war effort. Members of the deputation included Lord Samuel, Captain Leonard Plugge, M.P. (chairman of the Parliamentary and Scientific Committee, from whom the deputation came), Dr. W. Wooldridge, C. S. Garland (British Association of Chemists), Professor W. Makower (Institute of Physics), Sir Lawrence Bragg, Professor B. W. Holman, Gower Pimm (Institute of Structural Engineers), Professor Bernal (Association of Scientific Workers), Colonel Thompson (president of the Institution of Mechanical Engineers), J. H. Wootton-Davies, M.P., Lord Pentland, Hugh Linstead, M.P., R. B. Pilcher (Institute of Chemistry), Lord Leverhulme and Lord Hinchingbrooke. It is reported that one of the points emphasized by some members of the deputation was that young scientific men of ability should be given more encouragement to exercise their inventive faculties. The view was expressed that not only the War Cabinet but the Chief of Staffs Committee should be advised by scientific men on appropriate matters.

IT is reported in *Nature* that at a recent meeting of the trustees of the Beit Memorial Fellowships for Medical Research, Dr. A. N. Drury, Huddersfield lecturer in special pathology in the University of Cambridge, was appointed to the advisory board in succession to the late Professor A. J. Clark. The trustees noted the election this year of three past fellows to the fellowship of the Royal Society, namely, E. Hindle (junior fellow, 1910–12, and senior in tropical medicine, 1927–33), F. M. Burnet (1926–27) and A. R. Todd (1935–36). Of the twenty-eight present fellows, there are now fourteen seconded for whole-time war-work. The following elections have been made, with permission for each fellow to be seconded at any time for war duties: *4th Year Fellowship* (£500 a year), E. G. L. Bywaters, to continue his studies of crush injuries in relation to kidney function, at the British Postgraduate Medical School, London. *Junior Fellowships* (£400 a year), Dr. D. Herbert, to study the biochemistry of toxoids for active immunization against gas gangrene, at the Dunn Biochemical Laboratory, University of Cambridge. Dr. F. W. Landgrebe, to study the separation of posterior pituitary hormones and their clinical uses, at the Medical School, University of Aberdeen.

THE seventeenth Congress of the French Medical Association of North America will be held at the Hôtel Mont-Royal, Montreal, from September 14 to 17.

THE London correspondent of the *Journal* of the American Medical Association states that the report on the work of London University during the past year shows that in spite of financial and other difficulties due to the war it remains a valuable institution which is producing skilled men and women both for war work and for playing a useful part in reconstruction after victory. In 1938–1939 there were 14,587 internal and 10,893 external students. In 1940–1941 (the first complete war year) the figures were 8,916 and 8,840. The smaller diminution on the external side is explained by the fact that evacuation has not hit it as much as it has dislocated the collegiate side. Moreover, many serving members of the armed forces are pursuing courses of study as external students. The figures for 1941–1942 are not yet complete, but according to the *Journal* there appears to be a slight increase in both internal and external students. In the latter it is in faculties whose work is most directly related to the war effort—science and engineering—that numbers are best maintained. Turning to students attending schools of the university, there is a sharp distinction between the medical and non-medical schools. In 1940–1941 medical students were nearly 90 per cent. of the number for 1938–1939, while non-medical students were only 56 per cent. Before the war 63 per cent. of the students at non-medical schools were men; now the proportion is only 50 per cent. In the medical schools the proportion of 90 per cent. has scarcely changed. The main new problem during the year has arisen from the government's decision to call up women for national service, which has had an immediate effect on the position of women students.

DISCUSSION

THE PRODUCTION OF TWO ANTIBACTERIAL SUBSTANCES, FUMIGACIN AND CLAVACIN

THE successful utilization of penicillin, produced by the fungus *Penicillium notatum,* for combating certain human diseases resistant to other treatments has focussed attention upon the possibility that various other fungi isolated from such natural substrates as soil or manure might produce different antibiotic substances. These might possibly supplement penicillin by acting upon pathogens not affected by this substance. Chemical compounds might thus be obtained which possess totally different antibacterial mechanisms. Several fungi, other than *P. notatum,* have already been shown to produce antibiotic substances; some of these have been isolated in crystalline form and identified chemically, whereas others have been obtained only in a concentrated active form.[1] In a study of the presence of antagonistic fungi in nature, the bacteria-enriched agar media[2] have been utilized.

[1] H. Raistrick and G. Smith, *Chem. Ind.,* 60: 828–830, 1941; A. E. Oxford, H. Raistrick and G. Smith, *ibid.,* 61: 22–24, 48–51, 1942; E. C. White, SCIENCE, 92: 127, 1940; G. A. Glister, *Nature,* 148–470, 1941.

[2] S. A. Waksman and H. B. Woodruff, *Jour. Bact.,* 40: 581–600, 1940.

More than 160 cultures of antagonists were thus isolated from soils, manures and composts.[3] These fungi were divided into nine groups on the basis of their taxonomic and physiologic relationships and were found to vary greatly in their capacity to produce antibacterial substances.

Of these antagonistic fungi, two species of *Aspergillus* were studied in greater detail: *A. fumigatus,* of which 16 strains were isolated from different soils, and *A. clavatus,* represented by 3 strains isolated from stable manure. In synthetic media, these two organisms produced active substances, that differed greatly in their chemical nature and in biological activity. These two substances were designated as *fumigacin* and *clavacin,* respectively.

Fumigacin is readily soluble in chloroform and in ethyl alcohol and to a limited extent in ether and in water; it precipitates from an alcoholic solution, on cooling, as fine, long, needle-shaped crystals. The substance is active against gram-positive bacteria but has only limited activity against gram-negative forms, as represented by *Salmonella* and the colon-aerogenes groups. Fumigacin is isolated from the medium by adsorption on norit, and subsequent elution with chloroform, after preliminary treatment of the norit with ether. The chloroform is removed by distillation and the active substance is dissolved in alcohol. Fumigacin is markedly different from the pigment fumigatin, isolated by Raistrick and associates,[4] in its mode of formation, chemical properties and biological activity.[5]

Clavacin is soluble in ether, chloroform, alcohol and water. As yet, it has not been isolated in crystalline form. It can be extracted from the culture medium by direct treatment of the culture filtrate with ether and chloroform, or it can first be adsorbed on norit and then removed from the latter by means of these solvents. It is readily soluble in dilute alkalies. Clavacin is particularly active against gram-negative bacteria, the colon-aerogenes group being nearly as sensitive as staphylococci and spore-forming bacteria. Another important characteristic of this substance is its high bactericidal property. It is known that most antibiotic substances act upon bacteria primarily as a result of their bacteriostatic properties; they are rather weakly bactericidal. Clavacin appears to be distinct from these in this respect, possessing both high bacteriostatic and high bactericidal properties, 6 to 18-hour-old cultures of various gram-negative and gram-positive bacteria being killed within 2 to 6 hours by dilution of 1:50,000 to 1:500,000 of the crude clavacin.

The substance recently isolated by Wiesner[6] from *A. clavatus* appears to be similar to clavacin, if not identical with it.

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[3] S. A. Waksman and E. S. Horning. In press.

[4] W. K. Anslow and H. Raistrick, *Biochem. Jour.,* 32: 687–696, 1938; A. E. Oxford and H. Raistrick, *Chem. Ind.,* 61: 128–129, 1942.

[5] S. A. Waksman, E. S. Horning and E. L. Spencer. In preparation.

NATURAL PROTECTION AGAINST SUNBURN

EVERY one knows that skin which has been exposed to sunlight is less likely to sunburn than skin that has not been exposed. However, the explanation usually assigned is only partially correct at best. Skin which has been exposed ordinarily assumes a brown or tan color, principally due to the formation of melanin pigment,[1] and Finsen[2] about 1900 suggested that this pigment acts as an effective screen to mitigate the action of the sun's rays. This explanation seems so logical that it has been almost universally accepted. However, the pigment is located principally in the basal cell layer of the epidermis, whereas findings subsequent to Finsen's show that the cells primarily affected in sunburn are chiefly the prickle cells which lie superficial to most of the pigment. This arrangement of the pigment is characteristic of white skin, whereas in Negro skin it is more evenly distributed throughout the epidermis.

About 1927 Guillaume[3] suggested that the thickening of the corneum or horny layer of the epidermis might be the principal protective factor, *i.e.,* the thickening of this layer should decrease the amount of radiation penetrating to the cells beneath. This suggestion was followed up by Miescher,[4] who showed that sufficient thickening of the corneum occurs after exposure to sunlight to provide effective protection.

In the disease, *vitiligo,* certain areas of the skin do not produce pigment, but exposure of these areas to ultraviolet radiation causes a decrease in sensitivity to subsequent exposure.[5] This is further evidence that pigment is not the sole protective agent.[6]

[6] B. P. Wiesner, *Nature,* 149: 356–357, 1942.

[1] See E. A. Edwards and S. Q. Duntley, SCIENCE, 90: 235, 1939.

[2] N. R. Finsen, *Mitt. Finsens Med. Lysinstitut,* 1: 8, 1900.

[3] H. C. Guillaume, "Les Radiations Lumineuse en Physiologie et en Therapeutique," Paris, Masson et Cie, 1927.

[4] G. Miescher, *Strahlentherapie,* 35: 403, 1930.

[5] C. With, *British Jour. Dermatol. and Syph.,* 32: 145, 1920.

[6] For additional discussion and references see: F. Ellinger, "Radiation Therapy," New York, Elsevier Publishing Company, 1941; H. F. Blum, "Photodynamic Ac-