Student Skeptics Study UFO's

The recent demonstrations in Washington and Wolfle's editorial, "Student unrest" (27 Oct., p. 443), as well as Tom Lehrer's records, show that young people "gotta have a cause," opposing U.S. government policy, or university faculty, or "the Establishment." It seems to me that this tendency to opposition can be effectively exploited in teaching science and other subjects. As an example, I am now teaching a course on "Flying Saucers," capitalizing on student interest in UFO reports that discredit the scientific establishment. The 50 students who signed up (for a class "limited to 20") will get the fundamentals of astronomy and physics that apply to UFO sightings. By the end of one semester, they should at least understand what is involved between the flying-saucer hypothesis and the laws of mechanics, radiation, and physics of the upper atmosphere (see Markowitz, "The physics and metaphysics of unidentified flying objects," 15 Sept., p. 1274). The only trouble is that I don't know enough social psychology to capitalize fully on this broad topic.

In the realm of physical science, it would help if E. U. Condon and his panel in Boulder, Colorado, would publish some statistics on the UFO reports, estimate the labor necessary to analyze one, and give interpretations of a few typical cases. Students will read such materials avidly (looking for loopholes) and will certainly learn some astronomy and physics in the process.

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Are Dental X-Rays Dangerous?

During Senate hearings on S. 2067, the bill which would set standards governing radiation hazards (15 Sept., p. 1292), Albert Richards, speaking for the American Dental Association, pointed out that dentists live an average of 1.4 years longer than the rest of the white male population and that dentists who die of diseases of the blood and blood-forming organs, including leukemia, live to an average age of 71.2 years while the parallel figure for the general population for death from these diseases is 68. His arguments are invalid for the following reasons:

1) The blood-forming organs, the bone marrow and the spleen, are deep within the body. A dentist is exposed only to scattered radiation which has a kilovolt-peak far lower than that of the primary beam. Therefore, only a very small percentage of this radiation would ever reach the blood-forming organs as most of it would be shielded out by the bones and overlying tissues.

2) There are less than 15,000 cases of leukemia in the United States per year. Therefore, the data may be statistically invalid, as there are less than 100,000 dentists practicing in a population of 200 million. If dentists were to get leukemia at the same rate as the general population, they would have roughly 7 to 7½ cases per year, and certainly in a group of 100,000, it is hard to see this as a statistically significant figure.

3) The universal use of x-ray in dentistry is an event of the last 20 years so that many of the older dentists have not had x-ray machines during their whole practice experience. Also, many have delegated this technique to assistants and hygienists.

Richards' figures comparing death rates from blood diseases of dentists with that of the general population are not realistic because virtually no dentists are under the age of 20, while many leukemia deaths occur among children. The incidence of skin cancer which could result from low kilovolt radiation would provide a more significant comparison. If the number of dentists having skin cancer were compared with another professional group not exposed to such radiation reliable data could be obtained. Most every dentist knows of a colleague who has contracted skin cancer from his x-ray machine.

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Age-at-death figures referred to by Medwedeff are from the study entitled *Mortality of Dentists, 1955–1960*, by the American Dental Association's Bureau of Economic Research and Statistics. The study, based on death certificates of dentists received from a majority of the state health departments, covered a period of 6 years. In accord with the *International Classification of Diseases, Injuries, and Causes of Death* (World Health Organization, Geneva, ed. 7, 1957), leukemia and aleukemia were included under "neoplasms," not under "diseases of the