is for a mixture of basic and applied research across a broad spectrum. The finding of new ways to ameliorate salinity problems and the investigation of the oceanic and biological processes by which CO_2 is removed from or returned to the atmosphere are random examples of the kind of research the panel thinks should be done. In the better-mousetrap category is the need to replace glass bottles, metal cans, and their plastic counterparts with new types of containers which will have an adequate storage life but will "degrade" rapidly.

Federal support of institutes and centers devoted to research in fields relevant to pollution control is urged, and the underwriting of refresher courses and of national and international conferences is recommended. To increase the ranks of the antipollution forces, the panel suggests that the award of grants in environmental research be related to the intention of grantees to stress the training of students.

Attempting to predict how much impact the new report will have on pollution is not a very rewarding pursuit. As a product of a PSAC panel, however, the report underwent scrutiny at the White House and can be taken seriously as an administration document.

The President's statement accompanying release of the report carried a general endorsement and seemed to promise early advances on at least one front—an increase in the number of professionals and technicians trained to deal with pollution problems.

The panel, it should be noted, was probably doing some wishful recommending when it urged new initiatives on the part of federal agencies in the administration of existing laws. The bureaucracy characteristically is hesitant to make new departures in regulation or enforcement without new legislation and additional funds.

It is hard to say whether Congress and the public would now favor the general attack on pollution problems which the panel advocates. Public awareness of the implications of pollution is growing, as allusions in editorial cartoons and satirical songs testify. At another level, heightening concern, in both government and organized science, is manifest. For example, the AAAS Committee on Science in the Promotion of Human Welfare this fall published its report, *Air Conservation*, with a key section titled "Air Conservation and Public Policy." A committee of the National Academy of Sciences is now completing work on a report on broad aspects of the problems of pollution.

On the other hand, Americans, city dwellers in particular, have demonstrated a remarkable capacity to absorb punishment dealt by a deteriorating environment. This docility and the potentially high costs of controlling pollution could make us continue to take arms against only the intolerable.

In the past some victories have been won over pollution. In the 19th century, for instance, such water-borne diseases as typhoid, cholera, and dysentery were virtually conquered as public health problems through advances in medicine and the building of safe water systems and sewers. The epidemics had been deadly enough to make the public willing to pay the bill.

In recent years, effects of radioactive fallout on the environment led to the setting of radiation standards and marketing controls—for example, on milk deemed to be contaminated.

Scientists played an important role in informing the public—a good number providing persuasion as well as facts—and doubtless helped create the atmosphere in which the limited test ban treaty was achieved. The experience was one source of the activist concern many scientists have extended to other species of pollution of the environment.

Critics of the PSAC panel report are likely to regard enunciation of a freedom-from-pollution principle as naïve, the tax recommendations as presumptuous, and the call for government action as conducive to more federal interference. But the report represents both a recognition by scientists that pollution problems have dimensions beyond the purely scientific and an effort to proceed accordingly.—JOHN WALSH

Naval Academy: Lockstep Program Is Abandoned

Annapolis, Md. The ferment that has stirred much of American education since the first sputnik launching in 1957 is nowhere more evident than here at the U.S. Naval Academy. As recently as 1958 the midshipmen were moving through the curriculum quite literally in lockstep. All took the same courses, and at each bell they marched in sections for their next class assignment. Any who would have liked to drop by the library en route found themselves frustrated.

The plebe who entered the Academy after 2 years of study at a civilian college was on precisely the same footing as one straight from high school. The midshipman brilliant in science or mathematics was bound to a course of study designed to accommodate less capable classmates. The faculty suffered from similar constrictions. They could offer no electives, and they had relatively few opportunities to express their own scholarly interests by introducing new work into the curriculum. Moreover, the tendency in some departments (such as engineering) to cover many topics, but at a rather elementary level, made it difficult to attract faculty of high scholarly attainments.

In 1959 the Academy adopted two fundamental changes of policy. First, midshipmen were allowed to "validate" college-level work completed at another institution or in high school. Second, a program of electives was instituted which, within a few years, developed sufficiently to permit midshipmen to take enough electives in a given field to constitute a "minor" or even a "major." Now, at least 15 percent of a midshipman's course work is in electives, and the percentage can be higher if he has done part of his required work elsewhere and validated that work, or if, by virtue of strong academic per-

formance, he qualifies to take "overload" courses. The old practice of marching to class was incompatible with the new flexibility and variety in class scheduling, and had to be abandoned.

The new validation policy and the electives program were accompanied by a significant change in the philosophy governing the basic curriculum. The rapid advance of technology was rendering much of the midshipman's technical training obsolete before he ever reached the fleet. "Accordingly," the Academy has explained, "courses in the engineering, naval science, and weapons departments were altered. No longer were descriptions of boilers, pumps, and guns included in the curriculum. Thorough courses in thermodynamics and fluid mechanics replaced the courses in internal combustion engines and steam plants. Courses in target-intercept analysis and the mechanism of explosive damage replaced the descriptive courses and drills relating to the nomenclature and use of the five-inch gun. Instruction in the operation of specific naval radar and sonar equipment was replaced by laboratory experiments in basic circuit analysis. The mathematical approach to all of these courses rendered them somewhat more difficult, but provided a thorough understanding of the principles involved."

Other changes have been occurring at the Academy, some of them as an inevitable outgrowth of the efforts to revitalize the curriculum. Traditionally, the Academy faculty has included many civilians, but now the civilians slightly outnumber the faculty's naval officers, and still more civilians are being added as qualified young Ph.D.'s are recruited. An effort has been made to upgrade the professional qualifications of both the civilian and the officer faculty.

Ninety-one percent of the 286 civilians now have masters' or higher degrees, though only 29 percent hold doctorates. The proportion of Ph.D.'s is still small compared to the 80 percent or more that one finds at the best universities and liberal arts colleges. The Academy's goal is to raise the proportion of Ph.D.'s among the civilians to about 50 percent. The gains for the officer faculty have been large, but, again, the upgrading is far from complete. Fifty-five percent of the 283 officer-instructors have advanced degrees, compared to 15 percent just 3 years ago. Some 3 percent of the officers are Ph.D.'s. Generally, for the officer-instructor, a master's degree is all that is expected.

A. Bernard Drought, appointed in July 1964 to fill the new position of academic dean, is the leader and symbol of the Academy's effort to strengthen its academic program. The creation of his office imparted better balance to the Academy's administrative structure. Drought, formerly dean of engineering at Marquette University, is the academic counterpart to the Navy captain responsible for the physical and military training programs and for the administration of the Brigade of Midshipmen. Both are under Rear Admiral Draper L. Kauffman, the Academy superintendent.

The task of achieving the best in undergraduate education would be easier were it not for the fact that, at the Academy, academic training is not so much an end in itself as simply one factor, though an important one, in the development of naval officers. Drought must seek to reconcile academic excellence with the requirements of officer training.

From a strictly academic viewpoint, it might be best to staff most departments almost exclusively with civilian faculty. This, however, would mean less contact between midshipmen and naval officers and fewer associations of the kind believed to build career motivation. In the afternoons the Academy grounds become the scene of a vast program of varsity and intramural athletics. Athletics occupy time that might otherwise be spent in study; yet, at the Academy, athletics are justified not simply as a healthy diversion but as a means of building hardiness and habits of leadership for situations requiring stamina and physical courage.

Study Time Increased

Drought, while displaying awareness of the Academy's special mission by going on the midshipmen's summer cruises and by other actions, is credited by the superintendent with having promoted the academic program with resourcefulness and vigor. He has been successful in insisting that midshipmen have at least 2 hours of study for each hour of class, and is said to be quick to oppose proposals for any new activities that might encroach on the academic program.

Drought has urged members of the faculty to devote a third of their time to research or other scholarly pursuits. His view is that research enriches teaching, and that it strengthens faculty recruiting by making the Academy more attractive to the young Ph.D. to whom research opportunities are important. This positive attitude toward research and scholarship is especially important in view of the fact that the Academy has no graduate programs, although some of its course work is on a graduate level.

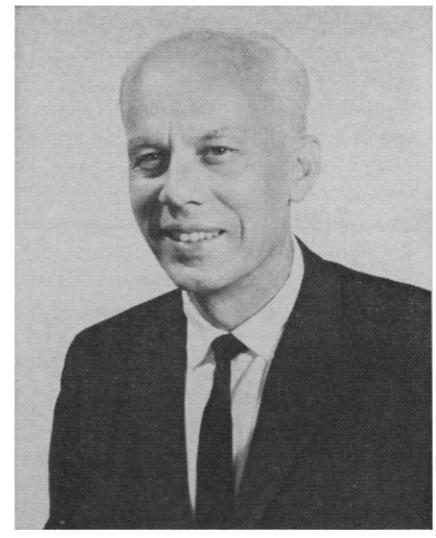
(A small number of the ablest midshipmen undertake ambitious projects of original research. Dean Drought believes that, with the growing shortage of graduate teaching facilities in the United States, graduate programs may be established at the service academies as well as at other currently all-undergraduate institutions. The Navy Postgraduate School was once at Annapolis, but in 1951 it was moved to Monterey, California.)

Research by the faculty is encouraged through sabbaticals, through opportunity for part-time study at nearby institutions such as Georgetown University and Johns Hopkins, and by closer ties with the Office of Naval Research (ONR). Johns Hopkins, in Baltimore, is some 20 miles away, and the distance to Georgetown and ONR in Washington is less than 40 miles.

In time, ONR may furnish the Academy faculty abundant research opportunities, though the ONR funds going to the Academy are still modest ($120,000 for the current year). ONR may support the research of individuals whose work it knows, or, through the Bureau of Naval Personnel, it may provide "seed money" to encourage research by young faculty members whose work it does not know. Projects currently supported by ONR include a study of cosmic rays, an investigation of the cause of fractures in materials, and a study in which the Academy's IBM model 1620/1311 computer will be used to simulate flight conditions and their effects.

The Academy's research facilities will be improved in the fall of 1967, when a new $13.6-million science and mathematics building opens. Laboratory space will be almost tripled. A shortage of land has been an obstacle to expanding the Academy's facilities, and the new building will occupy a site reclaimed from the Severn River. The Academy library, now containing about 180,000 volumes, is to grow to 250,000 volumes in 3 years and to 500,000 volumes in 10 years, according to current plans. The weakness of the library has not only discouraged research but, in the judgment of a curriculum review board 6 years ago, has handicapped the instruction of midshipmen, particularly

Rear Admiral Draper L. Kauffman



A. Bernard Drought

in the humanities and social studies. These weaknesses are expected to be relieved by the library's growth.

Academy officials insist that the instruction the midshipmen get compares favorably with that received by undergraduates at the best universities. They observe that the luminaries on university faculties tend to devote most of their teaching to graduate students and leave the undergraduates to scholars often less capable and mature than those at the Academy. If the Academy is to establish a reputation of high distinction as a teaching institution, however, it will have to develop or attract more luminaries of its own, and, especially, to recruit the abler young Ph.D.'s as new faculty positions are filled or as vacancies occur through resignation or retirement. Some vacancies are developing as faculty members, though in no fear of being fired, depart voluntarily because they know that, without a doctorate or success in publishing, their chances of promotion or merit pay are poor.

Admiral Kauffman, now in his first year as superintendent, is placing greater emphasis than his predecessors did on faculty recruitment, by actively looking for promising prospects rather than merely screening those who apply. The Academy faculty is 34 short of its authorized ceiling of 320 civilian members. Although recruiting is said to be progressing satisfactorily, the task would be easier if outdated or otherwise erroneous beliefs about the Academy were less common in academic circles.

That the midshipmen are of high caliber is generally recognized, though some people do not know that they are as great a joy to teach as the Academy claims. (Almost one-fourth of this year's 1321 plebes scored high enough in the National Merit Scholarship competition to become either finalists, semifinalists, or recipients of commendations). The amenities of life in Annapolis are well known. A historic town of charm and character on Chesapeake Bay, Annapolis is a favored location for an academic community. Misconceptions about teaching at the Academy turn on other things.

Even at institutions as close by as Johns Hopkins, many people are surprised to learn that the Academy can hire a new Ph.D., without teaching experience, at a 10-month salary as high as $10,000 ($16,478 is the maximum for a new faculty appointee; by merit increases a professor can earn as much as $21,500). They are no less surprised to hear that class sections never have more than 20 midshipmen, and that while the weekly teaching load (12 hours, with one or two courses) is heavier than that at the best universities, it is not at all bad. Some people do not even know that the Academy has civilian faculty members, and many are unaware that midshipmen now are doing more work in the liberal arts and taking a greater variety of courses than students at most civilian engineering schools.

Associate and full professors are granted tenure at the Academy. An associate or professor from another institution is hired on a 3-year contract, but is given tenure if retained beyond that period. Civilian faculty members are cleared by national security agencies before appointment; as government employees subject to the Hatch Act, they are barred from participation in organized partisan political activities. The atmosphere of the classrooms is described by knowledgeable observers as free and searching.

In short, the Academy needs to erase its old image as a place where the pay is mediocre, the teaching load is heavy, the research opportunities are few, and the curriculum is limited and inflexible. When the ablest of each year's crop of new Ph.D.'s start looking for a job, many probably do not think of the Academy at all. If they are research-oriented, they are more likely to look to the better universities; if they wish mainly to teach, the stronger liberal arts colleges, such as Swarthmore, Oberlin, and Reed, may attract them. However, Captain Charles H. Bowen, chairman of the Academy's science department, says the interest of Ph.D. candidates at Massachusetts Institute of Technology and other strong institutions is easily aroused when the Academy's advantages are discussed. He has had three vacancies in physics and electrical science since the summer, but expects no difficulty in filling them by the next academic year.

The refurbishing of its image is not the Academy's only problem. A familiar rule, which perhaps could be usefully applied there, is that a good way to attract some highly competent younger men to a department is to hire someone already highly regarded by colleagues in his field. The Academy has authorities in naval history and naval architecture on its staff, and some individuals with reputations in mathematics and other fields. But the new encouragement for research and publishing is so recent that relatively few members of the faculty have attained much recognition nationally.

The success of the Academy's faculty-building program may depend in part on its success in either recruiting some academic stars or rapidly developing more of its own. Salaries, though competitive for recruiting able young academicians who have not yet made their marks, are not high enough for recruiting in the star ranks. The Academy is investigating the possibility of establishing one or more visiting professorships paying perhaps $25,000 or more, the salary to be partly covered by gifts from sources such as the alumni association, the Navy League, and the foundations. Dean Drought says the presence of distinguished visiting professors would benefit the midshipmen,

stimulate the present faculty, and help attract new faculty people of the caliber desired.

The officer faculty presents one problem that is gradually yielding to remedial efforts, but presents another that the Academy seems content to live with. The Academy claims increasing success in identifying promising young officers and having them sent away for graduate training and then assigned to teach midshipmen. Moreover, Navy policy is to send at least half the Academy's graduates to graduate schools, though in most cases the advanced studies are deferred until after the new officer's first tour of Navy duty.

Thus, the Academy expects to draw from a growing pool of potential officer-instructors with graduate training. But the constant rotation of officer-instructors at 2- to 3-year intervals has drawn criticism from observers outside the Academy. The rotation policy is sometimes defended on the grounds that the repeated influx of new officers from the fleet helps to relate midshipmen's training to the Navy's changing needs. These officers' fresh experience at sea would seem more relevant to engineering and weapons studies, however, than to work in the basic sciences, or in fields such as English and history. The negative view of the rotation policy is that some, if not most, of the officers get their reassignment orders just as they are mastering their new teaching jobs.

The officer-faculty predominates in the weapons and naval science departments. In the science department, the numbers of officers and civilians are about equal. In the other departments, officers constitute a substantial minority; in the Department of English, History, and Government, for example, there are 58 civilians and 27 officers, most of them junior officers. Obviously, to improve teaching at the Academy, no problem that impairs the effectiveness of the officer-instructor can be overlooked.

Naval officers usually are selected for promotion for competence demonstrated in a variety of assignments. The Academy's Curriculum Review Board of 1959, which was chaired by Richard G. Folsom, president of Rensselaer Polytechnic Institute, observed: "It would . . . be highly desirable if many officers could be assigned to the Naval Academy for longer periods than the present two or three year tours without jeopardizing their future careers . . . [and if] at least a few well qualified officers who have developed a real interest [could] make a career of education within the Navy."

Academy officials say that excellent officers are being sent to Annapolis, and that, to judge from promotion lists, they fare well in the competition with officers who have spent more time at sea. But the Folsom Board's finding of 6 years ago was that many officers feel a tour at the Academy "does not significantly contribute to future career growth." This view may be less prevalent among officers now teaching at the Academy. But some knowledgeable people at the Pentagon say that, throughout the Navy generally, officers do not feel that any particular prestige or career advantage attaches to being chosen to teach at the Academy.

The Academy, now 120 years old, has proved its value by providing the Navy's most career-oriented officers. The Navy retains about 80 percent of the Academy graduates, as opposed to retention rates of 33 percent for Officer Candidate School graduates and 43 percent or less for Reserve Officer Training Corps programs. So the question has been, not whether to have a Naval Academy, but how the Academy shall

Midshipmen now walk between classes, rather than march as they once did. Tecumseh, the brooding figure in the background, is the midshipmen's god of "C," the passing mark.

rise to its highest potential as an undergraduate institute with a special mission. After a long period of apparent complacency, the Academy has, over the past 6 years, given this question its earnest attention. Altogether, the Academy appears to be in a healthy state of ferment. It has been making, and is making, major improvements; but, in view of the major problems that remain, complacency will not again soon be in order.—LUTHER J. CARTER

Announcements

A **radiation chemistry data center** has been established at the University of Notre Dame's radiation laboratory as a component of the National Standard Reference Data System. The center, sponsored by the AEC and the National Bureau of Standards, will be concerned initially with the compilation, critical evaluation, and interpretation of available data on reactions induced by ionizing radiation. Types of data to be compiled include chemical reaction yields, effects on physical properties, and specific rates of elementary processes. The center will be directed by Milton Burton, director of the university's radiation laboratory.

Grants, Fellowships, and Awards

Applications are being accepted by U.C.L.A.'s Harbor General Hospital for postdoctoral fellowships in **reproductive physiology**, to begin next July. The program, sponsored by the Ford Foundation and the Public Health Service, will present an interdisciplinary approach to the biology of early reproduction. Emphasis will be on basic research on the physiology, biochemistry, metabolism, pathology, and ultrastructure of reproductive tissues. Clinical research will not be stressed, but it is available. Candidates should have a doctoral degree and, preferably, be under 35 years old. Applicants for PHS fellowships must be U.S. citizens or permanent residents. The stipend is $7500. The Ford Foundation awards carry stipends of $6000 for married recipients and $5000 for single people; travel allowances are included. U.S. citizenship is not a prerequisite. Deadline for receipt of applications: *15 January*. (L. Fridhandler, Department of Obstetrics and Gynecology, Harbor General Hospital, Torrance, California)

FDA Commissioner Larrick To Retire

George P. Larrick, commissioner of the Food and Drug Administration since 1954 and a member of the predecessor agency since 1923, will retire next month. Larrick, 64, attended George Washington University and colleges in Ohio. There have been rumors of his resignation for some time in the pharmaceutical industry trade press.

Health, Education, and Welfare Secretary John Gardner also announced that a special committee had been appointed to study the increasingly controversial agency and to recommend qualifications for a successor to Larrick.

Rufus Miles, who recently retired as Assistant Secretary for Administration of HEW, heads the committee. Other members are John Corson of Princeton; Edward Dempsey and Boisfeuillet Jones, former special assistants to the HEW Secretary; and Bruce Caldwell, budget officer for HEW and a former FDA executive. Their deliberations are expected to take several weeks.

The American Philosophical Society offers a limited number of Daland fellowships for research in **clinical medicine**, including internal medicine, neurology, pediatrics, and psychiatry. Physicians in the early postdoctoral years may be nominated by the chairman of a medical school department in the field. The fellowships are for 1 year, and are renewable for 2 additional years. The stipend is $7000 the first year, with annual increments of $1000. Deadline for nominations: *15 January*. (G. W. Corner, 104 South 5th Street, Philadelphia, Pennsylvania 19106)

Meeting Notes

The sixth international symposium on **gas chromatography** will be held at the Catholic University, Rome, 20–23 September. The sponsor will be the gas chromatography discussion group of the Institute of Petroleum. Papers on the following topics will be considered for inclusion in the proceedings: principles, techniques, and applications; solution of analytical problems; principles and techniques connected with other kinds of chromatography; theoretical or experimental studies comparing other kinds of chromatography. Abstracts of up to 500 words are needed. Deadline: *1 January*. (A. B. Littlewood, School of Chemistry, The University, Newcastle upon Tyne, 1, England)

"Man's Extension into the Sea" will be the theme of a symposium in Washington, D.C., 11–12 January. The meeting will cover the 45-day **SEALAB II** experiment that began 27 August off the coast of La Jolla, California. It will include such details of the operation as aquanaut experiences, engineering and medical problems, training, logistics, communications, photography, scientific experiments and instrumentation. The sponsors include the American Society of Mechanical Engineers, American Society of Naval Engineers, Marine Technology Society, Society of Naval Architects and Marine Engineers, and the American Geophysical Union. Navy sponsors are the Office of Naval Research and the Special Projects Office. (T. Evans, Conference Management Organization, Colonial Bldg., 105 North Virginia Avenue, Falls Church, Virginia 22046)

Courses

The fifth annual course in **measurement engineering** will be presented by Arizona State University 24–28 January. The theme is "how to obtain valid data on purpose." Emphasis will be on the properties of the measuring system and the design principles and laws by which valid data are obtained; these data can be applied to specific problems to measure any desired physical quantity. The program will be directed toward laboratory workers, supervisors, designers, and theoretical analysts. Applicants should have a bachelor's degree or the equivalent in engineering, physics, or metallurgy. The registration fee is $200. Registration deadline: *14 January*. (Measurement Engineering Short Course, Arizona State University Engineering Center, Tempe)