another 500 soil samples. A study group convened by the nearby Lunar Science Institute last summer concluded that there might be 20,000 individual samples and that as these were subdivided, the number of accountable bits and pieces of lunar material might reach several hundred thousand. Only about 30 percent of the rocks and soil on hand before Apollo 17 have received preliminary analysis and most of the rest remain to be described and classified according to the 10 to 15 types of lunar rock identified thus far. Efforts to compile a computer library of what is known about the rocks, and to provide a cross-index to this information, are still in the formative stages.

Much of the data gleaned from the Apollo instruments is in the same raw state as the sample collection. "A lot of vital information is still locked up in the heads of the people who designed and ran these instruments," Duke says. "Until they get the data in shape by annotating tapes and throwing out worthless sections no one can understand it, and some of this may never get done."

All of which suggests that the principal investigators constitute as much of a national resource as the moon rocks themselves.

Similarly, a great deal of work remains to put the 30,000 lunar photographs accumulated by the Apollo program in useful order. Since the layoffs last fall there has been little progress on this task, except to catalog the pictures and file them away. Were an outside scientist to try to find, say, all the photographs taken of the moon's Hadley Rille, he would, in a word, be out of luck. The necessary cross-reference system does not exist.

The upshot of all this is that access to the scientific results of Apollo has been more than a little difficult for outside scientists, a point of some frustration to the Lunar Science Institute, whose mission has been to serve as an academic way-station for outside investigators, encouraging them to use the MSC's laboratories, photos, and lunar samples. The LSI was set up in 1968 by the National Academy of Sciences and has since been run by a consortium of 50 universities. Supported by $750,000 a year from NASA, the LSI serves as a pleasant faculty club for the MSC research community, running a lecture series, conferences, and providing stipends for visiting scientists and graduate students.

In the post-Apollo period, the institute has aspirations of becoming a central spokesman for lunar research, and perhaps, the space agency's conscience in matters concerning the protection and study of the Apollo collections.

To this end, the LSI released a report* earlier this month outlining the scientific accomplishments of the Apollo program, the questions of lunar genesis that it has raised thus far, and a suggested strategy for post-Apollo research. As a general policy, the institute said, the space agency should be prepared to maintain its support of lunar research for a "time at least comparable to the time it took to mount and fly the missions."

The end of Apollo, the report emphasizes, "leaves the scientific tasks undertaken . . . substantially unfinished." To finish them, it recommends three main steps for the care and study of the lunar samples:

► By mid-1974, completion of the preliminary analysis of a "representative portion" of lunar rocks and soil, perhaps 25 percent.

► By mid-1976, completion of a "basic description" phase in which all samples are described in detail and thereby placed "on a museum footing." At the same time, sample analysis should be integrated with instrument data and photographs from collection sites, the report said.

► Accelerating through the mid-1970's, a "problem-oriented" phase of study distinct from the task of classification.

In between these stages, the LSI's director, Joseph W. Chamberlain, suggests, lunar science will have a difficult path to hew through economic minefields. In the end, the institute's greatest contribution to science may be, in Chamberlain's words, to keep the wealth of Apollo from being locked up and forgotten.

Given the cost of Apollo, that prospect may seem absurd, but the history of exploration is littered with unfortunate precedents. Not the least of them was the Wilkes expedition, America's first, if dimly remembered, great effort to explore the earth.

Launched in 1838, the expedition's five wooden sailing ships carried naturalists and cartographers along a thousand miles of unexplored Antarctic coast, north through Micronesia, east to the Oregon Territory, and home again after 4 years at sea. It was an extraordinary adventure, as welcome a source of national prestige as Apollo. But its scientific value was largely lost when the government failed to make provision for widely publishing its discoveries and for protecting its priceless collections of plants and animals, some of which had never before been classified. In time the collections deteriorated; some of the expedition's records and results never appeared in print.

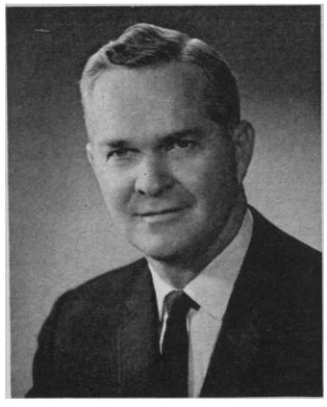
"This has always been a problem with exploration," historian A. Hunter Dupree notes. "People don't realize that the process extends beyond the expedition itself."—ROBERT GILLETTE

* Post-Apollo Lunar Science: Report of a study by the Lunar Science Institute; available at no charge from the LSI, 3303 NASA Road 1, Houston, Texas 77058.

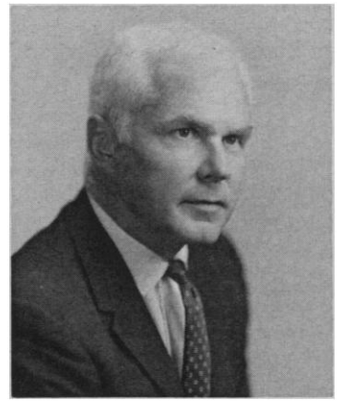
Health Hierarchy: Marston Fired and He's Not the Only One

On Friday, 8 December, Robert Q. Marston got the word that President Nixon intends to appoint someone else director of the National Institutes of Health (NIH). Marston was told by outgoing Health, Education, and Welfare (HEW) Secretary Elliot Richardson, who said that the President did not mean to imply that he had not done a good job. Nevertheless, there would be a new director. In Washington parlance, Marston's pro forma resignation, submitted in compliance with the President's request to some 2000 high government officials, was "picked up." In plain English, Marston was fired.

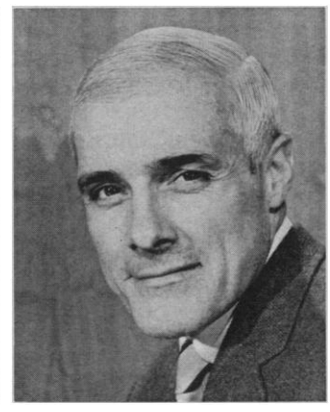
Marston's firing, which was unanticipated, to say the least, by the biomedical community, is consistent with



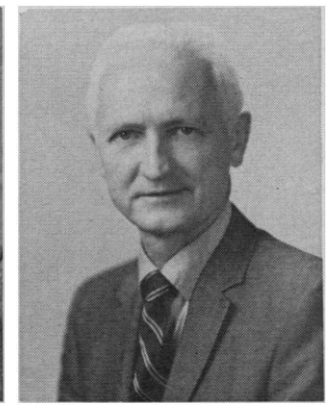
Robert Q. Marston



Merlin K. DuVal



Charles C. Edwards



Vernon E. Wilson

other changes that are taking place in the Washington health establishment these days, most of them by deletion. As things stand now, one knows who is leaving—practically everyone, including Merlin K. DuVal, who, as an assistant secretary of HEW, was Marston's boss. One has precious little idea who will soon be coming in or just why such sweeping changes are under way.

As best as can be determined, there was nothing personal behind the President's decision to fire Marston. Throughout his 4½-year tenure as director of NIH he has done what his superiors expected of him. Particularly during the 4 years he served under Nixon, Marston would seem to have been the very model of the team player the Administration indicated it wanted in its government. Indeed, Marston has, at times, been roundly criticized by some biomedical researchers for being too much a team player and too little an advocate of the NIH cause. They wanted him to be aggressive the way his predecessor James Shannon was. But the conventional wisdom held that if he had been, he simply would have lost his job. Better to play it cool. Marston did. He lost his job anyway.

At NIH, people at administrative levels are still in a mild state of shock over what happened. Richardson, in his conversation with Marston, told him that he could wait until he made plans for the future before announcing his firing if he wanted to. Marston thought about it over the weekend, discussed the situation with two top aides, John Sherman, deputy director of NIH, and Robert Berliner, deputy director for science, and decided the announcement could not wait. So, Tuesday, he told his staff and then did what his colleagues consider the only sensible thing—he took off for Europe to keep a long-standing engagement in Brussels.

Not surprisingly, there is a considerable air of uncertainty at NIH these days. Marston has said he will stay on at least until summer, but no one is sure in what capacity. To the NIH scientist in the laboratory, the real question now is what will happen to Berliner. As one of them summed it up, "We never saw much of, Marston. Internally, it is Berliner who runs the show as far as we're concerned." Berliner is highly respected for his scientific achievement and is regarded as a tough administrator. It is he who makes many of the day-to-day decisions about how NIH operates. His plans are up in the air right now, but neither he nor Sherman expects to make any move in the immediate future.

The two things people want to know now are who Marston's successor will be and why one is needed. With regard to the former, there is speculation that he will be drawn from within NIH (Theodore Cooper's name has been mentioned—he heads the National Heart and Lung Institute) and there is speculation to the contrary. At HEW, Earl Brian's name is being bandied about. Brian is a young physician with impeccable Republican credentials who has been secretary of the Human Resources Agency in California since May. Before that, he ran the state's department of health care services. Apparently he is well liked by Ronald Reagan, who appointed him to do some cost-cutting in the state's medicare and medicaid programs, among others. He has been the center of controversy since he first came into public view. While some Washington observers speculate that he may get Marston's job, others have him lined up for DuVal's. In point of fact, however, their speculation would appear to be of the most general sort. In this case, Washington's "usually reliable sources" are in no position to leak information, because they do not have it. The real decisions are being made in the White House, not in the agencies, and therefore very few people know what is actually going on. It seems entirely possible that there is no one already lined up and waiting in the wings for the big health jobs.

To the biomedical community, the person who heads the NIH is the most immediately important of the members of the health establishment. Certainly he is the most visible and the one most directly concerned with research. But by no means is the NIH directorship the only such position. Others that affect the research community are also now changing hands.

Starting at the top, the first change to be announced was that Richardson will move from HEW to the Department of Defense. His successor, Caspar Weinberger, comes to HEW from the Office of Management and Budget (OMB), where he had been director. Little known in health circles, Weinberger has told HEW leaders that he, himself, is no expert on health matters. His expertise is in management, and during his stint at OMB, his cost-cutting efforts brought him the nickname Cap the knife. Reportedly, he has said that he does not plan to move in to HEW knife in hand, but as yet people do not feel completely reassured.

John Veneman, under secretary to Robert Finch and Richardson, and who is thought of as a liberal California republican, will be replaced. He is going to return to California to run for elective office, possibly that of lieutenant governor. Frank C. Carlucci, like Weinberger an OMB man, will take Veneman's spot.

The top health official under Wein-

berger will be the assistant secretary for health, formerly the assistant secretary for health and scientific affairs. For the last 18 months, the post has been held by DuVal, who took a leave from his job as dean of the new College of Medicine in the University of Arizona at Tucson. DuVal has resigned according to plan and will return to Tucson as vice president of health affairs. From the beginning, DuVal said he intended to stay in Washington only long enough to reorganize the office of assistant secretary to give it some substance (*Science*, 15 September). He believes he has done that and so, in spite of what he calls "severe pressures" to have him stay, he is going home.

Under a recently accomplished reorganization, the assistant secretary for health will have real responsibility for coordinating the health-related functions of HEW, largely through his direction of the Public Health Service: the NIH, the Health Services and Mental Health Administration (HSMHA), and the Food and Drug Administration (FDA).

When DuVal first came to Washington, those three agencies had directors who had been around a while and who had, and wished to keep, a reasonably direct line to the secretary of HEW. DuVal encountered some opposition when he tried to insert himself between those men and a secretary who did have some knowledge of and interest in health. Now, he predicts, with the structure and the players changed, things will be different. The new assistant secretary, he speculates, may have real power.

In addition to a new director of NIH, there will also be a new chief at HSMHA. Vernon Wilson resigned from that job before his pro forma resignation could be picked up, apparently because he had reason to believe it would be. Wilson will return to the University of Missouri.

The only one left of the three is Charles C. Edwards, head of the FDA. Edwards is a Republican and a management type who had been at Booz, Allen and Hamilton, the Chicago-based consulting firm, before taking on the FDA. Generally speaking, Washington officials think he has turned in a creditable performance in the way he handles an almost impossible job. Speculation is that Edwards will either stay where he is or, possibly, move into DuVal's job.

Other people on the out list include Jesse Steinfeld, the surgeon general, whose job has been so downgraded that it has virtually disappeared, and former assistant secretary Roger O. Egeberg, who has been at HEW as a special assistant in charge of international relations since leaving the assistant secretaryship. At this writing, Steinfeld is formally out. Egeberg's resignation has not been picked up, but it is expected to be.

People are waiting to see what will happen at the Veterans Administration (VA), which has a greater involvement in the total health picture than is often appreciated, and at the Social Security Administration. Until further notice, Donald E. Johnson runs the VA, with Marc J. Musser as medical director. Robert Ball is chief of social security.

The departures from the top levels of government that have occurred or are anticipated represent one of the biggest turnovers of health officials that anyone can remember. The inclination to look for some Machiavellian scheme behind it all is inescapable. However, a number of observers believe that what is going on is really quite straightforward. The President, they point out, said he intended to streamline the government. Quite possibly, he intends to do so by making a fairly clean sweep of people in the upper ranks and replacing them with individuals chosen primarily for their talents as managers. That is the way it appears now.—BARBARA J. CULLITON

NSF: Engineers' Policy Group Urges More Software for RANN

The week of the final Apollo mission launch from Cape Kennedy, touching off another round of debate in the press over what, if anything, the United States has to show for its investment in space, the National Academy of Engineering's Committee on Public Engineering Policy (COPEP) released a report offering some new and refreshing views on how science might redirect itself in the quest for earthly relevance.

In the first of what will be a trio of reports due in the next year concerning the National Science Foundation's (NSF) most politically sensitive program, Research Applied to National Needs (RANN), the engineers' group told NSF in no uncertain terms that RANN must get involved in the nitty-gritty of institutional malfunctioning and reform as the key to answering national needs. RANN must, summarized COPEP chairman Edward Wenk, Jr., in a cover letter to the first report, find ways to improve the "effectiveness of our largely public and quasi public systems for delivering human and governmental services" in health, education, and so forth. Moreover, instead of just asking scientists what they might dream up as useful for the nation, RANN should start dealing with what COPEP termed the "users" of technologies, and ask them what they need. RANN must also seek far more institutional independence. RANN should "tread more boldly into problem areas where, on the surface, one might conclude that other agencies of government have major interest and jurisdiction."

COPEP was chosen to make the $280,000 review last spring because of two previous COPEP reports on applied research which, say RANN managers, formed much of the intellectual basis for starting the program. However, since only a few officials at NSF have had a chance to read the 450-page report, the issue of how much the foundation will implement COPEP's recommendations is, for the moment, premature.

The COPEP report urges RANN, which already serves as an applied research arm of NSF, to become even more so. Principally organized by Wenk; Raymond Bauer, chairman of the RANN advisory board and professor of business administration at Harvard University; and Micah H. Naftalin, executive director of COPEP, the interim