

Lasers for more than welding

Except in surgery, where it has long been used to weld back detached retinas, the laser has not had wide applications in the biomedical field. It has been assumed that the powerful light is naturally harmful to living tissues, a conclusion backed by experiments by Marcel Bessis of the Institut de Pathologie Cellulaire at the Bicetre Hospital near Paris, who found that the laser killed cells in a microscopic field.

The trouble, says Dr. Marc S. Bruma of a French National Scientific Research Center laboratory studying the laser, is that the tool's role has been cast as a mere hole-puncher, a popular image coming from industrial and military applications and unfortunately carried over into the medical field. A reappraisal, he says, is now in order.

One of the indicators of a possible broader use for lasers, presented at a recent international round table in Paris, comes from the failure of the laser as a cell-killing tool. For some years, experimenters have hoped to use its highly localized radiation to reduce skin melanomas, black-pigmented malignant tumors that spread rapidly. In one case, a melanoma responded to treatment, but in others, deep melanotic masses have been subjected to laser therapy without great benefit.

But beyond the inconclusive results previously found, a group headed by Dr. M. S. Litwin at Tulane University Medical School reports that radiation from a low-energy ruby laser actually stimulates the growth rate of both human and mouse melanoma. In addition, Prof. E. L. Mester, a laser investigator from Budapest, who irradiated tar-induced skin cancer in white mice with a few joules-per-square-centimeter of laser light from the same type of device, found that hair began to grow on the tumor site. The tumor normally remains bald because of the abnormal growth activity taking place just below its surface.

Both of these reports indicate that lasers are not necessarily harmful to living tissue; they can even have positive effects. If cancer cells can be stimulated, it is possible the growth of other, advantageous cells can be stimulated as well.

In another nondestructive application of lasers, researchers at the Institute of Ophthalmology of the University of London have demonstrated its use to determine the elastic contents of the eye, providing a potential method for detecting and diagnosing glaucoma. The method, developed by Dr. J. R. Mellerio, consists of directing the beam from a Q-switched ruby laser onto the limbus of a test animal's eye. The result-

ing thermal stress induces a transient acoustic wave to travel across the cornea; the wave is detected and causes a timer to stop, giving a measure of how long it took to travel across the cornea. This in turn is related to the elasticity of the matter the wave passed through.

Nevertheless, the laser's force as a cutter is also coming into the biomedical fore. An example is an almost bloodless light knife used by Dr. Stanley Stellar, a neurosurgeon at St. Barnabas's Hospital in New York, who reported its development by physicists at the Research Center of the American Optical Corp. in Farmington, Mass.

Dr. Stellar has done a series of experiments, with encouraging results, using the carbon dioxide laser on transplantable brain tumors in mice.

When used at energy ranges between 20 and 60 watts, the carbon dioxide

AIRPORT WAR

More trouble for Everglades

The wild and swampy Everglades National Park in Florida is a unique resource in a country most of whose natural treasure areas are in the form of great plains, mighty mountain ranges and generally wide open spaces. Its thousands of dank and tangled square miles teem with life, including many almost extinct species.

The fight to save the Everglades from the encroachments of civilization has been a running battle for decades; the latest in a long string of skirmishes centers around the plans for an airport, to handle full-sized jetliners.

The first shot in the Great Everglades Airport War was fired in 1952, when Florida's Dade County published a study ominously predicting the complete saturation of Miami International Airport. The idea of actually building a major new airport in the nearby swamps was not then brought up, however, and the report merely recommended that military, general aviation and training flights be relocated at smaller airports to make room for commercial traffic.

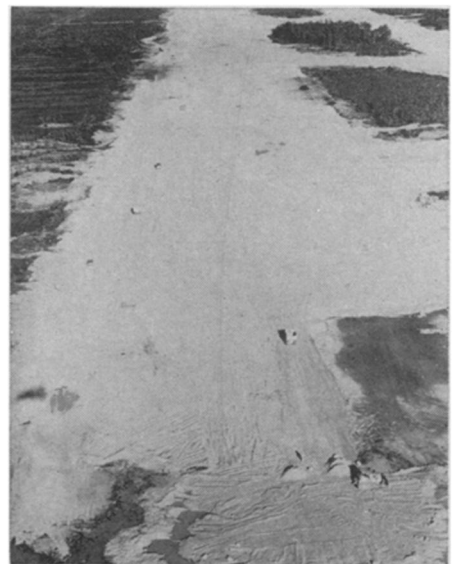
By 1962, military flights had been moved south to Homestead Air Force Base, and within the next five years, three regional airports had taken over almost all of Miami International's general aviation traffic. But the jet training airport has been and still is at the center of a full-fledged battle.

Pressure to free the space at Miami International still being taken up by training activities began in earnest in the early 1960's, although studies of noise,

beam, which is a continuous wave, not a pulse, becomes a cutter which causes very little bleeding and exerts no pressure, both important qualities in neurosurgery. In the future, says Dr. Stellar, pressureless drills for craniotomies and trepanations may be perfected from the light knife.

Perhaps the most important developments will come from stepping up the effectiveness of anticancer chemical and physical agents such as X-rays by laser light. But for the moment no one is willing to speculate on the results of such research.

And the prospects of immediate use of the laser on humans are not bright, according to Dr. Vincent E. Siler of the University of Cincinnati College of Medicine. Lasers should continue to be restricted until basic animal research proves without a doubt they have value in combatting human illness, he says; at present, conventional methods of surgery should be used to treat and control malignant tumors. ◇



Dept. of the Interior
Everglades jetport under construction.

airspace and other factors held up the first selection of a site until January 1967. Within five months five sites had been brought up, but all of them had been rejected.

By late 1967, agreement was reached on a site straddling the Dade-Collier County line, with at least the initial support of the regional office of the National Park Service. But the dust that had been raised by the controversy refused to settle.

There had been plenty of reports and recommendations, concluded a special Environmental Study Group of the National Academies of Science and En-

gineering last month, but none of them included a full-scale projection of the effects of the jetport on surrounding lands.

"To date," the group reports, "no known study of this nature has been conducted by any agency." In addition communication was poor at best between the various Federal agencies involved and between Federal and state authorities.

As a result, objections to the training strip did not emerge until more than a year after the site was selected, the group reports, and the partially constructed facility finds itself suspended in limbo while new attacks are mounted against it.

The Environmental Study Group, for example, which was studying the development of south Florida only as a case history with which to develop methods of handling environmental problems across the country, declares that a special water conservation district in surrounding Monroe, Collier and Hendry Counties is a prerequisite to any airport in the region. Pollution from the airport and aircraft, as well as from the people and facilities that would accompany such a development, could pose a serious threat to the ecology of the area.

The 26-man group, assisted by an additional 35 observer-participants, also recommends a comprehensive local-state-Federal management plan to avoid the pitfalls of past experience, as well as "the avoidance of all measures that would encourage commercial or residential development in the vicinity of the jetport." Furthermore, says the group's report, the area is a veritable "tropical reservoir of insect vectors," necessitating more study of diseases that could develop in any nearby population center.

An even more strongly worded document is that prepared by a team headed by Dr. Luna B. Leopold, chief hydrologist of the U.S. Geological Survey. The best solution, his report suggests, is to abandon the present site completely and go elsewhere.

Expanding the airstrip to a cargo facility and ultimately to a full commercial airport would be catastrophic, the Interior report says. "Regardless of efforts for land-use regulation," it declares, "the result will be the destruction of the south Florida ecosystem. Estimates of lesser damage are not believed to be realistic."

Sewage and industrial wastes from the jetport would total about 5.5 million gallons a day, with more from the inevitable surrounding urban areas. The resident Miccosukee Indians would be virtually destroyed as a tribal entity. Finally, despite existing adequate technology, says the report, there is no precedent to indicate that legal, administra-

tive or social practice would in fact result in keeping water quantity and quality adequate to continue the natural ecology as it is.

Some promise is voiced by Transportation Secretary John Volpe, whose department will be studying both reports in a joint task force with the Department of the Interior. "From what we have now," he says, "it looks quite doubtful that a major international airport could be developed here and conserve . . . the Everglades National Park. . . . This area in here would be rocking from the construction of this jetport, unless something by way of technology that we don't have today could be developed. None of us see it today." ◇

METRICS

A preliminary report

In 1866 Congress made the metric system of measurements legal in the United States, but not compulsory. "So no one used it," says Dr. Alvin G. McNish, technical director for the metric study at the National Bureau of Standards.

In the century since, all the world but the United States and Canada has adopted the metric system or declared its intention to do so soon. Last year Congress authorized NBS to make a study of the activities and costs that would be involved if the United States were to replace its traditional measures more and more by the metric ones (SN: 1/25, p. 91).

Congress has always been shy of compelling a change in measurements as the British Government is doing. Congressional committee spokesmen say that one reason for authorizing the study is to see whether there are ways short of compulsion to promote a changeover.

The study is still in its early stages, but already its leader, Dr. McNish, concludes that going metric would not cost nearly as much as some people have feared. On the other hand, he says, it would not benefit U.S. foreign trade as much as some of its proponents have hoped.

Changing to the metric system has conjured up images of vast expenditures to switch the entire economy all at once. Estimates of \$26 billion, \$100 billion, a tenth of the gross national product, have been bruited about.

But "you don't do that," says Dr. McNish. "You're crazy if you do." Instead, a gradual changeover could be carried out at much lower cost.

Some areas, like retail trades, would have to change all at once. A mixed or dual system in markets would engender too much confusion. But many industries, such as machine tool manufacturers, could change gradually as dies

and patterns were replaced. And things like land measurement would change slowly if at all. Dr. McNish and his co-workers have taken a preliminary look at examples of each of these cases, laying scare estimates to rest wherever possible.

Of the estimated \$3 billion to change over all the parcels of taxable land in the United States, Dr. McNish says the best thing to do is to let sleeping deeds lie.

In New Orleans, he says, are two adjacent lots, one measured in English feet, one in French feet. The records have been so for hundreds of years and nobody has been inconvenienced. "You don't buy the feet, you buy the land," he says.

On the other hand there are, especially in the retail trades, many items that are manufactured and packaged in sizes that are round numbers of some basic unit. For a true conversion to the metric system these sizes would have to be converted to metric units: quart packages to liter packages, pounds to half-kilos and so forth, and it will all have to be done at once.

Such a sudden switch calls for a high capital investment. Nevertheless an NBS pilot study of milk packaging gives grounds for optimism.

A machine that packages milk has six measuring reservoirs. Changing these from half-gallon to two-liter size would cost \$1,000 per reservoir or \$6,000 per machine. Since all the machines in the country would have to be changed at once, the capital investment would be large. Yet each machine, if it works a 16-hour day six days a week, will fill 45 million cartons a year. If the capital cost of the change is amortized over a year, it comes to 0.0133 cents per carton.

In further studies of the retail trade, says Dr. McNish, his group will try to determine the cost per item. Even if the initial capital investment is large, the cost per item may be reasonable.

A more gradual changeover, at very little capital cost, could be made in industries like screw manufacturing. The dies on a machine that makes screws have to be replaced after every 200,000 screws. As dies made to inch standards wear out, they can be replaced with dies made to metric standards at the same cost as would have been incurred with new inch-standard dies.

Under this scheme industries would have the expense of keeping dual inventories for a time, but many already have to.

The automobile industry is a large user of machine parts. A study shows that gradual replacement and redesign have generally resulted in complete replacement of parts in about 12 years. That is, a 1970 model is unlikely to