various stages of development. The total capacity of the training programs currently supported by NIDR falls far short of meeting the immediate needs of even these expanding and new schools. The problem is not merely one of inadequate numbers, since in these training programs there is also maldistribution of students among the various science disciplines. Of the 316 individuals in these programs who are currently being trained in the basic sciences, only two to six are in each of such shortage areas as embryology, endocrinology, pharmacology, radiation biology, epidemiology, genetics, and biophysics. A correspondingly serious deficit exists in the very important discipline of biostatistics.

Further stimulation of dental-science-related research depends on the assembling of a critical mass of scientifically trained individuals who can stimulate and enrich one another and attract others to work with them. Toward this end, NIDR has begun to develop interdisciplinary, university-based dental research centers in several sections of the country. While these centers will serve as critical foci, parallel efforts are needed in order to provide a stronger scientific base in every dental school. The unqualified acceptance of research as part of the responsibilities of the dental academician must be encouraged.

Scientists from all disciplines basic to oral health must be challenged and, made aware of the needs and opportunities in the field of oral research, and thereby enlisted in the effort to meet these needs and opportunities. Indeed, such enlistment is one of the primary aims of the dental research centers program. All scientists must be made increasingly aware of the implications of their work for dental research. It is only through such combined efforts that appropriate depth can be added to the breadth that has been achieved in the dental sciences during the past 20 years.

NEWS AND COMMENT

The Draft: Grad Schools, Students Feel Impact of New Regulations

The curtailing of draft deferments for graduate students has caused considerable alarm among graduate school administrators. There are plenty of rumors about how University X will lose substantial numbers of graduate students, including teaching and research assistants, while University Y has supposedly devised an ingenious, if questionable, way to protect its teaching and research assistants from the draft. The true impact of the new draft regulations will not be assessable until the graduate schools reopen next fall, or perhaps even later. But a telephone survey by *Science* has turned up evidence that the new regulations have already had an adverse impact on scattered departments and graduate schools, as well as a pronounced influence on the volume of student job interviews. And while no graduate dean volunteered the information that he has devised an ingenious draft dodge for his teaching assistants, the survey did turn up a heated controversy about the propriety of a letter pertaining to the draft sent out by the physics department at Cornell University.

The alarm in graduate school circles stems from two recent draft decrees. The first ended deferments for graduate students except those in medical specialties and those who entered their second or subsequent year of graduate study in the fall of 1967. The second continued the policy of drafting the oldest eligible men first. The combined result of these two rulings is that men who are currently in their first year of graduate study and men who will graduate from college this June and will be entering the first year of graduate school next year are prime candidates for the draft. One survey of 122 graduate schools predicts that first-year graduate enrollments next year will decline by 50 percent or more, while the number of full-time second-year graduate students may drop by one-third. Indeed, some graduate deans are predicting nothing short of "disaster." They say the expected drop in graduate enrollments will hurt both the graduate schools, which will be faced with fewer students and a sharp drop in income, and the undergraduate colleges, which often depend heavily on graduate students to serve as teaching assistants in undergraduate courses. Professors who depend on graduate research assistants may also be adversely affected.

At this point it's difficult to find hard evidence indicating whether the graduate schools are "crying wolf" or whether disaster is, indeed, just around the corner. Gustave O. Arlt, president of The Council of Graduate Schools of the United States (CGS), reports that a recent sampling of various kinds of institutions throughout the nation revealed that applications and acceptances for graduate school next year are running about 10 percent ahead of last year, which is in line with the annual increases experienced over the past 5 or 6 years. Arlt notes that "on the surface everything looks perfectly serene and all right," but he wonders how many of those who have accepted graduate school positions will actually show up and how many of those who do show up will be drafted by the end of the school year. The great bulk of college seniors and first-year graduate students will not become vulnerable to the draft until the end of the current academic year, so many who had planned to attend graduate school next year may find they are drafted this summer.

The new draft rules have clearly affected graduate acceptances at some institutions and in some departments, particularly the sciences and engineering. At Iowa State University, the physics department thought it had 25 firm acceptances of fellowships or teaching assistantships, as of 15 April, but 10 of the 25 subsequently changed their minds and said they intended to get jobs or pursue other activities that might make them less vulnerable to the draft. At Indiana University, applications to graduate school dropped about 30 percent below last year's level, presumably at least partly because of student uncertainty over the draft. At

another university, some 15 or more men who were offered teaching assistantships in physics declined for reasons relating to the draft—some went into the Peace Corps, some went to Canada, some enlisted in the armed forces.

Similarly, at M.I.T, graduate school acceptances are down 5 percent from last year while the physics department has suffered a sharp drop of about one-third. M.I.T's graduate dean attributes the drop partly to the new draft rules, partly to a "drastic cut in federal research money," particularly money for NSF, NDEA and NASA fellowships. At Purdue, it is perhaps revealing that fellowship acceptances are down roughly one-third, while acceptances for teaching and research assistantships are about the same as last year, a trend which the graduate dean attributes partly to a belief among students that they will have a better chance to avoid the draft if they have teaching or research duties and are not simply students. Many selective service officials say such a belief is unfounded.

The consensus of those interviewed by *Science* was that schools with a high percentage of men enrolled, schools which rank in the second echelon in terms of prestige and status, and schools with high percentages of science and engineering students (who are apt to flee to industry in hopes of escaping the draft) are most likely to be hurt.

More Interest in Jobs

One of the most visible results of the new draft rules has been to spur student interest in the job market. As it now stands, there are no sure-fire occupational deferments. The old advisory lists of essential activities and critical occupations that were followed by most local draft boards have been suspended, which leaves it up to each local draft board to grant occupational deferments based on "essential community need" or "the maintenance of the national health, safety, or interest." Nevertheless, many observers believe it is easier for a worker to get deferred than a student. As Betty Vetter, executive director of the Scientific Manpower Commission expressed it in an interview with *Science*: "There is almost no chance for deferment as a graduate student. There is some chance for an occupational deferment."

The fact that many students agree with this assessment became apparent during the job interviewing season on campus this year. Many schools report a marked increase in interviews with industrial firms, particularly those that are related to the national defense effort. The University of Maryland scheduled about 30 percent more individual interviews this year than last, an increase which the placement director believes is "without question tied in with the draft situation." Syracuse University early this year reported a 35 percent jump in registration for interviews and also attributed the increase partly to the draft. And Caltech experienced a flurry of interest in job interviews immediately after the new draft rules were issued in final form in mid-February.

Whether the increased interest in job interviews will translate into an actual increase in the number of students entering industry remains to be seen, but there are scattered indications that it may. The head of the ceramics division at a major steel company reports that he has "had to dig" for job applicants in recent years, but this year he "began to get applications from fellows with good grades" who were being urged by their professors to go on to graduate work but who applied to industry anyway. He has offered several of these students jobs and some have accepted. At Ohio State University, in contrast to previous years, a much higher percentage of students declined graduate fellowships in engineering and physical sciences than declined fellowships in the humanities and social sciences, a pattern which the graduate dean suspects is caused by a shift of technical students into industry.

Attraction of Teaching

The teaching profession is also believed to be attracting many students, largely because local draft boards are sometimes prone to regard teaching in the local schools as fulfilling "an essential community need." One first-year graduate student at Harvard, for example, was told by his local board that if he taught in his home area of Pascagoula, Mississippi, he would be deferred, but if he taught anywhere else, he would not. In a similar vein, the director of the Syracuse University placement office finds an assumption among male seniors that "teaching is the safest horse on a drafty merry-go-round." As a result of this belief among students, a Harvard graduate dean predicts that "the nation's high schools will be exceptionally well taught next year."

The draft picture is complicated by the fact that the draft is administered by a multitude of local boards which may follow differing policies in awarding deferments. Most manpower experts assume, for example, that a college graduate who is just starting work will have difficulty establishing that his services are "essential" to his community or company. But such is not universally the case. In Missouri, the state selective service office has suggested that local boards let new graduates work a year before drafting them on the theory that the students need a year of practical experience to crystallize their "book-learning," and that a year of employment will also give them a place to identify with and return to when they eventually complete their military service.

The Scientific Manpower Commission claims that some state selective service directors have even violated selective service regulations by advising local boards to reclassify college seniors and first-year graduate students into the I-A category before the end of the academic year. The commission advises students so reclassified to immediately request reinstatement to a II-S classification lest they later have difficulty obtaining an occupational deferment.

Graduate School Tactics

Graduate schools have taken several steps to cope with the anticipated loss of students and of teaching and research assistants. Mrs. Vetter, of the Scientific Manpower Commission, reports that some graduate schools have overadmitted by anywhere from 15 to 250 percent in hopes that they will end up with full classrooms. At Northwestern University, the graduate dean reports the tactic seems to have worked, but some schools may be embarrassed to find they have more students and more claimants for financial aid next fall than they can comfortably handle.

Mrs. Vetter also claims that many graduate schools are "actively seeking" girls and 4-Fs and foreign students to fill their graduate schools. Several graduate deans have the impression that even Yale University, that bastion of male supremacy, is deliberately pursuing female graduate students, but the graduate dean's office at Yale says such is not the case.

Many graduate schools are particularly worried about losing part-time teaching assistants who had previously

been granted student deferments. When the new draft regulations came out there were immediate efforts to get occupational deferments for these assistants on the ground that their services are vital to the community, but the graduate schools found that their arguments were not overly convincing to draft officials. An aide to Gen. Lewis B. Hershey, selective service director, reports that the general posed this question, in essence, to several college presidents: "Before you told me these men should be deferred because they were students. Now you tell me they should be deferred because they are teachers. When were you lying to me, then or now?"

In order to clarify the status of teaching assistants, Hershey sent a memorandum to local draft boards stating unequivocally that "A full-time graduate student shall not be considered for occupational deferment because he is engaged in teaching part-time." Many state and local draft officials interpret this to mean that only a student who is carrying a full teaching load would be eligible for occupational deferment. In this case, he would be much like an industrial worker or high school teacher who was taking graduate courses after work. The determination of what constitutes a full-time teaching load remains with local boards.

The graduate school grapevine is buzzing with rumors about how various schools have supposedly reached favorable "understandings" with local selective service officials or have devised a means for making it look as if teaching assistants are indeed carrying full teaching loads, but *Science* was unable to verify the rumors it tried to check out. Many schools seem to be adopting a policy of supplying local boards with all the favorable information they can and then hoping for the best. M.I.T, for example, initially wrote letters requesting occupational deferments to the draft boards of all teaching and research assistants who requested such action. After Hershey's clarifying memorandum made such occupational deferments virtually impossible, M.I.T started writing detailed individual letters to draft boards explaining exactly what individual teaching and research assistants are doing and requesting that the draft board simply not call up the individual, even though he is classified 1-A, until the individual has completed his degree. Whether such a tactic will work still remains to be seen.

Considerable controversy was provoked by a letter sent out in March by the chairman of the physics department at Cornell University. Some graduate deans who have seen copies of the letter interpreted it as an attempt to attract teaching assistants by promising them, in essence, that they would be sheltered from the draft by sympathetic New York State selective service officials. Neither the author of the letter nor Cornell administrative officials would provide *Science* with a copy of the controversial communication. The author says it was "not an attempt to proselytize" and that he "made no promises." Robert L. Sproull, vice-president for academic affairs, also asserts that the letter "didn't promise anything—it was not that naive." But he acknowledges that Cornell officials were "highly upset" when they learned about the letter and "blew the whistle" on any further such communications. "It was not an official university letter," Sproull stressed.

While the impact of the draft on graduate schools is not yet fully assessable, there is no question that the

A POINT OF VIEW

Excerpts from a speech, "Financing Medical Education in 1968," by Carleton B. Chapman, dean of the Dartmouth Medical School, at a conference held earlier this year in Chicago.

Financing our growing medical schools adequately at a time when the Nation is in financial turmoil is probably not possible. This is one aspect of the dangerous crisis we have reached in medical education. The other aspect is even more fundamental; it has to do with the educational philosophy on which our projections of fiscal need are based. . . .

The search . . . for some means of coping with our immediate and very diverse obligations and for preserving that which is good in our present system is being beclouded by a number of misconceptions and distortions. Two of them are quite fundamental. (i) All we need is more money. . . . This is something of a delusion. The fact is that the system for education for medicine we have built up since the turn of the century, though very appropriate at the time, is now a defective and wasteful one educationally and costwise. We have, down the years, attempted to keep the system abreast of the social and intellectual need solely by adding to it. The system we now have has been put together more by pressure groups than by broadly competent and socially responsible planning bodies. We have built in our own vicious circles and have cast our own rigid mould, ignoring the fact that a system of medical education that has been assembled by a process of uncritical accretion is, almost by definition, likely to be inordinately expensive, intellectually wasteful, and resistant to adaptive change. . . . The end result is the nine to 12 year system of medical education to which most of us have been subjected. . . . (ii) A second fundamental misconception is that our present problem stems solely from the enormous support given to biomedical research by the Congress since 1946. . . . But the reality, simply and unadorned, is that support of research in medical schools by the National Institutes of Health since the war has been virtually the only continuously effective force acting to upgrade the educational process itself. . . .

Conclusion. American medical education is at a crossroads and caught up in a major crisis, both at the same time. In its present form it is too lengthy, too expensive, and not sufficiently related to sociomedical reality. It now requires to be shortened, qualitatively upgraded, and brought into close relationship with the total national need. Continuing, but critical, support of excellence in biomedical research must be counted an integral part of the process. Funds spent to these ends will pay rich dividends; funds spent to maintain and extend the present outmoded structure will yield a disappointing return.

draft will disrupt the lives of substantial numbers of graduate students. In an effort to ease the disruption, many graduate schools have guaranteed readmission to students whose education is interrupted because of the draft.

There is also a good chance—though no guarantee—that students who are drafted during the school year will be allowed to complete the semester before induction. A memorandum from Col. Bernard T. Franck, an assistant to Gen. Hershey, notes that while there is no provision in the draft laws insuring an opportunity to complete the semester, the selective service director has administrative authority to postpone induction, on an individual basis, for good cause. The memorandum adds that "General Hershey would give consideration to the use of this limited postponement authority in individual cases."

It seems clear from the evidence turned up by the *Science* survey that some schools and departments will be hurt by the draft and that this is particularly true of the sciences and engineering. However, the impact may be eased somewhat after two years or so when the initial round of draftees begins returning to civilian life. Meanwhile, some outspoken educators are predicting disaster for the graduate schools in the years immediately ahead, and there is no certain way of telling whether the predictions will be borne out.—PHILIP M. BOFFEY

German Professors: Prototypes, But Paragons No More

Munich. The European university is under attack, and a prime target is the professorial chair, which provides the organizing principle for the traditional system. Germany produced the prototype of the "feudal" professor, and an effort is being made there—notably at the Technische Hochschule in Munich and at the newly founded universities—to depose this last autocrat.

The German professor is the legatee of early-19th century reforms inspired by Wilhelm von Humboldt—diplomat, scholar, and, briefly, Prussian minister of public instruction—who established the forms which were to give German universities preeminence in the 19th century, particularly in the natural sciences.

The tide of German idealism was running at the time of the von Humboldt reforms, and the *Weltanschauung* of that epoch still has an extraordinary influence on the university. The central idea of the unity of teaching and research, *Lehre und Forschung*, entailed a close relationship between professor and student in the universities' main work of acquiring knowledge and passing both knowledge and culture on to following generations. The university was regarded as having a right to self-government free of control by either church or state. "Academic freedom" in Germany chiefly implied the right of the student to study where and when and for as long as he wished.

Functionally, German universities became federations of professors each of whom was responsible for teaching and research in his own discipline and headed an institute with its own staff of assistants, library, and separate administration.

As is well known, the German university was the model on which graduate education in the United States was founded in the latter part of the 19th century. But the American importers grafted German research modes onto an already flourishing Anglo-American undergraduate college system. Central administration was strong in the American university as compared to the German. And the cultural mystique of the German university did not travel well.

In Germany industrialization and the demand for technically trained manpower put heavy strains on the university structure. The tradition of a single chair in a subject proved restricting, particularly in the sciences, as knowledge and new specialties proliferated. Attempts were made to bolster the system with "parallel" chairs and the creation of new higher-education institutions outside the university—technical schools, colleges of education, and specialty schools in mining, forestry, veterinary medicine, and so on. Thus the original university pattern was preserved.

Criticism of the university today centers on overcrowding and the remoteness of the professor from his students. A professor in the science faculty may be responsible for supervising as many as 100 graduate students. He is overburdened by administration, and the division of the university into self-contained little empires means an inefficient use of resources.

There are some other complaints as well. Professors still tend to reign in isolation in their institutes, and interdisciplinary research as well as research in new fields suffers. Junior staff members are overworked and underpaid and, in most cases, have little opportunity to conduct research.

Much of the same criticism is leveled at the technical universities, the *Technische Hochschulen*, which were founded in the late 19th century to respond to the demands of the industrial revolution. There were forerunner institutions established at Clausthal in 1775 and Karlsruhe in 1825, and, between 1868 (when the Technische Hochschule at Munich was founded) and the turn of the century, "TH's" appeared at Aachen, Berlin, Braunschweig, Darmstadt, Hanover, and Stuttgart. They started as technical schools teaching building and industrial techniques, but were soon teaching theoretical subjects as well as applied science, and developing their own research traditions.

The Munich TH is the scene of the best-known effort to reform teaching and research in physics by replacing the institutes with a departmental system on the American model. The effort was initiated by Rudolf L. Mössbauer, who won a Nobel prize in physics for work on resonance absorption of gamma radiation and discovery of the Mössbauer effect. Four years ago Mössbauer agreed to return to Munich on a half-time basis from his professor-