able us to foretell some of the course of human behaviour. The war brings the chance of testing the truth of this suggestion. It is becoming, obviously, more and more a war of moral forces; and an understanding of the nature and sources of national *moral* must be as important a source of strength as the knowledge of the military engineer.

The author proceeds to discuss the various forms of gregariousness, and finds the British form typified by the bee, the German form by the wolf. The difference is so great that the war is not so much a war between nations as a war between different species. Nature is making one of her great experiments; is setting herself to try out the strength of the socialised and the aggressive types. To the socialised peoples she has entrusted the task of proving that her old faith in cruelty and blood is at last an anachronism. To try them, she has given substance to the creation of a nightmare, and they must destroy this werewolf or die. And a calm consideration of the German and the British mind leaves us in no doubt where the strength lies. In Britain there has been no Hymn of Hate, no "God punish Germany!", no gospel of bluster and frightfulness. These are symptoms of lupine rage. But Britain, fighting for existence and for honour, has quieter and deeper vision; and she will not sheathe the sword until her task is done and a peaceful Europe once more possible, freed from the terror of imminent wanton attack by an aggressive Power.

British Fungi and How to Identify Them. By J. H. Crabtree. Pp. 62. (London: C. H. Kelly, n.d.) Price 1s. net.

OUR native fungi afford beautiful objects for the photographer, and have been well illustrated in the many popular and scientific works which deal with them. In the little book before us Mr. Crabtree illustrates some forty different species of well-known fungi by means of very good photographs, and each photograph is accompanied by a page of useful descriptive text. By the aid of both text and illustration a particular fungus should be able to be identified without much difficulty. In the case of the somewhat small differences between certain edible and poisonous fungi the ordinary photographic reproduction is not sufficiently clear to show the distinguishing features, and a few good colour prints would have been of value.

In a short introduction of four pages the author gives a concise account of the larger fungi in general—with which only this little book is concerned—details as to the spore-arrangement, etc., and a simple classification. It is unfortunate that Mr. Crabtree's frontispiece, "An unnamed fungoid growth found upon a tree," is not a fungus at all, but is what is known as a "wood flower." This hollow woody growth has been gradually formed about the suckorial portion of some parasitic plant, probably a *Loranthus*, which has become detached and has left a large tulip-shaped woody scar resembling a fungus on the branch of its host plant.

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LETTERS TO THE EDITOR.

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The Primary Sugar of Photosynthesis.

MICROCHEMICAL tests on the assimilating cells of several plants indicate a considerable concentration of hexoses in the chloroplasts, or in the protoplasm immediately surrounding them. Other lines of experiment suggest that while sucrose is concentrated in the large vacuoles, invertase is held apart from it in the protoplasm.

These facts force upon one the possibility that the pioneer analytical work of Brown and Morris established and extended by Parkin and by Davis and his collaborators, does not after all necessitate the conclusion that the formation of sucrose is a preliminary step to the production of hexoses in the leaf.

It seems more probable that the hexoses are formed from formaldehyde in the chloroplast, and, when their concentration reaches a certain limit, condensation into sucrose due to invertase, or some saccharogenic enzyme, takes place. The sucrose thus formed is passed into, and stored in the vacuole. As the volume of the protoplasm available for the hexoses is small compared to the space allotted to the sucrose, the increase of the total percentage of hexoses will be small when the leaf is exposed to light, while that of the sucrose will be large. Consequently the rise of sucrose on illumination shown in analyses of leaves is not a cogent argument for regarding it as the primary sugar.

The recognition of the localisation of various substances in the cell also supplies an explanation as to how the sucrose-hexose ratio of the cell is maintained in presence of invertase. The absence of invertase from, and the storage of sucrose in the vacuole may be compared to the conditions obtaining in the root of the sugar beet. Only there, of course, the source of sucrose is secondary hexoses. In photosynthesis the condensation of the sugars is probably determined by the fact that for the same rise of osmotic pressure in the vacuole twice the amount of the disaccharide may be stored. When the limiting pressure is reached in this way the condensation of hexoses to starch may give extended elasticity to the economy of the cell.

HENRY H. DIXON.

THOMAS G. MASON.

School of Botany, Trinity College, Dublin,
April 10.

Isle of Wight Disease in Bees.

DRASTIC recommendations regarding the disinfection or destruction of combs, hives, and appliances which have come in contact with bees infected by Isle of Wight disease have been made by the Board of Agriculture, and were repeated in an article in NATURE of March 2 (p. 7). The recommendations are founded upon the idea of the infectiousness of the disease, and are intimately connected with the recognition of the protozoon *Nosema apis* as the cause of the disease, and with the knowledge of the ease by which this parasite can be disseminated by infected bees. On account of the practical importance of the subject, I would direct attention to the results of experiments bearing upon these points, carried out by Mr. J. Anderson and Dr. J. Rennie, of the North of Scotland College of Agriculture and University of Aberdeen respectively, and communicated at a recent meeting

of the Royal Physical Society. As an account of the observations and experiments, which were numerous and detailed, will appear in the next part of the Proc. Roy. Physical Soc., an indication of their bearing is all that is necessary for the present.

(1) As regards *Nosema apis*, the authors have been "unable to recognise any causal relation between the presence of this parasite and the disease." Healthy stocks with no signs of disease have been found to be heavily infected by the protozoon, and that over prolonged periods. Numerous stocks have exhibited unmistakable symptoms of Isle of Wight disease, and yet no trace of *Nosema* has been found in them. This was markedly the case in the Deeside outbreak. Lastly, deliberate infection of a stock with *Nosema* did not produce the recognised symptoms of the disease. "*Nosema* may be a contributing weakening factor, favouring in certain cases the development of this disease, but we have not found that it is an essential factor."

(2) As regards the infectiousness of Isle of Wight disease: If it be allowed that *Nosema*, with its readily transported spores, is not the prime cause of the disease, the supporting evidence of infectivity is weakened, and the direct evidences must be examined more critically. The authors have watched in detail the natural course of Isle of Wight disease in three independent localities, and have followed the history of untainted swarms placed in contaminated hives and fed on contaminated honey. They have found no indubitable evidence of the infectiousness of the disease, although the indications seem to be that it is "probably infectious"; but in any case they are assured that it is "not necessarily conveyed by mere contact with contaminated hives or combs, or by feeding upon contaminated stores."

It is a point of some interest and importance that, on account of the unsatisfactory nature of experiments on a small scale in artificial conditions, the above results are based on observations and experiments upon hive bees living in natural conditions.

JAMES RITCHIE,

(Hon. Secretary, Royal Physical Society).

Edinburgh.

REGARDING Dr. J. Ritchie's communication, it would seem well to await the published paper of Messrs. Anderson and Rennie before making detailed remarks. Also, as Dr. Ritchie is not the direct author of the paper, it is inadvisable to bring in a third party. However, it is most surprising, to say the least, to learn that "Isle of Wight" bee disease is not considered to be infectious. How, then, has the disease spread all over Great Britain and most of Ireland during the last ten years? The statement of the non-infectivity of the disease is emphatically inaccurate. Dr. Ritchie writes of the "unmistakable symptoms" of the disease. But, what are the characteristic symptoms? The investigators working under the Board of Agriculture, in their reports of 1912 and 1913, showed conclusively that there were no well-marked differential symptoms of "Isle of Wight" bee disease. This was also pointed out in my article in NATURE, and the reason for this is obvious, namely, the limited range of expression of the bee, as was also mentioned in my article. Of the workers contributing to the reports of the Board of Agriculture, two were bacteriologists, two were protozoologists, and one was an expert bee-keeper. Many field experiments as to the pathogenicity of *Nosema apis* were conducted, and the investigators were unanimously of the opinion that "Isle of Wight" bee disease is microsporidiosis. Apparently Dr. Ritchie and Messrs. Anderson and Rennie have quite overlooked the importance of parasite carriers, a subject

which was carefully pointed out in my article and in the Journal of the Board of Agriculture, Supplements Nos. 8 and 10. Healthy carriers of most parasitic diseases are known.

As to "drastic recommendations," the simple elements of sanitation only were suggested, about which there can be no dispute. The destruction of hives was not suggested in my article. Regarding the experiments of Mr. J. Anderson and Dr. J. Rennie, there is no statement in the above letter as to what stages of *Nosema apis* were used by them.

These remarks must suffice for the present. My article was written after ten years' personal investigation of "Isle of Wight" bee disease, in nearly every part of Great Britain. Judging from Dr. Ritchie's letter, the paper of Messrs. Anderson and Rennie appears to contain little but negation. F.

Preventive Eugenics.

THE writer of the valuable article in NATURE of April 6, on the report of the Royal Commission on Venereal Diseases, has given it the title of "Preventive Eugenics," a term for which I am responsible, defining it as "the protection of parenthood from the racial poisons," by which latter I mean all such agents as, injuring the individual, injure also the next generation through him, or her, as parent.

Syphilis is, of course, an example of a racial poison, and your writer's protest against the term "hereditary syphilis" is most welcome to one who has made such protests for many years. As Dr. J. W. Ballantyne has said, the term is "an insult to heredity." It indicates the persistent medical and popular blindness to the ante-natal stage of human life. All syphilis is acquired syphilis, an infection of which the date may be ante-natal, when we inexcusably call it "hereditary," or post-natal, when we call it acquired, the fact being too obvious for even the "idols of the forum" to obscure. The Commissioners should have condemned the false term, and used "ante-natal syphilis" instead.

The point is not only academic. Eugenists who have had no medical, much less obstetrical, experience, unaware of the fallacy involved, have assumed much infant mortality to be due to bad heredity, and thus to be an instance of natural selection, when, in fact, ante-natally acquired infection of syphilis was responsible. This grave error is involved in the biometrical publications on infant mortality throughout, and has long discouraged the efforts now being made, at last, to save the infants who are our national future.

C. W. SALEEBY.

Royal Institution, W., April 8.

Atmospheric Electricity.

IT would be interesting to know if any reader of NATURE has made observations similar to those made here on the afternoon of April 14.

A large thundercloud was just passing off in the east without having produced any obvious thunderstorm phenomena. The sky overhead was occupied by cirrus, while a second thundercloud was coming up in the west. It was found that sparks, one of them certainly reaching 2 or 3 mm. length, could be drawn from the metal of a Besson comb nephoscope, supported on a wooden stand, with the comb at a height of 3½ metres above an asphalt roof (itself 12 metres above ground), on which observer and nephoscope stood. The leaden roof of a wooden cistern casing yielded similar results, but the most surprising observation was that a Campbell-Stokes sunshine recorder, bolted and cemented to a concrete parapet extending about a metre above the asphalt, also gave