LASSA FEVER

Studying a killer

In January 1969 an unknown virus was isolated for the first time from the sera of two nurses, who died, and from the serum of a third nurse, who recovered from a feverish illness of unknown origin. The three were Americans who had been working at a mission station in the village of Lassa in the Biu-Mubi region of Nigeria. Virologists at Yale University found that the virus was unlike any known one after a fourth patient, an ailing missionary, was brought back to the United States for treatment.

The infection, being called Lassa fever, involved almost all the body's organs. The virus produced fever as high as 107 degrees, mouth ulcers, a skin rash with tiny hemorrhages, heart infection and severe muscle aches.

Then in January 1970 further cases of a disease, with symptoms resembling Lassa fever, were reported from Jos, a tin-mining town in Nigeria almost 300 miles away. Ten of 20 Nigerian and American patients died from the disease, and doctors suspected almost immediately the disease was Lassa fever. Both outbreaks have a fatality rate approaching 50 percent, and both outbreaks occurred in January and February.

Subsequently, the Jos virus was identified as Lassa fever, and the plasma, drawn from survivors of the first outbreak and which contains the antibodies needed to fight the otherwise untreatable infection, is being used on patients in Jos.

Yale stopped work on the virus after a lab worker contracted the disease and died, but research will be continued at a new isolation laboratory at the National Communicable Disease Center in Atlanta.

The virus will be frozen in sealed containers, packed in disinfectants and flown from New Haven, Conn., to Atlanta, where it will be hand-carried to NCDC. There Dr. Robert E. Kissling, chief of the NCDC's Virology Section, Dr. Brian Henderson and technologist George W. Gary will work with the virus under maximum precautions.

Dr. Henderson contends that even should the Lassa virus get out of the laboratory, it probably would not spread in the community. "It's not the kind of virus, like influenza, that can be passed while talking," he says.

Dr. Kissling says the Lassa virus is similar to other viruses carried by wild rodents. Doctors so far suspect that the disease was transmitted by an animal but what animal is not known. It is also believed that the patients can acquire the infection from one another, but only through more than casual contact.

Early research will be conducted with white mice; the aim will be to control the virus rather than to develop a vaccine. But the researchers will also be concerned with how the virus spreads, why it is so deadly and how long the incubation period is.

Other lethal viruses will be studied in the facility built for the Lassa studies. These are to include the Marburg virus —first identified in Marburg, Germany, —where 20 of 28 cases occurred in an outbreak that killed 7 of 31 victims in that country and in Yugoslavia about three years ago. Others will include the Machupo virus, responsible for hundreds of cases of Bolivian hemorrhagic fever, the Congo virus and the Crimean hemorrhagic fever virus. □

NCDC

Kissling and Gary: glove boxes to handle a deadly virus.

NAS LAMENT

Minerals aplenty; technology gap

Ten years ago, domestic mineral production accounted for four percent of the gross national product. It has declined steadily; now it stands at three percent. During the same time period the net value of mineral imports has tripled.

This raises the fear that the United States is heading toward mineral bankruptcy. But a two-year study by six panels of the National Academy of Sciences' Committee on Mineral Science and Technology finds that the country has plenty of mineral wealth left; it is just not being adequately exploited. "The state of mineral technology in the United States is wretched," concludes the committee, made up of scientists and engineers from industry and universities.

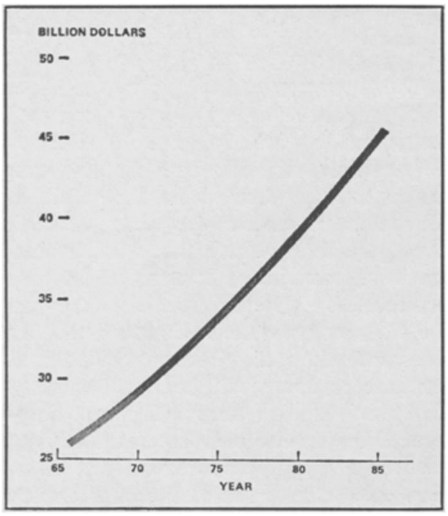
"We're running out of technology, not minerals," echoes Dr. Cyrus Klingsberg, executive secretary of the Academy. "There's plenty of mineral wealth around but not at an economic level" for exploitation by existing techniques.

As a result, many of the nation's resources, including waste materials, remain untapped. One such source is geothermal energy: the steam produced by water contacting hot underground rock (SN: 2/1/69, p. 113). It could be used to provide electricity or potable water. Although the Western United States has many such areas, little is being done to develop them, partly because Federal lands may not be leased for geothermal development and partly because of unanswered questions, such as how long the supply will last or the best place to drill a well. Without such knowledge a commercial geothermal venture would be financially hazardous.

But the same techniques that tell a petroleum engineer how much oil is underground could tell a utility company how much geothermal energy is underground and how best to develop it. From leaching copper out of waste tailings to the safe drilling of water wells, petroleum engineers with their knowledge of fluid mechanics and geology can be of assistance to other industries.

"We could offer them answers that aren't part of their technology," says Prof. Henry J. Ramey Jr., a petroleum engineer at Stanford University and a member of the mineral fluids panel. "But they don't use them. If they can be made aware, they would pick up the technology in a split second. It's really a problem of communications."

But the answer to the mineral problem goes deeper than just applying



Projected U.S. mineral consumption.

existing technology. New techniques are being developed with coal (SN: 7/26, p. 84), but not enough to suit some people. Dr. Martin A. Elliott of Texas Eastern Transmission Corp., Houston, Tex., advocates better utilization of the nation's tremendous coal reserves. He points out that the Government spends far more on developing atomic energy than it does for developing gasification and liquefaction techniques to convert coal to natural gas and to oil. And the same holds true for techniques for getting oil from oil shale and electricity from burning coal through magnetohydrodynamics.

"These processes are going to be needed; as good ideas come along, they should be studied," urges Dr. Elliott, who was on the fuel science and technology panel. "What is really needed is more basic research in these areas."

If coal utilization is suffering from a lack of basic research, the area of nonmetallic materials, which includes ceramics, cement, graphite, nuclear fuels and semiconductor materials, is crying out for more applied research. The panel sees the failure of researchers to develop new synthetic inorganic materials to do a specific job as the reason why the country does not have better semiconductors, construction materials or heat- and oxidation-resistant materials. One major reason for this is the failure of inorganic chemistry to be joined with other branches of materials science and engineering to form an interdisciplinary effort.

By way of illustration, Prof. H. C. Gatos of the Massachusetts Institute of Technology has pointed out that, "The classical inorganic chemistry, which is fading in this country, has found in the U.S.S.R. new fertile soil in electronic materials and particularly in semiconductor compounds."

Another reason, says Prof. Alfred Allen of the University of Illinois, is that

	1963	1964	1965	1966	1967
Vacancies	22	25	50	95	153
Job offers	30	29	83	140	201
Engineers Hired	13	19	39	50	56
Offers/ Vacancies	136%	116%	166%	147%	131%
Hirings/ Vacancies	59%	76%	78%	53%	37%
Demand Index: Vacancies per Company	2.4	2.8	4.3	5.1	5.9

Charts: National Academy of Sciences

Mining engineers in short supply.

the limited financial return from some nonmetallic materials means restricted research budgets. Citing the fact that refractory brick can be bought for as little as 15 cents, he says, "The value of the product doesn't allow for a large percentage of the sales to be spent on research."

As indicated by Prof. Gatos, the lagging mineral technology here has enabled other nations to move up on the United States. In extractive metallurgy, the recovery of metals from ore or waste, United States industry has produced few new extractive processes when compared with England, Russia, Japan and Australia.

"We're not hurting too badly at the moment," says Dr. Herbert Kellogg of Columbia University. "We're neglecting the low grade and complex ores. I think we'll be hurting in 10 years," he adds.

The same is true of mining, where the innovations come from Sweden (controlled blasting), Germany (improved drills), South Africa (shaft sinking) and Australia (rock reinforcement), to name a few.

Despite different needs for the various areas of mineral science and technology, whether mining, extractive metallurgy or fuels, one common ailment is the lack of scientists and engineers. Some 35 percent of the mining schools have closed since World War II, and since 1959 the number of B.S. degrees in mineral science and technology has shown a downward trend, as students are discouraged by rising tuitions in out-of-state colleges and attracted to more glamorous fields.

"We've got 10 jobs for every student," complains Prof. Allen. "We need students."

Recommendations have been made by the committee ranging from more Federal funding, to Governmental reorganization to joint industry and university educational programs.

DADDARIO LEGACY

Future of a subcommittee

For much of the decade of the 1960's, a major spokesman for science on Capitol Hill was Rep. Emilio Q. Daddario (D-Conn.). Through his Subcommittee on Science, Research and Development he publicized the importance of basic science and made a place for it in Congressional deliberations.

Now that Daddario is leaving (SN: 2/21, p. 196), the future of his podium is in question. And although the chairman of the parent House Science and Astronautics Committee, Rep. George P. Miller (D-Calif.), says he has not decided yet who will replace him, the subcommittee will probably be considerably altered by next year no matter who the chairman is.

If Miller selected a replacement for the retiring chairman strictly on the basis of seniority, he would choose Rep. John W. Davis (D-Ga.). Davis is known as a close follower of scientific developments, though not as an initiator of policy. But he is already chairman of a Science and Astronautics subcommittee on the National Bureau of Standards, and Miller says he plans to sound out several candidates "to get their feelings on some issues I think are important."

In any case the work Daddario started may be outgrowing the subcommittee he put on the map. Because of the phasing out of some subcommittees on space, and of the increasing emphasis on technology assessment (SN: 3/7, p. 241), says a committee staff member, "The work of the Daddario subcommittee becomes more crucial to the whole technical picture. What's going to happen is that there will be a reappraisal of the whole situation by the first of next year." Three separate committees might be spun off to handle the expanded workload—and to create chairs for senior Congressmen now heading dying space subcommittees—he speculates. One new subcommittee would be devoted exclusively to technology assessment, another to overseeing the National Science Foundation and a third to the general area of science policy.

In the last decade, under Daddario's leadership, the Subcommittee on Science, Research and Development has probed a wide range of science policy issues. Daddario was a strong force in creating a science policy office within the Library of Congress. He opened up debate on centralizing science in Government agencies and was one of the first to question the defects in the way Government supports science in the universities. His subcommittee revamped the charter of the National