BACTERIA

The Healing Touch

from our Microbiology Correspondent

RECENT work in Stockholm has shown that the bacteria which first establish themselves in burns prevent or diminish infections from other species. An investigation of bacterial antagonism in burns was prompted by two observations made at the Burns Unit of Karolinska Sjukhuset. First, fresh, uncontaminated burns were colonized rapidly by pathogenic strains peculiar to the unit, and second, after treatment of staphylococcal septicaemia with erythromycin, strains of staphylococci resistant to the antibiotic spread throughout the unit and could be isolated from the burns of all new patients, but not from patients admitted before the start of erythromycin therapy—they were heavily infected with sensitive staphylococci.

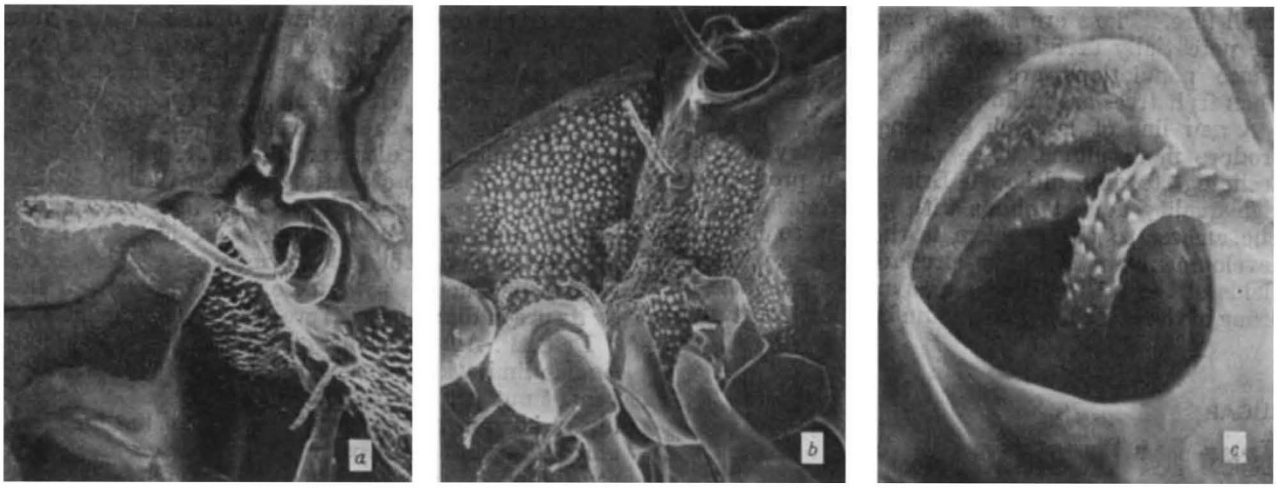
Kristina Wickman has examined the effect of introducing innocuous bacteria to fresh burns in the hope of antagonizing pathogenic microorganisms. Her experiments with *Staphylococcus epidermidis* as the interference strain and an erythromycin-resistant *Staphylococcus aureus* as the pathogenic strain are reported in *Acta Pathologica et Microbiologica Scandinavica* (**78B**, 15; 1970). Full-thickness burns were produced in male guinea-pigs to approximately 2 per cent of the total body surface, insufficient to affect the general health of the animals. A massive dose of the interference strain was applied to the burns by means of a swab and an accurate dose of *S. aureus* was given in the form of an aerosol. Spontaneous occurrence and establishment of staphylococci were also studied.

Colonization of burns by *Staphylococcus aureus* was not completely prevented, but the percentage occurrence of the pathogen was significantly reduced by the presence of the interfering strain. Thus, *S. aureus* was recovered from 73 per cent of untreated control animals but from only 27 per cent of animals in test groups. Moreover, there was a considerable difference in the extent of growth of the interference and pathogenic strains, which was maintained until 18 to 19 days after burning; the mean healing time of control animals was about 23 days. The fact that the pathogen finally prevailed suggests that *S. epidermidis* did not exert a true antagonistic effect nor confer immunity. Wickman considers the phenomenon to be simply competition between bacteria with similar nutritional requirements and concludes that, if the population of the interference organism could be maintained at a higher level throughout the healing period, then the pathogenic strain would not be able to dominate the infection. In this situation, the precedence of wound colonization is critical and competition between different strains of *S. aureus* was as striking as that between *S. epidermidis* and *S. aureus*. Out of eighty-two animals challenged with the test aerosol, only one of the forty-two *S. aureus*-positive lesions was colonized by the test and spontaneous strains in the two weeks following burning.

This stratagem of microbiological control has been tried previously, for example in the context of nosocomial infections in human babies. But whereas earlier attempts to exploit this prophylactic phenomenon involved potentially pathogenic microbes, Wickman has used a non-pathogenic organism isolated from the animal's indigenous microflora. Her work also highlights a possible hazard resulting from antibiotic prophylaxis. Chemotherapy may eliminate the originally present, antibiotic-sensitive bacteria which might normally antagonize invading pathogens. Consequently antibiotic resistant and often more virulent hospital strains may have a very much easier time of infecting burn and other wound lesions.

MICROSCOPY

Close up on Mite



The scanning electron microscope has again revealed structural details of a minute arthropod. These micrographs of the oribatid mite, *Oppia coloradensis* Woolley, were taken by Dr T. A. Woolley (Colorado State University) and Mr T. Yamamoto (Jeolco Ltd, Burlingame, California) on a Jeolco JSM-U3 instrument at 5 kV. All specimens were coated with gold. (*a*) The clavate sensillus, pseudostigmata and exobothridial hair below the pseudostigmata (×600). (*b*) A slightly different angle on (*a*), showing the first and second legs and their tuberculated foveae (×600). (*c*) The enlarged opening of the pseudostigmata and the spined base of the emergent pedicel of the sensillus (×3,000).