Letters

Fire Control of Chaparral

Henry Hellmers' letter on fighting fire with fire (21 Nov.) points out the fallacy of working against the ecosystem. Since fire is a natural part of this environment, he proposes the use of fire to reduce the hazard in the chaparral-covered land. While I agree with Hellmers' basic proposal, I feel he is too general in its application and ignores or minimizes the problems involved and the possible harmful side effects. Some of these problems are:

1) Extremely steep slopes. Much of the mountain chaparral land lies on slopes above the angle of repose of loose material. Any disturbance of the vegetation holding it in place leads to mass wasting that moves material off the hillsides and into the stream channels. Workers in range management concluded 20 years ago that the vegetation should not be disturbed on slopes steeper than 50 percent.

2) Fuel volumes in a pure chaparral type do not build up enough in 9 years to permit a reburn. In fact, it is common practice among fire fighters in brush-covered areas to "herd" the fire toward old burns since the fires will go out or die down greatly in burns up to 10 years old. A longer rotation to permit fuel volume to increase poses extreme difficulties in controlling the fire. The only areas on which burning might safely be done are those where a stand of grass has become established either naturally or by the seeding efforts for watershed stabilization. And this herbaceous fuel disappears in about 3 years under the brush regrowth.

3) Some of the soil types in the Southern California chaparral react extremely unfavorably under fire. They become water repellent, greatly inhibiting infiltration, and increasing surface runoff and subsequent erosion. Workers on the San Dimas Experimental Forest have dubbed them "monster soils."

If we combine these limiting factors with Hellmers' approach of working with the environmental factors, we arrive at an entirely different treatment. Advantage could be taken of the large accidental fires which occur despite the efforts of the fire control agencies. Prescribed burning could be conducted on the areas where grass either came in naturally or resulted from an emergency revegetation seeding. Fires would be in grass, avoiding the hazard of trying to burn standing brush. The steep slopes would be left alone.

If this treatment were applied to areas where grass has adapted to the soil, greater success might be achieved than with the present Forest Service fuel break program where first consideration is given to fire control tactics and access for fire crews. There is also a possibility of natural conversion of the vegetation type. Burcham, for instance, suggested that many vegetation types are determined by the period of fire (*1*). Chaparral has survived under an average fire interval of about 30 years. Changing the frequency or period of burning may also change the vegetation type.

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Reference

1. L. T. Burcham, *Proc. Soc. Amer. Forest. 1959* (Society of American Foresters, Washington, D.C., 1959), pp. 180–185.

Reporting on Feminism

It surprises and saddens me that *Science* is willing to publish an article such as Luther J. Carter's "New feminism: Potent force in birth-control policy" (27 Feb., p. 1234). After reading it, I began to wonder how a report on a sociological meeting concerned with a less controversial subject would sound if, like Carter's, it contained descriptions of the physical appearance of the participants (with emphasis on deviations from the norm in dress and manner), statements about which stereotypes their personalities fitted, and reports on what they said in moments of exasperation. The workshop reported on by Carter obviously involved as participants some people who are unhappy and concerned because they feel that certain basic human rights have been denied them. This makes the bad manners and poor taste more serious. Far more disturbing than the lack of courtesy is the casual lack of humanity displayed here. A report like Carter's cheapens the image of *Science* and of scientists.

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Dialogue: Schizophrenia

In defense of his proposition that "the evidence must surely compel acknowledgment of a *genetic* [italics mine] contribution to schizophrenia" Heston does not provide much relevant evidence ("The genetics of schizophrenic and schizoid disease," 16 Jan., p. 249). The alternative to genetic causation is environment, and since maternal environment before birth is not controlled, Heston's own study on foster children has only succeeded in showing that the postnatal effects sometimes advanced as causes of schizophrenia are probably not the only cause. A genetic cause must be due to a difference in the subject's genes, not those of his mother or father. To my mind, data, good data, concerning monozygotic versus dizygotic twin incidence remain our best basis for inference.

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Carran raises an important point that can be settled quickly. In extensive family studies, notably those of Kallmann (*1*) and Böök (*2*), the proportion of schizophrenic children born to normal females and fathered by schizophrenic males was nearly the same as the proportion of schizophrenic children born to schizophrenic females and fathered by normal males. This evidence makes the uterine environment hypothesis difficult to defend.

I disagree with Carran's assertion that "the alternative to genetic causation is environment. . . ." It should be clear by now this either-or choice is not a feature of the real world. Gene environment interactions are essential in the

development of any character and indeed an adverse uterine environment may be a factor in the expression of some cases of schizophrenia.

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References

1. F. J. Kallmann, *The Genetics of Schizophrenia* (Augustin, New York, 1938).
2. J. A. Böök, *Acta Genet.* 4, 1 (1953).

Thermal Pollution Control

In the records of the hearings conducted by the several congressional committees concerned with, or touching upon, thermal pollution, virtually all testimony appears to be based upon three premises: (i) the future electric load in the United States *must* be as large as predicted; (ii) this load must be met by steam power stations basically similar to those in use today; and (iii) when thermal effects are more than can be tolerated, cooling towers are the only practicable solution.

There seem to be non sequiturs involved. A more logical and positive approach would be to concentrate upon the elimination of energy waste. My own work has convinced me that (i) the magnitude of the predicted load can be reduced appreciably without diminution in the level of service simply by improving the efficiency of power-consuming equipment including motors, lamps, compressors, and so forth; (ii) the efficiency of future power stations can be raised to the 50 percent level by means of new power cycles. An example is the closed cycle gas turbine which appears to be gaining acceptance in Europe; (iii) beneficial uses can be found for much of the heat from central power stations now being rejected to rivers and lakes.

These measures for reducing energy waste will reduce thermal pollution and at the same time will conserve our nation's fuel resources and reduce air pollution.

To achieve these results, two things are necessary. First, an adequate amount of money must be made available for research and development work by the federal government. The Federal Water Pollution Control Administration has been given prime responsibility for research on thermal pollution control but funding is only at the rate of $500,000 per year. This is woefully inadequate. Second, the economics of power generation must be modified so that the utilities and industrial, commercial, and residential consumers all have an incentive to use equipment of higher efficiency.

The government should inaugurate an energy conservation program. As a first step, appropriate federal legislation should be enacted requiring: (i) a new federal tax on coal, oil, gas, and nuclear fuels raising the sales price so that more efficient designs will be favored. The tax revenues thus realized can be used to fund government research on control of thermal and air pollution; (ii) acceptance by the federal government of any unusual financial risks which a utility company encounters in building the first of any new type of power station promising higher efficiency and less thermal pollution; and (iii) mandatory labeling of electric appliances by the manufacturer so that the consumer may be aware of the power consumption at the time of purchase.

The regulatory agencies of the individual states can help by requiring each utility to invest a small percentage (say 2 percent) of its total revenues in research and development, and by permitting those utilities generating power most efficiently to enjoy significantly higher profits.

Professional societies and trade journals can help by publicizing the need for more efficient designs of power stations and power-consuming equipment. Perhaps they should follow the lead of the Swedish Association of Engineers and Architects which (with the support of Swedish power producers) is sponsoring a $15,000 contest for the best solution of what to do with the excess heat generated in nuclear reactors.

Finally, the utilities should recognize that their responsibility for developing more efficient power stations is not discharged simply by ordering a new steam turbine of slightly higher pressure or more gargantuan dimensions. It is true that the industry has adopted some new concepts in recent years, namely, nuclear power and combustion gas turbines. The former, however, was pioneered by the Atomic Energy Commission and the Navy, and the latter by the British and the Swiss. Surely the time has come for the American utilities industry and its suppliers to take the lead in finding more efficient ways to greater electric power.

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