Letters

Reproduction, Technology, and the Behavioral Sciences

The review by Jean Marx (Research News, 23 Nov. 1973, p. 811) of recent developments in the biology and technology of in vitro fertilization and the associated bioethical and legal considerations neglects an important component of this scientific and social frontier—the behavioral science component. The development of individual mastery over (*1*) and social control of (*2*) the behavioral and biological processes fundamental to reproduction are important aspects that should be considered in the continuing dialogue on this subject.

Let me support this claim with some recent, unpublished data from a survey of 88 unmarried women, ages 18 to 23, randomly selected from two counties adjacent to Stanford Medical Center. Of this group, 90 percent indicated they would utilize artificial insemination with their husband's sperm if it were the only way they could conceive once they were married; 66 percent indicated they would utilize in vitro fertilization with their own egg and their husband's sperm. However, when they were asked to consider artificial insemination that involved another man's sperm or in vivo fertilization that involved another woman's egg, these percentages dropped to 14 percent and 11 percent, respectively. The psychological basis for these differences is not clear. The respondents' attitudes toward these technological manipulations did not correlate with measures of their modernity, femininity, socialization, self-esteem, female role orientation, or somatic anxiety. Were the respondents in this survey influenced in their answers by feelings about marital and sexual fidelity? Were they reacting to the possibility of unequal biological relatedness of spouses to their children? What exactly are the psychological antecedents to and consequences of decision-making by individuals and couples when they consider the use of technological manipulation for reproductive purposes? Answers to these questions are fundamental to any complete consideration of the moral and legal issues and are necessary ingredients to any meaningful understanding of the needs of individuals and couples and to any reasonable process of public policy formation.

A parallel problem area is the preselection of genetically determined properties in progeny by parents. A simple and specific example involves the preselection of gender. Technologically, this can already be accomplished by amniocentesis and abortion. Some social scientists have commented on the social implications of gender preselection (*3*), and others have investigated its acceptance in natural populations (*4*). In the survey discussed above, 36 percent of the respondents said they would select the sex of their children, given the opportunity, and 31 percent said they might but were not sure. This is certainly preliminary evidence that further technological development of techniques for sex preselection might lead to their widespread use. Here again we are largely ignorant of the behavioral components of a development in the technology of reproduction. Such components would help us clarify the ethical problems and provide important guides to social action.

We should not proceed with these matters as we did with the development of oral contraception. Behavioral scientists should be an integral part of all further research and development on this important scientific frontier.

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Safety of Medical Devices

In the report on medical devices by Barbara Culliton (News and Comment, 9 Nov. 1973, p. 565) it is stated that there were some 512 deaths and 30 injuries associated with artificial heart valves and 89 deaths and 186 injuries from cardiac pacemakers reported in the medical literature over a 7-year period. I developed a heart valve, first used it clinically in 1961, and have been active in cardiac valve surgery for 15 years. It is most disheartening that only the negative aspects of the remarkable achievements that have occurred in the field of heart valves and pacemakers are presented in Culliton's report. During this 7-year period, there were at least 250,000 heart valves, and probably an equal number of pacemakers, inserted in the United States alone. The patients who receive heart valve replacements are all totally restricted, and their life expectancy is a matter of months. I personally have patients who are living 11 years after heart valve replacements; several woman patients of mine have successfully delivered children and are maintaining normal home lives.

The senators and the public should realize that people don't walk in off the streets asking for a new heart valve as if they were shopping for a suit of clothes. All of us in this area are working under extremely difficult and hazardous conditions, since no one likes to admit the possibility of death or injury from an operative procedure. The mortality rate in most institutions for heart valve replacement operations is now 5 percent. With improvements in procedure and materials, the percentage of postoperative emboli is steadily being reduced and is now also in the neighborhood of 3 to 5 percent.

As for the question of implanting pacemakers, what else can one do for a patient whose heart rate is 30 beats per minutes and who is having intermittent episodes of complete cardiac arrest?

In the field of medical devices, there are many small companies for whom premarket clearances may be particularly difficult. On the other hand, in the early days of the development of medical devices, particularly invasive devices, the giants of industry who could have helped us out had no desire to manufacture products which had such limited sales and carried such high risks.

Furthermore, heart valves and pacemakers should not be compared to the ionizing radiation devices, operating-room machines, or contact lenses, which I am sure make up the bulk of the billion-dollar sales that were mentioned. A heart valve which now costs about $300 is probably one of the greatest bargains there is, considering the vital function it performs. While I agree that many products, such as oxygen tanks and monitoring devices, could be further improved and premarketed, they do not in any way compare with sophisticated devices such as heart valves and pacemakers. The record of achievement in cardiac surgery and heart valve development has been one of the more dramatic and successful endeavors of the medical profession.

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Heart Panel's Report

On 4 April 1972, President Nixon appointed a panel of 20 experts "to determine why heart disease is so prevalent and so menacing and what can be done about it." The President's Advisory Panel on Heart Disease met for the first time on 18 May 1972 and learned from its chairman, John S. Mills, that the President expected a final report from the panel on 1 September of the same year. By extraordinary efforts on the part of every member of the panel, its chairman, the staff assigned to it, and many consultants and advisers, the report was completed and sent to Assistant Secretary Merlin K. DuVal, Department of Health, Education, and Welfare, on 1 September. It was sent to President Nixon 6 weeks later.

It has now been more than a year since submission of the panel's report to Assistant Secretary DuVal, and the White House has not yet made the panel's recommendations public, although speedy completion of the report was presumed to be urgent for national planning of the attack on heart disease and to complement the attack on cancer. Because the report and its recommendations were addressed to the President and classified from the start as "confidential," and since no member of the panel "leaked" any portion of the report to the press, we have the fascinating situation in which, as far as I know, no member of Congress, even those charged with developing a budget for the National Heart and Lung Institute, has seen the report or knows of its contents.

I am not concerned with whether the report was brilliant or unimaginative. I am concerned that the report required the time of many experts (conservatively estimated at 5000 working days—days that were diverted from a variety of important activities) and that it required several hundred thousand dollars of taxpayers' money. For what?

It seems that there are two ways of preventing a similar waste of scientists' time and taxpayers' money in the future.

1) Whenever the Executive or Legislative branch of the government appoints a special panel, commission, or committee to study a problem and make recommendations to it, the report should be simultaneously available to each branch, unless it can be clearly and unquestionably proved to be classed as confidential or secret. This would eliminate costly duplication of effort and prevent bottling up of recommendations not to the liking of the branch that initiated the request. Such reports should be made public within 2 months of submission, after each branch has had time to study the report and, if it wishes, prepare comments to accompany it.

2) Whenever scientists are asked to serve on such a panel to prepare a report on unclassified matters (such as the health of the nation), they should agree to serve only if it is clearly understood that their report—good or bad—will be available both to the Congress and to the Executive branch and, within a reasonable time, to the public.

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Computer Systems

Thomas H. Maugh II (Research News, 19 Oct. 1973, p. 270) refers to large "computer systems like the IBM 360 or the PDP-10." The IBM 360 is a series of machines ranging from the small 360/20 to the very large 360/195. The DEC PDP-10 is a medium-sized to large computer system but is not typical of the large computers used in big scientific applications.

Maugh states that the maximum memory capacity of a minicomputer is about 8000 words, whereas the typical capacity of a large computer is several hundred thousand words. The DEC PDP-8, one of the earliest and smallest mini's, has a capacity of up to 32,000 words (384,000 bits), whereas the IBM 360/30, an extremely popular medium-sized machine, has a maximum memory capacity of only 16,000 words (512,000 bits). (The discrepancy is because the 360/30 has 32 bits per word; the PDP-8 has 12.) The sizes of computer memories are best compared in bits or bytes, as word lengths vary from less than 12 bits to more than 128; but, more important, the size of a computer is determined by its data-path widths, channel capacities, memory speed, and so forth, as well as its memory capacity. One of the most powerful computers, the CDC 7600, has a main memory capacity of only 64,000 words.

Maugh implies that large computers require sophisticated programming skills and that minicomputers are too inflexible. If anything, it is the mini's that require sophisticated programs because they lack adequate software. Any computer can be programmed so that an operator need only push a few buttons. The trick is to find a computer small enough to have a low net cost yet large enough to handle the load. To do this, purchasers of computers should have the software, hardware, local programming skills, and the application thoroughly evaluated by competent professionals.

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"Back-to-the-Wall" Effect Continues

Two years ago (Letters, 19 Nov. 1971, p. 774), I noted the unusual frequency with which the World Series has lasted seven games since the end of World War II and pointed out that this was associated with a highly improbable sequence of outcomes in the sixth game. I also noted that there are very real philosophical difficulties in interpreting peculiar or unique numerical phenomena when they are defined after the fact of their occurrence.

These difficulties are well recognized. For example, William Prout (1785–