

alkalophilic phages — growing at around pH 10 (see also p. 225, this issue).

Since then, he has been studying their molecular biology and has been successful in using the new types of enzymes they produced by microorganisms in industrial processes, most notably the use of CGTase from an alkalophilic *Bacillus* species to produce cyclodextrin from starch on an industrial scale and at very high yields. More recently he has discovered a penicillase gene in an alkalophilic *Bacillus* species which, when transferred to *Escherichia coli*, changes the membrane permeability (for reasons as yet unknown), causing the bacteria to excrete penicillin into the culture medium. Commercial applications are obvious and are being followed up in Japan and abroad.

But Professor Horikoshi sees this as just a beginning. Given powerful tools provided by advances in genetic engineering, he now believes that we are falling behind in knowledge of new functions that may be usefully transferred to other organisms. In particular, industrial processes are often unsuited to the neutral pH and moderate temperatures that suit the microorganisms which have been most extensively studied so far. What better place to look for a thermostable enzyme suited to a high-temperature industrial process than in a thermophilic bacterium?

There is plenty of reason to believe that there are vast numbers of microorganisms living in extreme environments that are still waiting to be discovered. Recently a bacillus isolated from a hot spring in Yellowstone Park in the United States has been reported capable of growing at 100°C, a yeast, *Candida scotti*, has been isolated from the Antarctic which grows at 0 to -10°C but not at +15°C, and a *Thiobacillus* species growing at pH below 4 are already commonly used for leaching metals from mine wastes. And of course there is the notorious "black smoker" bacterium that grows at temperatures of around 250°C — if indeed it really exists (see *Nature* 303, 423; 1983).

What the Superbugs project now aims to do is to screen microorganisms isolated from extreme environments all over the world, analyse their tolerance mechanisms, metabolic pathways and the expression and control of tolerant enzymes, and then to try introducing activities such as alkalophilicity, halophilicity and thermophilicity into "moderate" bacteria. It may then be possible to put into operation new bioreactors that can operate at higher temperatures and salt concentrations.

Luckily, Professor Horikoshi already has a good site for the independent laboratory the project requires — the old building not far from Tokyo University that RIKEN abandoned when it moved out into the country some 15 years ago. The new RIKEN site also happily contains a new microorganism culture collection which could prove vital for storing new organisms.

Alun Anderson

US space weapons

ASAT deal in Congress

Washington

CONGRESS is heading towards a compromise that would impose a six-month moratorium on tests of antisatellite weapons (ASATs) against a target in space and further require the President to certify that a "good faith" effort is being made to negotiate "the strictest possible limitations" on such weapons "consistent with . . . national security" before proceeding with such tests.

The compromise would reconcile the differing approaches taken by the House of Representatives and the Senate to avoid an arms race in space weapons. The Senate voted by a substantial majority to impose the certification requirement only; the House, by a smaller margin, called for a one-year ban on testing against a target so long as the Soviets do not resume testing their ASATs.

The expected compromise may be approved when members return at the end of this month, and would be seen as facilitating possible negotiations between the Soviets and the United States this fall. The US Administration is at present barred by Congress from conducting tests against a target as a result of a similar amendment passed last year. That amendment required the President to certify that an effort was being made to negotiate a "ban" on ASATs. President Reagan reported last spring that a ban was impossible because of difficulties in verification.

The United States carried out a first test of its ASAT in January. No target was involved, and the rocket did not carry a warhead. Unlike the Soviet ASAT, which is fired by an inter-continental ballistic missile booster and requires two orbits to rendezvous with its target, the US system is a direct-ascent rocket fired by an F-15 fighter. The Soviet system has an unimpressive test record, with 11 failures out of 20 tests.

A second test of the US ASAT is expected any time now; it would add a warhead but again not involve an actual target. The Air Force wants to introduce a live target for the third test.

The administration, while expressing interest in the Soviet offer of ASAT negotiations in Vienna in September, has suggested that only a rather weak agreement might be possible. "Rules of the road" for satellites might be agreed to, for example. Another suggestion is a ban on tests of high-altitude ASATs, but this is not likely to go down well with the Soviets, who have a relatively greater proportion of their military satellites in low orbit. Both sides use low orbits for photographic reconnaissance and weather satellites; the Soviets in addition place a great many communications satellites in an eccentric orbit that brings them high over the Soviet Union and low over the Southern Hemisphere, and are

thus vulnerable to existing ASAT technologies. High orbits are used for navigation satellites (which are in semi-synchronous orbit) and early warning, electronic intelligence, and — in the case of the United States — communications satellites (geosynchronous orbit).

The certification requirement that the Senate has proposed would require the President not only to certify a good-faith negotiating effort but also that US tests against a target are necessary to "avert clear and irrevocable harm" to national security, that the tests will not irreversibly harm prospects for future negotiations, and that the tests are consistent with the Anti-Ballistic Missile Treaty.

Stephen Budiansky

Britons never slaves?

Los Angeles

APPROXIMATELY 40 British engineers, scientists and data-processing professionals are being brought to the United States every year by a Southern California head-hunting firm that makes employers an offer that is hard to refuse.

The British professionals agree to work for less money than US counterparts, are "highly motivated and expertly trained", and once in the United States, cannot change jobs. Work visas are good for three years, whereupon the British imports must return home.

The practice has infuriated a group called the Committee of Concerned Electrical Engineers which compares the head-hunters with the slave traders of 200 years ago.

According to John Alcorn, co-founder of International Staffing Consultants (ISC) of Newport Beach, California, there are genuine shortages in the United States of systems analysts, programmers and computer engineers as well as "high-tech engineers in speciality areas". Two jobs recently filled by Britons were as a ring laser gyroscope engineer and an electrical discharge machine operator.

The US Labor Department protects American workers, Mr Alcorn said, by demanding that employers advertise jobs before letting foreigners apply. But this requirement can be bypassed if foreigners are hired on temporary visas.

ISC, which serves "a couple of dozen companies", ungrammatically advertises that "The opportunity to work in the United States is a powerful motivator for the British DP professional. They earn approximately one half of the salaries paid to US employees, so working for you is viewed as an exceptional opportunity. Unlike US employees, you won't risk losing them to your competitors."

Sandra Blakeslee