacteriology and pathology.

Soil Conditions and Plant Growth. By Dr. E. J. Russell. Third edition. Pp. viii + 243. (London: Longmans, Green, and Co., 1917.) Price 6s. 6d. net.

THIS book is, as the title implies, concerned with the relationship between soil and plant. After an introductory historical account of the subject the author describes the constitution of the soil and the various factors of plant growth. In the development of these topics and of the question of the relation of the plant to its soil environment, the reader is kept constantly in touch with the best original work at home and abroad.

The author has made numerous additions in his third edition, and has considerably expanded those portions treating of the biological conditions in soils. He has also added a chapter on the colloidal properties of the soil, in which he brings the reader abreast of the recent researches and disputes of Continental workers, as well as the latest Rothamsted work on the interaction of dilute acids and soil colloids.

It is superfluous to say that the book is well written. There is an ample bibliography, which should be invaluable to the investigator in any branch of the subject.

The study of the relationship between soil and plant is exceedingly complex. Progress can only be made by studying the soil in every aspect of importance to the plant. It is a pity that so much labour should have been expended during past years in haphazard manurial trials, designed to instruct the farmer, but yielding generally a scanty harvest of accurate information. Soil investigators owe a debt to Dr. Russell and his predecessors at Rothamsted for enlarging the study of the soil into a respectable field of scientific activity.

G. W. ROBINSON.

Lesioni di Antropologia. By Prof. Fabio Frassetto. Vol. iii. Pp. xiii + 422. (Bologna: Mareggiani, 1917.) Price 20 lire.

IN the thirteen lectures contained in this volume Prof. Frassetto covers that part of his course which is devoted to the limbs—their evolution, development, and morphology. In his lectures dealing with the methods which are to be applied to the measurement of bones and to the exact estimate of their anthropological characters he has introduced much that is new and valuable. All through these lectures is reflected that spirit of mutual understanding which has existed between the anatomists of Italy and England since Harvey's time. There is no better summary of the contributions which British anatomists have made to physical anthropology than is to be found in these clearly written and excellent lectures by Prof. Frassetto.

A. K.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Radiation of the Stars.

I AM sorry that the only reply I can make to Prof. Eddington's remarks in NATURE of July 5 is that his amended equation seems to me neither to be true nor to lead to his supposed laws. But perhaps I may be permitted to offer a few remarks on the general problem.

Suggested sources of stellar energy fall into two broad classes—gravitational and electrical, the latter including chemical and radio-active sources. Of the former the Helmholtz contraction is by far the most powerful source of energy; the contraction of our sun from a state of infinite rarity would provide energy for about 20,000,000 years of radiation at the present rate.

An upper limit to the capacity of electrical sources can be calculated in a way I have not seen elsewhere. Our sun's mass is 2×10^{33} grm., its radiation about 4×10^{33} ergs per second. Thus to radiate for 20,000,000 years (or, say, 7×10^{14} sec.) at its present rate, each gram of matter must provide on the average 14×10^{14} ergs of energy. A gram of matter contains 3×10^{23} negative electrons, so that the average electron must provide 4.7×10^{-9} ergs of energy, corresponding to a fall through a potential difference of 10 electrostatic units, or 3000 volts. This is the energy of falling from infinity to a distance of only 4.7×10^{-10} cm. from a nucleus 10e, and so is probably much greater than any energy actually available from changes of electrical structure; it is, of course, enormously greater than any known ionisation potentials.

It accordingly looks as though the Helmholtz contraction will provide much more energy than any other source, and we must apparently adjust our views to the time-scale set by the contraction theory.

If this is accepted, it will be obvious that the calculation of stellar temperatures and emissions of energy cannot be a steady-state problem at all. I do not see how, in any case whatsoever, any new knowledge can be gained from calculations which assume the star to be in a steady state, for the calculated rate of emission can come to nothing but the previously assumed rate of generation of energy inside the star. For progress to be made, this big and difficult problem must, I think, be attacked on dynamical, and not on statical, lines.

July 7.

I HOPE I may state my grounds for disbelief in Prof. Eddington's results more clearly. The results are readily combined in the one result that the total emission depends only on M, and varies as M. Prof. Eddington claims to obtain this result in two ways. In his original paper he assumes (*M.N.*, vol. lxxvii., p. 20) a rate of generation $4\pi Me$, and after much calculation obtains a result which, on introducing the omitted constants, reduces (*l.c.* p. 29, equations (29) and (25)) to exactly $4\pi Me$, proving my point. Again, in NATURE of June 14, Prof. Eddington claims to obtain a result which I do not understand, but which is necessarily contradictory to the foregoing, since the emission cannot now involve e at all. He apparently says:—"Tell me the mass of a star and I will tell you its output of radiation without knowing the rate at which energy is being generated in its interior; I