

ary, at a series of U.S.-USSR meetings to discuss the controversial establishment of air routes between New York and Moscow. Though buying and selling planes to the Soviet Union is at present "illegal and impossible," the Russians may have a more-than-three-year development jump on the U.S., during which time negotiations could be pushed.

Airlines in this country, however, have a strong tendency to "Buy American," which means that they would be unlikely to make use of such arrangements even if they are made—an unlikely occurrence, says the FAA.

If, despite all the obstacles, the U.S. and Russia still wanted to establish reciprocal aircraft trade, they would have to hammer out a "bilateral airworthiness agreement," which would be signed on the basis of examination of each country's aircraft structural designs, flightworthiness specifications and safety standards. Another desirable feature, though not a definite FAA requirement, would be first-hand inspection of manufacturing facilities to make sure that they could keep production aircraft up to the standards of the prototype. Foreign inspectors are not the Soviet government's favorite people.

It is not always necessary to actually fly the other country's aircraft in bilateral agreements, says the FAA—they could be simply "rubber-stamped" through—but such cases are the exception.

Presently, officials from the U.S.

and Britain are trying to work out a mutual set of airworthiness standards for unrestricted commercial aircraft trade, although several British planes, such as the BAC-111, are already in service with airlines here. Other countries with aircraft marketing agreements include France, whose Nord 262 is the only aircraft roughly filling the shoes of the venerable DC-3; Japan, maker of the Naihon YS-11 now in service with Hawaiian Airlines; and Italy, whose Piaggio 108 executive jets is experiencing an unfortunate series of distribution problems. Germany and Sweden are both preparing to enter the U.S. market with executive jets of their own, and these have been "overtures by Czechoslovakia to get something into the country," the FAA reports. A unique arrangement for the purchase of gliders from Poland came about simply because "they're great—they have no competition."

Working out a bilateral agreement with the Soviet Union could be a time-consuming process if it ever comes to pass, since once it is signed, the State Department steps back into a "passive role" and trade is allowed to proceed, limited only by restrictions stated in the original agreement. In addition, the entire deal could be cancelled if Russia were to begin purchasing any parts for U.S.-bound planes from countries with which the U.S. has no diplomatic relations. These include Communist China, Albania and Cuba.

Atom Smasher Called Omnitron Accelerates Wide Range of Particles

A new atom smasher, now being designed at the University of California, will create super-heavy atoms.

Scientists believe that element 114, and/or element 126, would be relatively stable if they could be synthesized. The elements beyond uranium, number 92, the heaviest natural element, and up through 103, the last positively discovered, have lifetimes of decreasing length. The shortest is measured in minutes.

The proposed accelerator, called the Omnitron because of its wide range of uses, was described in detail at the 1967 National Particle Accelerator Conference in Washington. The Omnitron will accelerate nuclei of all 92 natural elements, from lightweight hydrogen to uranium.

The ability to produce beams of heavy particles is valuable not only to physicists but also to physicians, since such beams offer a possible future way of killing cancer cells and thus saving lives.


Dr. Albert Ghiorso of the University of California cited the medical use as a possible application of the Omnitron. In effect, the Omnitron is a machine that will, in one package, extend the capabilities of most conventional accelerators.

Dr. Ghiorso said that nuclei of argon atoms could be accelerated and then beamed to the pituitary gland, knocking out a cancer in this location.

Ultimately beams of pi mesons, basic nuclear particles, could be produced by the Omnitron in sufficient intensity for possible use in human patients. This technique has shown promise in preliminary trials with the 184-inch cyclotron now used for biomedical research at Berkeley.

Radiation treatment of disease, sometimes called atomic surgery, has been successful against such serious ailments as acromegaly and Cushing's disease.

The Omnitron is estimated to cost \$25 million. Construction should take about four years. Co-inventors of the

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accelerator, with Dr. Ghiorso, are Robert Main and Bob H. Smith, both of whom have had long experience in accelerator design and operation.

Although the Omnitron is the most complicated accelerator ever proposed, Dr. Ghiorso said everything included in the design is based on proved techniques.

Crime Chromosome

A rare genetic abnormality appears to explain criminal behavior in men afflicted with the condition—an extra sexual chromosome.

Instead of XY, the usual sex chromosome pattern, the men in question have an additional male chromosome and a pattern of XYY. The link between XYY and criminality was first suggested two years ago in Scotland, when researchers discovered a remarkably high incidence—three percent—of the rare condition among patients of a maximum security hospital for the mentally ill and retarded.

Since then, further surveys in similar English hospitals have borne out the three percent figure, implying that genetics may be an important consideration when the criminal shows evidence of severe mental disturbance or retardation.

Drs. W. H. Price of Edinburgh's Western General Hospital and P. B. Whatmore of the Carstairs State Hospital in Scotland reported today the follow-up studies of personality and criminal pattern in these patients.

Altogether there were nine XYY men out of a total 342 patients at Carstairs. All suffered from severe personality disorders. They were extremely immature, unstable and irresponsible, had little capacity for affection and seemed unable to tolerate the slightest frustration. Seven of the nine were mentally subnormal.

When matched with 18 other patients with normal sexual chromosomes, no great differences in personality and mentality could be found, with some important exceptions. Rarely were the XYY patients violent, while the others were more openly hostile and aggressive. In effect, the XYY men were less dangerous criminals than the men with normal chromosomes. But their criminality began at a much younger age.

The XYY patients first ran up against the law at about the age of 13, while the others usually did not get into trouble before 18.

A second major difference between the two groups lay in family background. Criminality and mental illness was virtually nonexistent among the families of the XYY men, who came from a range of social classes.

"There is no reason to believe,"

wrote Drs. Price and Whatmore in the British Medical Journal of March 4, "that these patients would have indulged in crime had it not been for their abnormal personalities." And their abnormal personalities were probably due to the extra Y chromosome, they said.

In contrast, the families of the 18 controls did show some evidence of a criminal environment.

New Supernova Theory

Once every 30 to 60 years, astronomers estimate, a star in the Milky Way galaxy that is considerably more massive than the sun explodes in a brilliant blaze millions of times brighter than the sun.

These supernovas blow into space gaseous material amounting to at least one solar mass, but exactly why only certain stars undergo such tremendous explosions is not known.

The supernova explosion of a star is usually believed to result from a catastrophic implosion that reverses into an explosion. One mechanism for an instability that could lead to such an implosion is when the temperature of a heavy star's iron core rises to some five billion degrees C. and the iron begins to dissociate into alpha particles and neutrons.

A new theory concerning how supernovas are formed is reported in the March 6 Physical Review Letters by three scientists from The Hebrew University in Jerusalem. They propose an alternative mechanism for triggering the explosion.

The physicists suggests that the dynamical instability is caused by pair formation, which is the conversion of a photon into an electron and positron when the photon traverses a strong electric field.

This instability occurs in heavy stars prior to the formation of any elements heavier than oxygen, and the resulting implosion is easily reversed by oxygen burning.

The explosion following the implosion disrupts the star, spewing out oxygen and such elements as magnesium and silicon, as well as all lighter elements in the envelope surrounding the core.

The behavior of a star with a mass 40 times that of the sun was calculated by Prof. Gideon Rakavy and his two co-workers at The Hebrew University. The model becomes unstable when the star's core reaches a temperature of 1.8 billion degrees C. The implosion heats the center to 3.2 billion degrees and about four solar masses of oxygen are burned before the motion is reversed.

Totally, about six times the sun's mass is consumed, releasing more than enough energy to completely disrupt the star. The explosion lasts only about 10 seconds.

Vaccine Loses

The Federal Government has won its case against the Rand Development Corporation, manufacturer of the controversial Rand Cancer Vaccine that allegedly cures cancer.

Judge James C. Connell has granted a permanent injunction against both the manufacture and distribution of the vaccine that has been given to hundreds of "terminal" cancer victims in Cleveland, Ohio, hospitals, (SN: 2/18).

Corporation president H. James Rand says he may take his drug out of the U.S. for testing. He has been working with scientists in Germany, Israel and Russia who have been studying the theory he's been testing. Rand points out that Dr. Albert Sabin "had to go to Russia to get his (oral) polio vaccine tested before it was accepted in this country."

Government lawyers did not seek court injunction against Rand on grounds that the vaccine is ineffective; they stuck with more clear cut issues. The vaccine, they charged, was illegally transported across state lines, was found to be contaminated in some instances, and was used in clinical tests before it was cleared for such use by the Food and Drug Administration. FDA regulations require data on animal and laboratory experiments be obtained prior to use on humans.

The Securities and Exchange Commission announced it will investigate alleged stock manipulation by Rand following the rash of publicity the vaccine has gotten in the lay press in the last few months.

Survey Ships Launched

Two hydrographic survey ships will be launched for the Coast and Geodetic Survey in Jacksonville, Fla., this week.

The ships, each 231 feet long, will be used for charting United States coastal waters, according to the Environmental Science Services Administration, the Survey's parent organization.

They will be completed and go into service later this year, replacing older vessels being retired. Named the USC&GSS Fairweather and Rainier, they will join the Mt. Mitchell, which is also scheduled to begin operations this year for the Survey.