BIOMEDICINE

Toxic shock culprits

More details about the causes of the toxic shock syndrome are reported in the Feb. 20 SCIENCE by Mitchell L. Cohen and Stanley Falkow of the University of Washington at Seattle. The infectious agent definitely seems to be the bacterium *Staphylococcus aureus*, but only *S. aureus* bacteria that make several specific proteins.

Last year the Centers for Disease Control in Atlanta reported that the toxic shock syndrome had been associated not only with the use of tampons but with vaginal colonization by *S. aureus* (SN: 10/18/80, p. 247). However, the CDC noted that quite a few menstruating women have *S. aureus* in their vaginas but do not have the syndrome—suggesting that there might be a difference between the *S. aureus* bacteria that normally inhabit the vagina and those that cause the syndrome. Cohen and Falkow studied 52 *S. aureus* isolates provided by the CDC—32 from patients with toxic shock syndrome and 20 from persons infected with *S. aureus* but without the syndrome. They report that 78 percent of isolates from syndrome patients, but only 25 percent of isolates from control subjects, contained two particular proteins.

These results, Cohen and Falkow conclude, not only confirm *S. aureus* as a culprit in the syndrome but suggest that it is only specific *S. aureus* bacteria—those that make the two proteins—that are the villains. Whether the two proteins act as toxins and the ultimate disease initiators in the syndrome, however, remains to be determined, since the proteins might only be markers for the causative *S. aureus* bacteria. Also to be learned is how the culprit *S. aureus* bacteria interact with tampons to cause the syndrome.

'Seeing eye' computer

Despite white canes and seeing-eye dogs, mobility is a major problem for the blind. But Carter C. Collins and Michael F. Deering of the Smith-Kettlewell Institute of Visual Sciences in San Francisco are developing an electronic travel aid that may help the blind get around easier and more safely.

The aid consists of a shoulder-mounted television camera that produces images of nearby objects. The camera image is processed within half a second by an attached computer. Computer-generated speech then identifies nearby objects for the wearer, and computer-generated body taps tell the person in what direction and how far away these objects are. The computer provides an update on the environment every one or two feet at a blind individual's normal walking speed.

The aid is to be tested soon on blind patients.

New approach to controlling allergies

What may be a more effective approach to treating allergies is slowly emerging from the labs of David H. Katz of the Scripps Clinic and Research Foundation in La Jolla, Calif., and of Kimishige Ishizaka of Johns Hopkins Medical Institutions in Baltimore. They are working with chemicals in the body known to suppress IgE antibodies — a class of antibodies known to be involved in allergic reactions.

Several years ago Katz found, in animals, that immune cells called T cells make a chemical that suppresses IgE antibodies. Now Ishizaka and his colleagues report that they, too, have found in animals a chemical that suppresses IgE antibodies. The two chemicals are not identical but are related. If either can be isolated from humans, then developed in tissue culture, it might make a highly specific and effective antiallergy drug. The allergy therapy now available—frequent shots of an allergen to which a patient is allergic—is time-consuming, costly and often ineffective in desensitizing a patient against the allergen.

TECHNOLOGY

Self-saving liquid-junction cathodes

Bell Laboratories' work on liquid-junction semiconductor solar cells (SN: 4/22/78, p. 250) has taken a new twist, and it seems to be paying off. Under the direction of Adam Heller and Barry Miller, the first stable, efficient semiconductor photocathode cell was developed to convert sunlight into electricity. Its 11.5 percent efficiency, announced this month, is similar to the best achieved in their earlier work using photoanodes. But more important, making the cathode the photochemical element has solved the problem of corrosion — a persistent blight that had plagued the photoactive electrode's semiconductor surface whenever the cell was exposed to intense sunlight; over time, surface corrosion would cause a cell to fail.

The new liquid-junction cell has built-in cathode protection against the formerly devastating oxidation of the semiconductor's surface. As light strikes the semiconductor—in this case, indium phosphide—it generates electrons and drives them to the semiconductor's surface. The surfeit of electrons that builds up protects the surface from oxidation, contributing to the cell's stability. In fact, the more light that strikes the cell (tests have included concentrations of up to three times incident sunlight), the more stable it becomes.

Heller points out that "while this advance isn't the final step needed for economic viability, it opens the door for a possible next generation of efficient, more economical liquid-junction solar cells." Heading the list of what comes next, Heller says, is the search for a less expensive semiconductor that offers similar cathode protection (gallium arsenide, used in previous liquid-junction cells, won't provide it) and then learning to apply it to the cathode in polycrystalline thin films.

Drilling from towers of ice

An Oslo attorney has applied for an international patent on an offshore oil-drilling platform made of ice. Eystein Husebye would case his ice structure — 200 meters on a side, 60 meters high — in a concrete shell lined with insulation, the Norwegian Information Service says. Supposed to be as safe as current offshore platforms, it would cost only 20 percent as much.

Designed for arctic exploration projects, these bergs would be positioned on the seafloor, then frozen to its rocky bed. Envisioned platforms would be large enough to separate living quarters for their crews from production equipment with a safety zone between the regions in case of fire. Husebye claims his structures would be as stress resistant as steel and concrete, even during fires.

Advance of the superchips

Who packs the power of a large, mainframe computer on just three small semiconductor chips? The company that pioneered the microprocessor (or computer on a chip) — Intel Corp. — announced introduction of its "micromainframe" on Feb. 17. Designed for programing-intensive jobs, the three chips contain 220,000 transistors between them, handle 32 bits (basic units of data) simultaneously and can process twice the data load of today's most powerful microprocessors. This micromainframe, which was designed to be programed in the Defense Department's high-level Ada language, is able to multiply 32-bit numbers by 32-bit numbers in 6.25 microseconds.

On Feb. 19, Hewlett-Packard Corp. announced the development of what it believes is the densest integrated-circuit chip ever designed. Also a 32-bit model, this 450,000 transistor chip multiplies a 10-digit number by a 10-digit number in 1.8 microseconds. HP will not market the chip commercially, but plans instead to use it in its own products.