

The facts behind the fantasy **CLONING** A Biologist Reports

Robert Gilmore McKinnell

McKinnell describes the historical background of frog cloning, the actual procedure, and its uses—in studies of cancer, aging, and immunobiology.

In discussing the ethical questions about human cloning—as yet unachieved—McKinnell emphasizes the pointlessness of such a procedure. From both a biological and social standpoint, he holds, the diversity resulting from sexual reproduction is far more valuable than the sameness of cloned creatures. Illus. \$8.95



Illustration:
RANA PIPENS, the species used in the
author's cloning experiments.

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Minnesota Press
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LETTERS

Risk Accounting

It seems to me that there is cause for concern that the recent flurry of letters (4 May, p. 454; 11 May, p. 564) attacking the recent article by Inhaber (23 Feb., p. 718) will cause readers of *Science* to lose sight of the fundamental methodological change in risk accounting proposed by Inhaber, namely that one should charge for those risks incurred in the acquisition of materials of construction and the construction of the facility. In fact, this aspect of risk accounting has not generally been included previously. Had it been, we would not have read a continuing series of scientific and public pronouncements in the past that solar energy is benign, either ecologically or from the point of view of health and safety. No energy source is. Just think about the pollution from copper mines and smelters when you consider a technology that needs copper.

I myself have had questions about some of Inhaber's data and results, as have had others. More detailed and accurate studies are needed to confirm or negate his general results than have been afforded by the letters of criticism. Whatever the eventual results, he has made an important contribution to our thinking.

I also question two of Lemberg's criticisms (4 May) of Inhaber's method. I find no basis for charging only incremental risks connected with material acquisition, as proposed by Lemberg. If a coal miner is killed in a coal mine accident, we don't say, "But he might have been killed constructing some skyscraper" when we count the risks from coal-generated electricity.

Second, society cannot exist only with energy systems subject to daily or other frequent loss of all or most generating capacity. There must be storage or backup systems, and a proper risk accounting has to include a charge for this aspect of an unsteady supply source. Lemberg might have suggested that Inhaber should have used the risk corresponding to the average societal energy mix rather than that due to coal, which Inhaber estimated to have the highest risk. Or Lemberg should have proposed less risky backup.

In his risk accounting, Inhaber did not allow for one potentially important aspect. If society spends \$1 billion a year more to make electricity, it does not have that billion dollars to improve the health and safety from whatever risks provide the greatest risk reduction po-

tential per dollar expended. If one could "save" a life (defer a premature death) by expending \$200,000, a billion dollars per year saved by use of a cheaper energy source could enable the "saving" of 5000 lives a year. This contribution to risk accounting could be dominant if there is a major disparity in costs of energy among various sources.

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French Anti-Nazis

As one who spent the war years in occupied France working with the Underground, I strongly disagree with Joan Bromberg's statement (18 May, p. 741) in her review of *Scientists in Power* (1) that the most active French anti-Nazi group was the Communist Party. The Communists were latecomers to the movement, siding with De Gaulle and the Resistance only after Germany attacked Russia in June 1941. At that time political and religious considerations mattered much less than individual commitment against oppression; the spectrum ranged from right to left and from fundamentalism to atheism. Furthermore, the raised fist in the accompanying photograph was not the Communist salute but that of the Popular Front, which, besides the Communists, included socialists like Pierre Cot as well as Centrists like Prime Minister Daladier.

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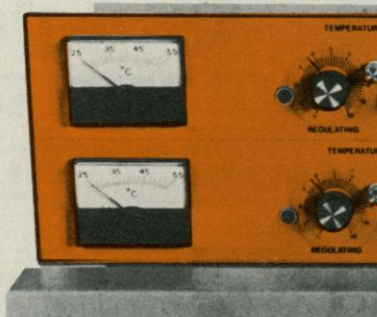
References

1. S. R. Weart, *Scientists in Power* (Harvard Univ. Press, Cambridge, Mass., 1979).

Proposals, Peer Review, and Research Results

The rapidly worsening nature of the processes used in the funding of research is receiving increasing if belated attention. A recent editorial by Philip H. Abelson (13 Apr., p. 133) highlights one important aspect of the situation (aside from the universal complaint of lack of money), namely the serious drop in morale among scientists. But, if the situation is to improve, the scientific community must do much more than complain. I believe that the universal solvent of "more money" (legitimate as such

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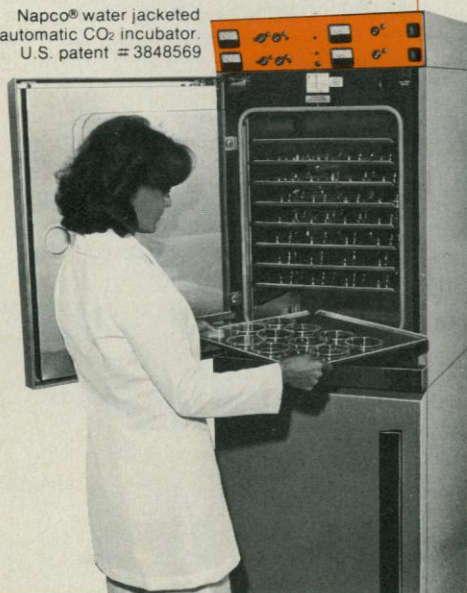
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requests may be) has so befuddled our intellectual capacities that the scientific community shares with the government the responsibility for the present situation.

It all starts with sloppy science and ends in an administrative "Cuckoo's Nest." The doctrinaire pernicious nonsense that the only or best way to support science in all times and circumstances is through elaborate, peer-reviewed, proposal mechanisms was spotted long ago by Leo Szilard (Editorial, 16 Feb., p. 607). His criticism has never been rebutted. The present system is still, regrettably, taken as gospel by a good fraction of the postwar generation of U.S. scientists, the following facts notwithstanding:

- Many of the premier U.S. agencies supporting research (for example, the Office of Naval Research and the Defense Advanced Research Projects Agency) have never used it.

- Entire nations seem to manage without it.

- The efficiency of the process in terms of scientists' energy used in doing research over the energy used in obtaining money and doing the research, is now between 66 percent and 50 percent. And it is this system which everyone complains about.

- The psychological damage to the body of science in terms of morale, almost "encouraging" dishonesty, and so forth, may be the most serious flaw in the system.

- Historians of science record that great science is built around key individuals, small groups, or a special "bunch of people," in Lewis Thomas' felicitous phrase, not around elaborate proposals.

- In simple English, performance (that is, the track record) is a much better guide to success than promise (that is, proposals).

Unless one is prepared to change this system in a major way, I believe that complaining about it is futile. Money cannot help this situation, any more than additional gasoline can fix a flat tire.

Nearly 10 years ago it was an experienced congressman, not any science group or scientific body, who proposed a major change. In the 91st Congress, George P. Miller, veteran chairman of the science, research, and development subcommittee, introduced a bill, HR35, in which he proposed a complex "formula" to allocate research money to universities. A divided academic community managed to head it off.

Things are different today. I, too, have sampled some 20 outstanding "successful" research group leaders with the proposition: "Would you take 75 percent

of the total basic research support your laboratory now has if you wrote only one annual report-proposal, and your funding became a complex, slowly adjusting function of the number of graduate degrees, the number of papers published (and possibly the amount of *mission agency* support you received)?” All of them said they would take the formula even at the cost of a 25 percent cut.

No one unfamiliar with the literature should dismiss the “formula” basis as unable to take care of most situations, including new investigators or playing into the old-boy network. Exactly the opposite is true in both cases. In an era when non-directed academic research support is quite unlikely to receive a significant increase in funding, science unions could, for a change, go to the bargaining table accepting even a 5 percent cut in (real) pay in exchange for a major change in “working conditions” for their members.

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Quality of the Social Sciences

The excellent editorial by William D. Carey (20 Apr., p. 259) illustrates how far we still must go before the social sciences can achieve legitimacy. The congressman who said that philosophers and thinkers have been contemplating social phenomena for centuries without National Science Foundation support and have been able to reach far-ranging conclusions without wasting tax dollars is not alone. The political elites of the world, like their general publics, have only a dim understanding of what social scientists do. Worse yet, few appreciate that reliance on conventional wisdom contributes to many of our social disasters and that research-generated knowledge could appreciably reduce our error rate.

The most effective response to this widespread ignorance and disdain is a clear-cut improvement in the scientific quality of our research, as well as increased attentiveness to its social relevance. Books and journals in the social sciences are brimful of material that makes researchers shudder and laymen laugh, and it is high time that we pulled up our socks and got more serious about how we design, conduct, and write up our work. On top of that, we had better take our teaching more seriously, too. The people who run the world have all sat through social science courses in the

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