itself has led to compartmentalization of hydrology into ground water, surface water, and no man's land.

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We subscribe to Hewlett's concern for ambiguous definitions, but apparently he has misinterpreted or misread parts of our article. He says that we "first treat ground water as water stored within the zone of saturation under the land surface, and later as 'all the water beneath the land surface.' " We did not define ground water later as "all the water beneath the land surface." Our statement reads, "Ground water, or more broadly all the water beneath the land surface, is distinctive in hydrology . . ." We believe that the words "or more broadly" fully qualify the statement to indicate that "all the water beneath the land surface" includes other subsurface water in addition to ground water.

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Esthetic Values and Power Lines

The general sentiments expressed by Harold E. Thomas of Woodside, California, on conservation and on the attractiveness of the local scene (Letters, 10 Apr., p. 135) are completely in accordance with mine. In the continuing competition between preservation of natural resources and esthetic values on one hand, and purely economic motives on the other, we must be willing to discount the short-range economic arguments more and more. This remark applies to private agencies, to local communities, and to agencies of the federal government.

Unfortunately, these sentiments do not support in any way the conclusions of Thomas and the city of Woodside in relation to the dispute concerning the power lines to the Stanford Linear Accelerator Center which the AEC has contracted for with the Pacific Gas and Electric Company. As evidenced by Thomas's letter and the recent article in *Science* about the Stanford Linear Accelerator Center (News and Comment, 27 Mar., p. 419), this matter seems to have become of more than local interest. The proposal made by the PG&E to the city of Woodside and the San Mateo County Planning Commission—which was accepted by the County Planning Commission (not "denied," as Thomas wrote) but refused by the Woodside Town Council and now the San Mateo Board of Supervisors—was to construct a line about 4 miles long supported on painted steel poles of average height 70 feet (not "towers," as stated by Thomas). The middle sketch in Fig. 1 shows the type of pole to be used. Of the 34 installations in the line, five would be in the city of Woodside and eight in San Mateo County; most of the installations would be single poles but some would consist of three. Since the line would carry 220 kilovolts, it would cost about $400,000 a mile to put it underground with current practices. Woodside presently contains 1700 poles of the more conventional wooden type ranging in height from 45 to 75 feet and carrying pole transformers and other equipment, as shown in the right-hand sketch in Fig. 1: 1400 of these were inherited by the city when it incorporated; the city constructed 25 more while contesting the AEC-contracted lines. The local power lines could be put underground at a cost of $30,000 a mile or so, since they carry much lower voltage. It is against this background that the AEC found it difficult to justify the high cost of putting the 220-kv circuits underground, although it supported undergrounding all SLAC secondary (less than 12-kv) circuits, in conformance to Stanford (but not Woodside) practice. . . .

The crucial issue before the public is therefore not whether the federal government is coming into the city spoiling a carefully guarded natural resource, but whether the federal government can be forced by local jurisdictions to adopt standards which are more stringent and costly than those applied to local users. Since the proposed pole line is actually a great improvement on local practices of transmitting very-high-voltage power by means of the tower structures commonly used (Fig. 1, left-hand sketch), and since the need for power for SLAC is urgent, we believe that the pole described should be an entirely acceptable solution.

As a long-range problem the encroachment of overhead public utilities on the landscape is becoming serious. It might therefore be proper for the federal government to engage in a joint effort with the utilities to improve the engineering of underground installation with a view to reducing the cost. . . It is clearly impossible for the federal government to adopt practices by which the cost of transmission

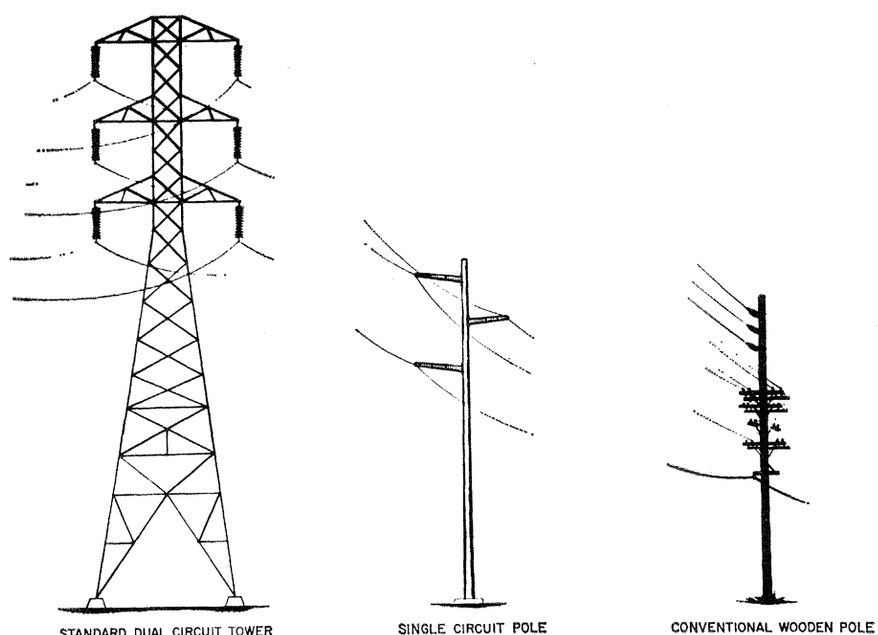

Fig. 1. Types of power poles involved in the current discussions on supplying power to the Stanford Linear Accelerator Center. (Left) Standard tower used by utilities for overhead transmission of 220-kilovolt power; (center) single-circuit pole proposed by the Pacific Gas and Electric Company to supply power at 220 kilovolts to the Stanford Linear Accelerator Center; (right) conventional wooden pole common in California communities for carrying lower-voltage circuits.

over a few tens of miles equals the cost of generation of electrical power. . . . Here federal support for civilian technology—now greatly lagging behind support of military and space technology—could make an important contribution.

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It should be noted that all "local practices" of power transmission in Woodside and its environs are PG&E practices. PG&E is the largest electric utility in the country and keeps its costs down toward the minimum, even at the sacrifice of esthetic standards. . . . The super-power line desired by SLAC also has a minimum-standard precedent, constructed last year by PG&E. This 220-kv line, on "towers," is 20 miles long, extends back and forth over the otherwise scenic skyline, and requires a swath 100 feet wide through the forest, which includes many redwoods. . . . The line was constructed, despite objections by conservationists, after the State Public Utilities Commission refused to intervene on the ground that, "no matter how awful the line might look," the complainants must first prove that it violates safety or is otherwise against the public interest.

The arguments now being advanced in favor of the overhead line to SLAC are the same as those used to justify the existing lines: economy and urgency. It is unfortunate that Panofsky should be forced to defend these minimum standards for the region, while admitting that they are unacceptable on the Stanford University lands upon which SLAC is located. But in this he does not express the national interest, for if the public interest in all future developments were truly limited to conformance with existing standards, with only slight and inexpensive improvements, we would condemn many people to live forever with urban sprawl, smog, festering slums, or grossly polluted streams.

In the Woodside controversy both sides represent the "public interest," and the conflict is between short-range and long-range public interests—the sort of conflict that can develop entirely within the federal government, within the AEC, even within Panofsky's letter. The present conflict also brings up problems of federal versus county and municipal jurisdictions. Fortunately, Congress in 1959 established the Advisory Committee on Intergovernmental Relations, with continuing responsibility to bring together representatives of federal, state, and local governments to consider common problems. A hearing by this Commission, and consideration of all aspects of the controversy, might lead to resolution of the problem in the true public interest.

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Appeal by Yugoslavian Scientists

The earthquake which destroyed the city of Skopje last July also wiped out some of the most modern laboratories in Yugoslavia. The young University of Skopje, the third largest university in the country, was leveled in just 15 seconds.

It is now being rebuilt, and classes have begun again, but there is a desperate need of equipment for science teaching and research. Together with UNESCO staff scientists, members of the university have drawn up detailed lists of the items required in each department, and they appeal to their colleagues around the world to make contributions by means of UNESCO gift coupons. Contributions in kind, of the apparatus needed, would also be received gratefully.

For lists of what is needed, please write to UNESCO Gift Coupon Office, Place de Fontenoy, Paris 7, France.

THA HLA
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Boveri and Cancerogenesis

Fritz Baltzer's article on Theodor Boveri (15 May, p. 809) does justice to his merits as an outstanding biologist in the field of germinal chromosomal research but makes no mention of his contribution to cancer science. Shortly before his death, Boveri published a book, *Zur Frage der Entstehung maligner Tumoren* (Jena, 1914), in which cancer was explained as due to a somatic cell mutation. Very little was then known about cancerogens, and cancer was considered about 99 percent a "spontaneous" disease. Boveri postulated that on account of a wrong mitosis in a somatic cell, the set of chromosomes in the cell progeny became abnormal. In the next 15 years this theory found only a few adherents (Whitman, 1919; Levy, 1922; E. Schwarz, 1922; G. Schwarz, 1924). In 1929, K. H. Bauer modified it, replacing the mutated (or mutilated) number of chromosomes with an invisible mutation on the molecular level.

The somatic cell mutation is today considered the most plausible common explanation of the radical change in the growth pattern of a somatic cell, whether this change is initiated by ionizing radiation, by ultraviolet rays, by one of many cancerogenic chemicals, or by burns. It does not detract from the value of Boveri's contribution that so far the somatic-cell-mutation theory in this or that form is still without experimental proof. In any case, it has not been disproved.

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Population Control: the Intrauterine Ring

Daniel S. Greenberg is to be commended for his thoughtful and timely reports on the rapidly changing climate in official Washington in relation to population control and foreign aid. His report on the Fourth Triennial Conference of the International Planned Parenthood Federation (News and Comment, 1 May, p. 513) is an excellent example. He is wrong, however, when he writes that "no means now exist for limiting the families of couples who are only mildly motivated toward this goal" and that "cheap, simple, and reliable methods" do not yet exist. Such a method does exist; it has been used by thousands of women for several years, it costs but a few cents, and it does not require continuing strong motivation. I refer to the modern version of the Gräfenberg or intrauterine ring (see *Scientific American*, Jan. 1964, p. 54, and Annual Report, 1963, Planned Parenthood Federation of America). Berelson and Freedman, reporting on a study in Taiwan ("A study in fertility control," *Scientific American*, May 1964, p. 29), have shown that strong motivation is not necessary for the adoption of this "one-time" method.

The United States cannot afford to wait for an effective method which will offend no one. AID should be aggres-