DADDARIO REPORT

Quest for a science policy

Over a three-month period this summer the pastel walls of hearing room 2325 in the House Rayburn Office Building echoed with the pronouncements of the nation's premier scientific leaders, who came to lament the passing of science as one of the country's major preoccupations and to propose new ways to insure an orderly flow of support to scientific research.

The occasion was a series of hearings on a national science policy (SN: 7/25, p. 57), conducted by the scientific community's politically weak but very sympathetic best friend in Congress, the Subcommittee on Science, Research and Development. The hearings represented also a sort of scientific swan song of the subcommittee's outgoing chairman, Rep. Emilio Q. Daddario (D), who Tuesday lost his bid for election as governor of his home state of Connecticut.

The report based on those hearings, issued this week, contains few surprises. The need to establish a formal national policy for the support of science is reaffirmed. A special administration task force to draft one by the end of 1971, for Congress to consider in 1972, is requested. (The report this spring of a Presidential commission on science policy (SN: 5/16, p. 478) is termed a beginning, not a concluding, effort.)

The White House Office of Science and Technology, the subcommittee urges, should be bolstered to become the focal point for the coordination of Federal support of research and technology.

And, as many scientists have been saying, the responsibility for basic research should center in the National Science Foundation. NSF now funds only 15 percent of the federally supported basic research in the United States, and the subcommittee wants that proportion to increase to approximately one-third.

This would go a long way toward alleviating one of the major problems of research support, the year-to-year fluctuations in research funding by the mission-oriented agencies, whose budgets are large but highly susceptible to shifting exigencies. The need to have basic research proceed in a deliberate rather than flighty fashion is a legitimate central tenet of the proposed national science policy—although scientists tend not to emphasize that many other national needs, like housing and health care for the poor, would likewise benefit from regularized support.

The trend toward a strengthened NSF is well under way and has fairly

Federal R&D Outlays

Fiscal years	Research and Development Expenditures (millions $)	Expenditures as percent of Federal Budget
1940	$ 74	0.8
1945	1,591	1.7
1950	1,083	2.5
1955	3,308	4.8
1960	7,744	8.4
1961	9,284	9.5
1962	10,381	9.7
1963	11,999	10.8
1964	14,707	12.4
1965	14,889	12.6
1966	16,018	11.9
1967	16,842	10.6
1968	17,030	9.5
1969*	16,553	9.0
1970*	16,922	8.7

* estimates

NSF

broad support, but another recommendation of the subcommittee, eventual establishment of a National Institutes of Research and Advanced Studies (NIRAS), faces the formidable obstacles any extensive proposed governmental reorganization confronts. NIRAS, a concept the subcommittee began promoting earlier this year, would absorb NSF and the basic research and graduate education activities of other agencies. It would account for 60 percent of all federally supported basic research. But the creation of any such institution is years off at best.

Administration science policy leaders are hardly unaware of the need for improved procedures for deciding what is supported. The new director of OST, Dr. Edward E. David Jr., and the director of NSF, Dr. William D. McElroy, are trying to evolve new procedures for weighing the priorities of various subfields of science against each other. "There is a strenuous effort to try to do this allocation process better—to try to exercise leadership and develop new mechanisms," says an OST aide. But staff members in both OST and NSF caution not to expect too much from these fledgling efforts. □

INTERNATIONAL SPACE

Meshing at the hardware stage

Progress on the international scene is often difficult to define, detect or measure. But recently, spacemen of the Soviet Union and the United States appear to be accomplishing what diplomats find frustrating—talking and reaching some agreement.

A space accord signed last week—the first significant cooperative agreement since 1965—defines the tempo and scope of technical exchanges between the space agencies of both countries, directed toward the development of mutually compatible rendezvous and docking systems for spacecraft (SN: 10/17, p. 315). Such systems would allow a spacecraft of the Soviet Union to rescue stranded American astronauts in orbit, and vice versa.

Dr. Robert R. Gilruth, Director of the National Aeronautics and Space Administration's Manned Spacecraft Center in Houston, and Boris N. Petrov, Chairman of the Soviet Council for International Cooperation in Exploration and Use of Space, signed the working agreement after two days of preliminary talks in Moscow. (The pact will be signed on the governmental level later.)

The two-day Moscow conference identified 12 technical areas to resolve if spacecraft of the two nations are to dock. These include the dynamics of docking (energy and shock absorption), radio devices for the rate of closure, optical devices and alignment optics, cabin atmosphere compatibility and airlock use. Three technical groups composed of from three to five members from each nation will work on compatible hardware, operational problems and coordination of the exchange. Arrangements are to continue through the fall, leading up to another meeting in March or April, probably at the Manned Spacecraft Center.

It is not inconceivable that a multiple docking adapter could be designed to link the current Soviet Soyuz series and the Apollo series to be used in the 1972 Skylab workshop (SN: 10/10, p. 303). But both space agencies are studying the development of new hardware. The Soviets are thinking of large earth-orbiting space stations and NASA is pushing the reusable shuttle and space stations. Therefore, any compatible systems would most likely be used in the next generation of spacecraft.

The current Soviet Soyuz series, designed for earth-orbital research, differs in size and complexity from the larger moon-landing Apollo hardware. The Soviets also currently use a slightly different rendezvous method, which is described as a "catch-up" maneuver in the same orbit, but slightly out of plane. The American astronauts, on the other hand, try to get in plane as soon as possible and catch up by moving from a lower and faster orbit to the awaiting spacecraft in a higher and slower orbit. It is believed that although the Soviet method requires more propulsion, it is just as accurate and extremely flexible.

Soviet docking procedures differ as well. Instead of moving through an internal tunnel from one craft to another after docking, the cosmonauts space walk outside the craft to make a transfer. However, Soviet officials revealed blueprints of more advanced systems that include an internal tunnel much like the Apollo system.

The Moscow talks coincided with a 10-day visit by Soyuz 9 Cosmonauts

Vitali I. Sevastyanov and Andrian G. Nikolayev to the United States. They toured the Marshall Space Flight Center in Alabama, and went to Houston.

Although it would be premature to speculate when a docking between spacecraft of the United States and the Soviet Union might occur, recent developments, says Dr. Gilruth, auger well for the future. □

IN THE SEA

Ubiquitous mercury

Since last spring when mercury was discovered in fish in Lake St. Clair and Lake Erie (SN: 4/18, p. 388), Federal agencies have stepped up their monitoring programs. The result: Mercury seems to turn up almost everywhere, sometimes in excess of the Food and Drug Administration's limit of 0.5 parts per million in foodstuffs.

Last week, the first reports of mercury in marine organisms came in. According to a National Marine Fisheries Service laboratory in Seattle, the livers of seals caught off the coast of Washington this year contained up to 172 parts per million of mercury, far in excess of the FDA limit. But mercury concentrates in the livers of predatory organisms, and the high levels in seal livers do not necessarily mean toxic levels in flesh of fish used for human consumption.

In fact, an earlier FDA study of marine organisms near two pulp mills discharging mercury into the Pacific Ocean from Washington state showed only one organism out of 85 contaminated with mercury over the FDA limit; this was a crab with 0.7 parts per million.

Seals are highly migratory animals, and Dr. George Y. Harry, director of the NMFS laboratory, says his scientists do not have even a clue to the source of the mercury found in the seals. But a plan for core sampling of sediments and monitoring of nonmigratory organisms is tentatively scheduled.

In the meantime, FDA is doing toxicological studies and Richard Ronk, FDA food guidelines chief, has agreed with local health officials that expectant mothers should not eat fish from contaminated areas; the effects of mercury on human fetuses simply are not yet known.

An additional problem is that no Federal agency yet has sophisticated enough equipment to make more than a gross determination of mercury levels in food. It is still impossible to tell whether contaminant mercury is in the highly toxic methylated form or less toxic inorganic compounds.

FDA has announced it will begin sampling a variety of foodstuffs, in addition to fish, for mercury. Included are bread, milk, beef, sugar and potatoes. □

RADIO EXPERIMENTS

Trying to confirm Weber waves

About a year and half ago Dr. Joseph Weber of the University of Maryland announced that his decade-long search for gravitational waves had been successful (SN: 6/21/69, p. 593). Gravitational waves are energy-carrying waves involving fluctuating gravitational forces and are analogous to electromagnetic waves, which involve fluctuating electric and magnetic forces.

"Weber's experiment is extremely important," says Dr. R. Bruce Partridge of Haverford College in Pennsylvania, "and anything anyone can do to check it is worth doing." A way of checking by radio observation occurred to Dr. J. V. Jelley of the United Kingdom Atomic Energy Authority at Harwell.

He reasoned that any object that was radiating the gravity waves observed by Dr. Weber ought to be sending out a great deal of energy. Some of this might well come as a radio signal. Radio observation would be an independent check on the existence of the gravity-wave source.

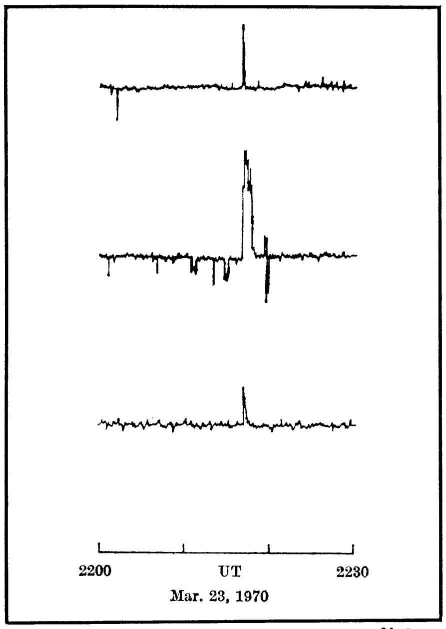
In response to Dr. Jelley's idea an array of radio telescopes was set up on five sites in Great Britain and Ireland—at Harwell, Cambridge, Dublin, Glasgow and Jodrell Bank. In the United States Dr. Partridge and Dr. Remo Ruffini of Princeton University have set up a radio detector.

Nobody has reported any radio observations of Dr. Weber's source or sources, but the observations so far have convinced both the British-Irish and American groups that the experiments are worth continuing.

The British-Irish observations are at 150 megahertz; the American, at 19,000 megahertz. Since nobody can be sure of the frequency range of the possible radio signal from the supposed object, says Dr. Partridge, searches at a number of frequencies may be necessary before something definite is found.

The reasoning behind the British-Irish array was that if all or several of these receivers recorded a pulse of the same shape simultaneously, the pulse would be from a celestial object that might be the gravity wave source. Several multiply coincident pulses were observed, they report in the Oct. 24 NATURE, but the difference in pulse shapes among the stations convinces them that they came from terrestrial events.

Unlike the British-Irish detectors, the Partridge-Ruffini device can be pointed at the center of the galaxy, which is where Dr. Weber believes his signals are coming from. Since it is also roughly at the same longitude as Dr. Weber's detectors it looks at the galactic center at the same time. It can thus compare any received signal directly. The galactic center is in the sky at different times for the British-Irish group so they cannot compare observations directly with Dr. Weber.



Nature

Triple coincidence of radio pulses: Varied shapes rule out distant source.

Dr. Partridge expects to present a preliminary report on his work soon. The British-Irish group have installed directional antennas in four of their stations and added one on the island of Malta because the galactic center does not rise very far above the southern horizon in Great Britain. They have started another series of observations with these. □

FORMIC ACID

New space molecule

Interstellar space is rapidly becoming the largest chemistry laboratory in the universe, and its specialty seems to be organic chemistry. The latest organic molecule to be discovered there, reported Oct. 30, is formic acid ($HCOOH$). It is the second five-atom molecule to be found in interstellar space; cyanoacetylene (HC_3N) was the first (SN: 10/10, p. 299). Formic acid was found with the 140-foot radio telescope at the National Radio Astronomy Observatory by Drs. Benjamin Zuckerman of the University of Maryland, J. A. Ball and C. A. Gottlieb of Harvard College Observatory and H. E. Radford of the Smithsonian Observatory. It appears in the direction of the object Saggitarius B2 and possibly also in the direction of Saggitarius A. The formic acid was detected by its emission of a particular frequency, 1638.805 megahertz. The cloud located in the direction of Saggitarius B2 is traveling about 60 kilometers per second; the other about 40 kilometers per second. □