

explaining their structural relationships to human races as inheritances from a common basal stock.

It will be thus seen that Prof. Sergi is the arch-priest of that heterodox doctrine—the multiple origin of closely allied species and genera. His faith is more robust than that of the majority of his colleagues. He accepts implicitly Ameghino's speculations concerning the independent origin of mankind in South America. Although the reviewer regards the majority of Prof. Sergi's opinions as ill-founded, he is only too willing to admit that it would be presumptuous, in the present state of our knowledge of extinct forms, to refuse them a most careful investigation.

A. K.

Vicious Circles in Disease. By J. B. Hurry.

Second edition. Pp. xiv+280. (London: J. and A. Churchill, 1913.) Price 7s. 6d. net.

In the issue of NATURE for May 18, 1911 (vol. lxxxvi., p. 374), an extended review by Sir T. Clifford Allbutt was published of the first edition of Dr. Hurry's book. The present edition has been revised, and six new chapters have been added in the hope of covering the ground more adequately. Most of the material of these additions has appeared already in the medical Press.

LETTERS TO THE EDITOR.

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Soil Fertility.

DR. RUSSELL begs the whole question in two lines of his letter in NATURE of January 16, when he terminates para. 7 with "the increased gain in plant growth on such highly heated soils can be largely attributed to this cause," viz. to the formation of ammonium and other simple soluble nitrogen compounds on heating soils to 170°.

If this were true, then the effects of heating soils, whether to the temperature of "partial sterilisation," viz. 98° (as in Dr. Russell's experiments) or (as in mine) to 170°, could be imitated by adding in, say, daily doses, suitable solutions containing ammonium compounds and nitrates.

I have repeatedly tried this with various combinations of salts, both in pot experiments and in the field, and have invariably found that the increased growth due to heating the soil previously was never even approached in extent by that in any of the plots or pots to which the manures were added.

It appears to me that the increased growth in Dr. Russell's experiments can only be safely ascribed to the manufacture of soluble nitrogen compounds by bacteria when in parallel sets of pots and plots the same effect is shown to be produced by artificially dosing unheated soils with such nitrogen compounds.

F. FLETCHER.

Rewika Ranch, Kyambu, British East Africa,
March 6.

I AM not at all surprised that Mr. Fletcher failed to reproduce the conditions of a strongly heated soil by simply adding frequent doses of ammonium compounds to an unheated soil. Soil suffers considerable decomposition when heated to 170° C., and changes

markedly in chemical composition, physical properties, suitability as a medium for the growth of bacteria, moulds, and other organisms, and as a habitat for the higher plants. Experiments become extraordinarily difficult to interpret when so many factors change simultaneously, and for this reason I have always preferred to adopt very much milder methods, treating the soil with antiseptic vapours (e.g. toluene), or heating to as low a temperature as possible (60° to 95° C.). Here less complication arises, because the decomposition effects are at a minimum, and one can study the various factors one at a time.

Increases in productiveness equal to those brought about by treatment with antiseptic vapours or heating to 65° C. can be obtained on our normal untreated soils by additions of sodium nitrate or ammonium sulphate. Further, partial sterilisation has failed to bring about increased productiveness when the treated and untreated soils are subsequently so liberally treated with nitrogenous plant food that the nitrogen supply is no longer a limiting factor. In "sick" soils, however, there is another limiting factor, the presence of disease organisms and pests, and this also is put out of action more or less completely by partial sterilisation. Here addition of nitrogenous plant food (which leaves the pests unaffected) does not make the untreated soil equal in productiveness to the partially sterilised soils. We could get no evidence of the toxin suggested by Mr. Fletcher, and, this being the case, I do not see how we shall advance matters by assuming its presence as a third limiting factor.

E. J. RUSSELL.

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Induced Cell-reproduction in the Protozoa.

I WAS interested in Mr. T. Goodey's letter under the above heading in NATURE of March 13, but should like to make a few remarks thereon. Hay infusion, which Mr. Goodey states caused the excystation of *Colpoda cucullus*, is prepared from dried grass, and here we have the products of cytolysis, and, in consequence, should expect the presence of auxetics. As a matter of fact, any vegetable infusion contains auxetics, the presence of which can be demonstrated by the jelly method on human lymphocytes, as described by Dr. H. C. Ross, "Induced Cell Reproduction and Cancer" (London: John Murray, 1910). Encysted forms of *Colpoda* cannot be compared with the winter spores of *Polytoma*, as in *Colpoda* there is, so far as I can gather from Mr. Goodey's letter, no conjugation prior to the encystment, and consequently no real development is necessary for the excystation, but only rupture of the cyst-wall. In *Polytoma*, however, the cytoplasm within the spores has to undergo several complex changes, leading ultimately to division of sarcode, formation of envelopes round the products of division, and the development of flagella. Thus, I take it that in *Colpoda* there is no reproductive process in the excystation, and consequently no necessity for auxetics; anything that will cause the rupture of the cyst-wall being sufficient, although, as already shown, auxetics were certainly present in the hay infusion.

With regard to the "pure distilled water," Mr. Goodey should remember that this is pure only so long as he adds nothing else to it. Directly organisms are added, auxetics would be present, as, apart from the fact that some of the culture fluid would be introduced with the organisms, even if this were not so, auxetics would be present, as there would be necessarily some death-rate. The same phenomenon also occurs in pond *Amœbæ*, the encysted forms of which can also be caused to undergo excystation by incubation with distilled water.