

## College in 2000: Is less more?

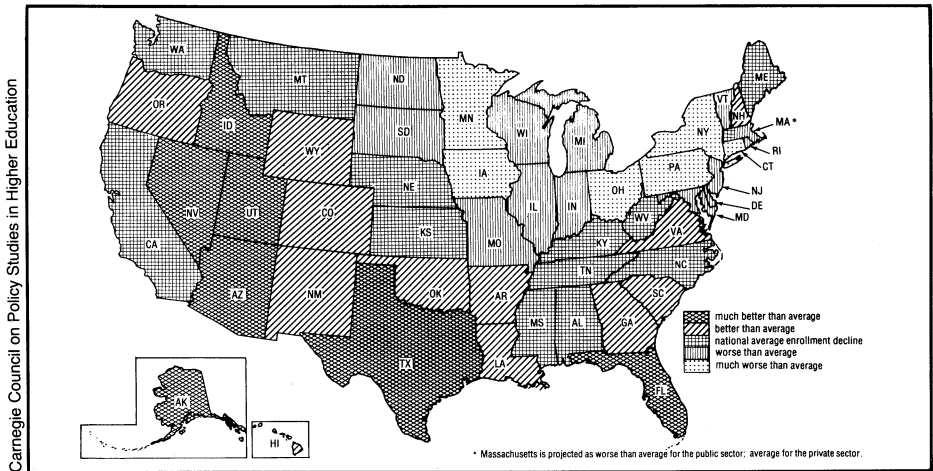
For those who subscribe to the "smaller is better" philosophy, the final two decades of the 20th century might appear to hold the promise of an upswing in the quality of higher education in the United States. Undergraduate enrollment in U.S. colleges and universities will probably decline by 5 to 15 percent between 1980 and 2000, the Carnegie Council on Policy Studies in Higher Education predicts in its final report: *Three Thousand Futures: The Next 20 Years in Higher Education* (Jossey-Bass, Inc.).

The council, headed by Clark Kerr, says that by the year 2000, "there will be more women [enrolled] than men, as many people over 21 as 21 and under, nearly as many part-time as full-time attendees, and one-quarter of all students will be members of minorities. Roughly one-half of the students in the classroom of 2000 A.D. would not have been there if the composition of 1960 had continued. This is a fundamental, almost radical change in higher education."

While the demographics of student populations have shifted drastically from those of 1960, the Carnegie council advocates that the turn of the century should bring "a return to the academic quality level of 1960 in the achievement capacities of college graduates . . . . Every institution should have this as a goal." And the council predicts that at least partially because of the expected drop in enrollments, this goal of upgraded quality may be achieved. Students who do attend colleges "will seldom, if ever, have had it so good," according to the report. "They will be recruited more actively, admitted more readily, retained more assiduously, counseled more attentively, graded more considerately, financed more adequately, taught more conscientiously . . . and the curriculum will be more tailored to their tastes."

But the picture has a dark side as well. The enrollment decline — suggested by the census bureau's projected 23 percent decline of 18-to-24-year-olds by 1997 — generally is expected to hit private institutions hardest. "The best universities and liberal arts colleges may become better," says the report, "while those not quite the best may become comparatively worse in the average, precollege caliber of their students."

Of "average or above vulnerability" to the potentially negative impact of enrollment changes will be Ph.D. programs of doctorate-granting universities with relatively modest research activities and universities and colleges with multiple programs below the Ph.D. level. "The most vulnerable category, with enormous variations among individual institutions, includes the less-selective liberal arts colleges — many of which are located in the



Projected state enrollment trends in 1990s relative to national average decline.

East and Midwest — and private, two-year colleges, a declining group for some years," projects the council.

Both the East and Midwest may lose about 10 percent over the next 20 years in their comparative share of the college enrollment, while the South is expected to gain 5 percent and the Southwest and West 10 percent or more. According to the council, "Some institutions in the South and West that are now in the second rank academically will make it into the first rank by the end of the century."

College enrollments will not drop as sharply as the overall decline in "college age" 18-to-24-year-olds, the council says, for several reasons:

- That age group accounts for only about 80 percent of total undergraduate enrollment.
- College participation of the over-22 age group is expected to increase to 50 percent of the total student population in 2000, compared with 30 percent in 1960. "This age group is growing, more of its members have been to college and are therefore inclined toward continued learning," says the report, "and more of those who have not enrolled may do so, either for job advancement or to enhance nonvocational interests."
- Female enrollment is expected to comprise 52 percent of the college population by 2000, and "more participation by non-minority women can be expected."
- The dropout rate for four-year colleges has recently declined from 50 to 40 percent, and the council suggests this trend may continue.
- A higher percentage of black students will be attending colleges and universities over the next 20 years. Even now, among those in the same income range, a higher proportion of blacks than whites attend college, the council notes. Overall, minorities in the 18-to-24 range are expected to account for one-fourth of all college students by 2000, compared with a 4 percent figure in 1960.
- Hispanic and foreign student populations are expected to continue to grow in the next 20 years.

"Problems, even severe problems, lie ahead," says the council. "But there are reasonable solutions to most, if not all of them; it is better to plan to meet the future effectively than just to fear it as a new dark age." □

## Agent Orange: A problem of exposure

Medical pathologists identified a high incidence of a particular type of autoimmune antibodies — antibodies formed against the body's own cells — in tests on the blood of Vietnam veterans who claimed direct contact with Agent Orange, a herbicide widely used to defoliate jungle terrain.

Flagging the find as "peculiar," professor M. Mitsuo Yokoyama, under whose guidance the immunological blood tests were conducted last fall at the University of Illinois Medical Center in Chicago, said that "it's very unusual to find such a high incidence of autoimmune antibodies in a group of people, especially when compared to the general population." In tests completed at the center this month, a majority of the 17 veterans studied exhibited antibodies in the liquid portion of their blood that react with "the smooth muscle and nuclear components of their own systems," he said.

Although this is not a major defect in the individuals' immune systems, it is "certainly suspicious," volunteered one researcher hearing of the finding. She said smooth-muscle antibodies are frequently associated with, though are by no means proof of, several chronic liver diseases.

"Our inability to ascertain any long-term problems with the immunity systems of these veterans," say Dean Jabs and Yoshinobu Matsuo, who conducted the tests, "does not mean that they don't exist. We conducted a few tests on a very small group of patients. A much more extensive, large-scale investigation is needed."

In fact, a number of studies hoping to  
*Continued on page 59*

Gurney and Konishi are now more closely examining how the hormones affect the volumes of the brain areas. They have evidence that each hormone controls a separate developmental event; estradiol influences the size of the cells and testosterone influences the number. They are also looking at hormonal effects on the architecture of the brain cells.

Support for the idea that sensitivity to androgens is an important aspect of sexual differentiation comes also from the work of Arnold, now at the University of California at Los Angeles. Arnold finds that nerve cells in many of the song-control regions accumulate the hormone testosterone or its metabolites. Because accumulation of a hormone is considered a prerequisite for many of its effects, Arnold believes androgens act at many levels in the male zebra finch brain to shape singing behavior.

Sex difference in number and size of hormone target cells was described by Arnold and Albert Saltiel in the Aug. 17 SCIENCE. In some areas of zebra finch brain, such as HVC, a greater proportion of the cells accumulate testosterone in males than in females. In RA, no difference is observed in the number of target cells, but the cells in males that accumulate testosterone are larger than those in females. Therefore, by adulthood the zebra finch sexes differ in several ways in the brain cells that can respond to sex hormones.

The workings of the song-controlling brain regions have been explored further by Arnold. With a microelectrode, he can

electrically stimulate cells in the RA or HVC and measure a response in the muscles of the syrinx, the organ responsible for bird sound production. Even though song areas in the female brain are smaller and may look different than those of the male, at least for one area the wiring seems to be the same between the sexes. Arnold finds that stimulation of the female HVC, like that of the male, can produce muscle contractions in the syrinx. But some sex difference remains — the level and duration of the electrical stimulation required to produce a muscle response is generally greater in females.

By using specific staining and marking techniques, Arnold and colleagues also are identifying microscopically the cells involved in sexual differentiation. So far they have found a sexual difference in the topographical distribution of two chemicals — the enzyme that breaks down the neurotransmitter acetylcholine and the catecholamines thought to be neurotransmitters in the brain.

The recent findings by Arnold, Gurney and Konishi add strong support for a model set forth 20 years ago. The "organizational hypothesis" says that the neural circuits underlying sexual behaviors are permanently arranged by hormones in the newborn. Now the evidence is clear that there are sex differences in aspects of neural organization, and the scientists have begun to identify the developmental events that lead to such differences as those that underlie the male zebra finch's exclusive song. □

### ... Agent Orange

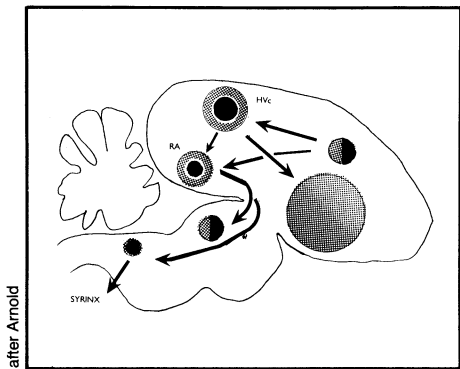
identify health effects from the controversial herbicide are planned or underway. For instance, a General Accounting Office study released last month says that the Air Force is developing a health-effects study of its servicemen who participated in the aerial spraying of Agent Orange as part of operation "Ranch Hand" in Vietnam. The GAO report adds that the Veterans Administration is also working up a list of veterans who have been treated for herbicide-related problems; as of last September, it had identified 4,800 who had requested such treatment. Those listed will eventually be asked to visit a VA facility to undergo a physical exam, and then be re-examined once a year for the next five.

In its report, "U.S. Ground Troops in South Vietnam Were in Areas Sprayed With Herbicide Orange," the GAO found that contrary to statements issued by the Defense Department, military personnel did enter regions within the first four to six weeks after they had been sprayed. In fact, the report found that between 1966 and 1969, an estimated 16,100 marines were assigned to units that came close to or into regions that had been sprayed with Agent Orange no more than four weeks earlier — 5,900 troops were there on the day of spraying. Although Army troops undoubtedly were exposed also, records are too disorganized and incomplete to ever track down the number, much less the names of those involved, the GAO study found. However, "names and last-known addresses of marines assigned to units close to herbicide orange spraying can be obtained from Marine Corps records," says GAO. Unfortunately, complains Lewis Golinker, a staff attorney for the National Veterans Law Center in Washington, to date that simply has not been done.

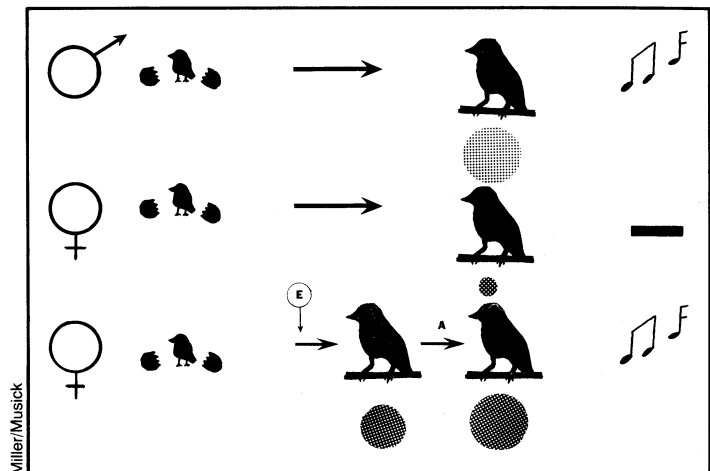
Between 1965 and 1970, the Defense Department sprayed 10.65 million gallons of Agent Orange — roughly a 50:50 mix of two potent herbicides, 2,4-D and 2,4,5-T (SN: 3/17/79, p. 166) — in Vietnam. While civilian use of 2,4,5-T is normally restricted to application of one to four pounds of the chemical per acre, undiluted Agent Orange sprays in Vietnam deposited an average 13.8 lbs of 2,4,5-T per acre.

Since 1977 there have been nearly 1,000 health claims registered by veterans who suspect that they suffer illnesses caused by exposure to Agent Orange. But a lack of strong supporting evidence linking the chemical to human-health effects has limited the ability of claimants to win compensation. In fact, the "VA has allowed no compensation claims based solely on herbicide exposure in Vietnam," the GAO says. And it adds that DOD still views Agent Orange as "relatively nontoxic."

The nation's five Agent Orange manufacturers, threatened with a class action suit representing more than 2,000 servicemen, have themselves filed suit against the government claiming the chemical was misused. □



Several of the brain regions believed to control bird song are larger in the male's brain than in the female's. The black disks represent the relative size of the female regions; the shaded disks represent male's. No size determinations have been made on areas shown by half disks and the largest song region in the male brain, called area X, cannot be seen at all in the female brain.



Male birds sing, females do not. But females treated with estradiol just after hatching and with androgen at adulthood do sing and exhibit other male behavior. The shaded disks represent the relative size of one brain region involved in song production.