

The Federation of American Scientists, which has historically concerned itself with defending scientists against the onslaught of various intellectual Philistines, now turns, with the publication of its new PROFESSIONAL BULLETIN, to the defense of science itself "from those various threats which, by undermining our scientific capability, would injure the interests of society and mankind." Below are samples from the first three issues.

Ms. scientists' problems

Only nine percent of American scientists are women, but despite lower pay and blatant discrimination in hiring and award granting, they are better educated and somehow manage to be more productive. According to the October FAS BULLETIN, women Ph.D.'s publish slightly more than men in their fields—with married women producing most of all. The old idea that a good education is wasted on women, who will only work until they get married, is "demonstrably absurd." Even before the women's movement became vocal, a 1967 study of women who had received their Ph.D.'s some four to nine years earlier showed that 90.7 percent of those who were married but had no children were still working and 83.8 percent of those with children were still working. Women must also have superior academic backgrounds in order to survive: Twice as many women as men admitted to four-year colleges from 1968 to 1971 had B+ averages or better, and another study showed that almost a quarter more women doctoral students had undergraduate records of B or better.

As their reward, women chemists, for example, with a Ph.D. and five to nine years experience, receive less than three quarters of a comparable man's salary. The proportion of female college teachers has dropped over 20 percent since 1949. And though women comprise five to eight percent of physical science researchers, the National Science Foundation gives them only 0.03 of one percent of its awards and grants.

Doctorates in decline

From 1960 to 1971, the number of scientists and engineers rose 50 percent and doctorates doubled to form 10 percent of that group. Most of the increase came about as a result of expanding campuses and research facilities—a trend that came to a screeching halt in 1969, while the number of doctorates continued to rise. The November BULLETIN examines the prospects for doctoral students during the next decade and concludes simply that there will be too many Ph.D.'s in some fields and that they will have to get jobs outside their chosen professions.

During the great expansion, three-quarters of the demand for new college teachers came from the opening of new positions rather than from need for replacements. Now, one expert believes, only one Ph.D. in four will be able to find academic employment, with perhaps as little as one in ten by the 1980's. What expansion there will be must therefore come from the private rather than the public sector. Already the biological sciences have been hit by a six percent jobless rate.

A degree in vital problems?

As one answer to the doctoral dilemma, the BULLETIN notes a trend to interdisciplinary degrees concentrating on specific problems, such as food production. Graduates would be trained in general technical aspects as well as social and economic considerations of a problem, and would be qualified for jobs in government and industry.

Hundred-year satellite planned

A satellite that could be the most durable ever launched is scheduled to be put in orbit in 1976—a two-foot solid metal ball covered with mirrors that space agency officials hope will be good for a century.

Called LAGEOS, for LASER GEODETIC satellite, the dense, 900-pound sphere will be a target for earth-based lasers whose signal reflections will be precisely timed to give pinpoint data about strains and motions within the earth for earthquake prediction and other studies.

"Many earth motions occur at a rate of about five centimeters a year," says program planner Robert Spencer of Marshall Space Flight Center in Alabama. "Since measurements using present satellites are only accurate to within about one meter of actual movement, it would take several years to ever distinguish the exact amount of movement." There are some satellites now equipped with laser reflectors, but they lack the ponderous solidity of LAGEOS, which should help it provide measurements accurate to within as little as two centimeters.

With no electronic or mechanical parts to get out of order, LAGEOS should be a dependable performer. "We are hoping," says Spencer, "to get 50 to 100 years of use out of it."

Maneuverable satellite will use many orbits

Explorer 51, NASA's first highly maneuverable unmanned satellite, was launched Dec. 15 to study the atmosphere from an orbit that will be changed every few weeks for as much as a year.

Fueled with 370 pounds of propellant for the purpose, the satellite will actually dip down into the upper fringes of the atmosphere to study its heat balance, airglow and other characteristics. Officials at Goddard Space Flight Center in Maryland plan to guide the 16-sided probe as low as 72 miles above the ground, less than five miles above the record altitude reached by the X-15 research rocket plane. Atmospheric drag at that height would pull the satellite down in less than a day if it were in a circular orbit, however, it will fly in a long ellipse that carries it more than 4,300 miles from the earth on each pass. Various circular orbits will be used later, from 180 to 360 miles up.

In addition, data from Explorer 51 will go directly from Goddard to a terminal in the laboratory of each of its 14 principal scientific investigators, so that they will be able to coordinate their studies while an interesting phenomenon such as an aurora or solar flare is actually in progress.

Nonexistent data base is communication hub

The Air Force Systems Command has successfully tested a communications system whose data storage base cannot be destroyed—because it doesn't really exist.

In the new system, called Seek Bus, information is not switched from point to point as in conventional systems, but is broadcast into the air to form a "data base in the sky." "This data base cannot be destroyed," says an AFSC spokesman, "because it doesn't physically exist." Instead, the information is continually in transit among potentially thousands of ground stations, aircraft, drones and even satellites. The system is "alive" as long as any two of its stations are operating.

Seek Bus has been tried out in tests of the AWACS Airborne Warning and Control System in Europe and of the West Coast Air Defense system in the United States, and is expected to be operational as early as 1977.