risk the initial uncertainties of standing for election unless he can do this from the relative security of a legal partnership, business ownership, considerable private means, or a position of leadership in a trade union. By default, our societies are firmly eliminating from potential political leadership an increasing proportion of their most intelligent and able men, because more and more men of the highest caliber are entering a steadily widening range of professions. Professional men in their thirties with family responsibilities, who are on salaries and lack private means, cannot campaign for Congress. In the smaller Western countries, or in times of recession, they cannot readily find suitable professional re-employment if they fail to gain re-election after their first term. This growing group is finding that, while their representatives may not be hostile to their interests, they seldom show intuitive understanding or deep insight into their world. The professional community is educated, aware, and articulate, but Congress and Parliament contain all too few men who readily comprehend this critical group in our dynamic modern society.

By the same token the very best advice of your "devil's advocates" will not be fully effective unless Congress includes enough men with the appropriate background and political savvy to be at once enthusiastic in their vision and cautious in their skepticism concerning proposed legislation in technological areas.

It is becoming urgent to devise conditions under which a reasonable proportion of young professional men with a developed political bent may campaign for election within the present party framework. Public life is notoriously insecure, but the established representative learns to live with this and to slowly build legitimate backstops against his potential failure to achieve re-election. It is the new candidate or the novice congressman who is most clearly "out on a limb." The principal employers of graduates (government, universities, and contract research industries) should seriously consider various schemes to guarantee such a candidate suitable re-employment, at least up to the point where he has been elected to a second term. The number of people involved from any one organization would be minute, and the man being reinstated after one term in Congress might well have grown considerably in overall stature. Beyond the second successful election, the fledgling representative should be achieving political maturity and should be prepared to face the same future uncertainties as his colleagues in Congress.

There remains the harder task of persuading many local and state conventions to choose sane, honest, well-equipped men as candidates, rather than free-wheeling demagogues with a gift of gab, or of graft. This is a very real problem, and one which is scarcely being discussed at present. Alternatively, the election process is considered (as in your editorial) to be a distinctly dubious means of providing Congress with adequate advice in technological areas. Here we have a dangerous confusion of two equally important but quite different issues. The one is concerned with specific judgments now exercised by Congress, particularly in matters of budget control. The other is concerned with the range of intrinsic qualities and mental outlook among the individuals who will in fact be able to offer themselves as candidates for election to responsible public office in the years ahead.

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Disclaimer

The letter by Carleton Putnam (13 Dec. 1963, p. 1419) has already evoked able and thoughtful replies (24 Jan. 1964, p. 306). My attention has been called, however, to a statement in his letter which incorrectly describes the position of the "authorities" listed on pages iv–vii of the George report ("The Biology of the Race Problem," prepared by commission of the Governor of Alabama, 1962). Putman writes, "*The Biology of the Race Problem* is almost entirely a collection of the views of scientists other than George, views which have been published again and again in scientific books or journals." On the contrary, George's book consists of *quotations* and *abstracts* from published works and *views* which are George's and not necessarily those of the original writers.

The use of a list of "authorities" in a sociopolitical polemic raises a nice point of scientific propriety. The authors cited are not, to my knowledge, misquoted, and the material abstracted is in the open literature. George has a right to use these quotations and even to interpret them in a manner uncongenial to the original authors. The racial problem is not unique in having the same data interpreted differently by different individuals. The prominent display of the list, however, tends to mislead readers as to the extent of the scientific support for George's conclusions regarding racial differences and their application to the school segregation problem. Putnam's letter strengthens the possibility of misunderstanding, since it does not contain George's disclaimer (p. vii), "I do not ascribe any particular opinion to any of these people regarding the school integration problem; but as to the specific points on which they are cited, their testimony is authoritative." Unfortunately, only those who know the "authorities" personally will be able to guess at their actual social and ethical convictions. As one of the cited "authorities," I should like to dissociate myself from the implication that I share George's views on the desirability of racial segregation.

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. . . George stated the scientific facts and then drew his conclusion. His opponents have consistently questioned this conclusion and put forward their own conclusions without disproving George's facts or producing any contradictory facts of their own. Yet they have managed to leave with the newspapers and the public the impression that they have refuted the evidence itself. Witness the headlines in the New York *Times* [1 Nov. 1963]: "Scientists Rebut Theories. . . . Say There is No Evidence to Support Any Hypothesis of Inherent [Racial] Differences." Such headlines, never disclaimed, do more than "tend" to mislead.

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Rhythm and Natural Selection

G. Hardin's letter, "Ultimate failure of rhythm" (6 Mar., p. 995), points out very well that if time of ovulation is genetically controlled the use of the rhythm method of avoiding conception would lead to selection for genes causing irregular ovulation. He concludes, "In the long run, the 'natural' method, no matter how perfected, will be frustrated by natural selection." However, several factors which would make se-

lection for irregularity very weak and perhaps nonexistent should be pointed out.

First, only in that portion of the population using rhythm would there be any selection at all and only in the female half of that population. Also, time of ovulation is probably a polygenic trait and the phenotype which we are examining rather distant from primary gene action and thus highly susceptible to environmental factors. These conditions would slow down selection. Nonetheless, use of the rhythm method would increase the selective value of the genes that cause irregular cycles.

On the other hand, selection factors exist which have been operating through evolution to give us a reasonably regular cycle in present-day women. These factors, however strong or weak they may be, should continue to operate in the population and perhaps cancel out entirely the selection caused by the use of rhythm. (It is interesting, and in a sense amusing, to note that the use of rhythm now, with its possible selection against regularity, may be several thousand years too soon. Perhaps we were evolving toward perfect regularity when natural methods of conception control would have been foolproof!)

Further, one may even postulate that selection for regular ovulatory cycles may increase as the use of rhythm grows. For example, that portion of the male population who are ready to practice rhythm are intelligent, responsible and self-sacrificing people, otherwise they would not attempt such a method. It seems reasonable (at least as reasonable as many of Hardin's conjectures) that they might in the future practice a rather rigid selective influence by choosing as mates only those women who have regular cycles. Thus selection may soon turn in favor of regular ovulatory cycles and the natural method of conception control become even more effective.

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Scientists and Civil Defense

I hope that scientists do not heed D. S. Greenberg's advice, on other matters so sound, that scientists transfer their attention from "bomb" problems to such home problems as traffic control (27 Dec. 1963, p. 1635). . . . Certainly their efforts and influence are needed to supplement the efforts of the Arms Control and Disarmament Agency, and civil defense is even more critical because it is the primary concern of no agency.

I also take issue with Greenberg's implication that the verdict of informed, thinking men is against civil defense. I don't believe that any scientific group has rocked or "could rock the U.S. government with a well-drawn and well-publicized brief against civil defense." And it was *not* "against its better judgment" that Congress granted an early Kennedy request for civil defense expansion (6 Dec. 1963, p. 1277). Contrary evidence is in the recent civil defense hearings before the Hebert subcommittee of the House (*1*). In these open hearings, 88 witnesses testified in favor of the bill for incorporating fallout protection into new public buildings, and 15 against. Of the 30 with claim to some scientific competence, including scientists, engineers, M.D.'s, and architects, 25 were for and 5 against the bill. However, as I interpret the testimony, only one, a psychiatrist, was against civil defense, his grounds being the possible psychic damage to children from civil defense preparations. The other four were against the bill because it was not strong enough, their general contention being that an effective civil defense must also afford protection from fire, blast, chemical, and biological hazards—comprehensive protection of the type which Russia and Sweden, according to other testimony, have already supplied to an important fraction of their populations. . . . the subcommittee, and then the House, by wide margins, voted for this bill authorizing all of the little the Department of Defense had asked for. If the Senate informs itself as well as did the House, it should follow suit.

Of course the remaining question is how far we should go beyond this rudimentary step, involving 0.5 percent of our defense budget, toward the ultimate of comprehensive protection, involving up to 10 percent of our defense budget for 5 to 10 years (*2*). Unfortunately, the Department of Defense may not supply a good answer to this question despite the competence of its OCD, if its thinking is reflected in the statement by General LeMay, Chief of Staff of the Air Force, that the expenditure for comprehensive protection "would be unwise, ill advised, and more importantly, would inevitably become competitive with requirements for active defense." Assistant Secretary Pittman candidly stated, at the more recent Senate hearings, that the program of the bill "has the support of the military services because it has been carefully designed as a modest and manageable undertaking. If it threatened to grow into a vast and expensive system, it would not have the support of the Secretary of Defense and the Joint Chiefs which it has today" (*3*).

We cannot leave to the military alone the development of policies on which, should war come, hinge the fate of each civilian and each segment of civilian society and culture. . . .

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2. T. R. Martin, Jr., and D. C. Latham, *Strategy for Survival* (Univ. of Arizona Press, Tucson, 1963), pp. 261–293; H. A. Sawyer, Jr., *Civil Engineering* **29**, 868 (1959).
3. S. L. Pittman, *Information Bulletin, Department of Defense, Office of Civil Defense, No. 93*, p. 12 (1963).

Cigarettes and Polonium-210

Our report dealing with polonium in cigarette smoke (*Science*, 17 Jan., p. 247) was necessarily brief, and it is evident from Irving Michelson's letter (28 Feb., p. 917) that some aspects of our observations were not clear. With respect to the relative importance of polonium in genesis of lung cancer, we have emphasized that the anticipated low radiation dose would act primarily as a cancer *initiator*. The known chemical carcinogens are apparently not present in sufficient amounts in smoke to account for lung cancer rates ascribed to cigarette smoking. Although ionizing radiation is an initiator par excellence, only time will tell the importance of polonium's alpha radiation among the possible initiators of bronchial cancer in smoking. As we pointed out, the cocarcinogens in cigarette smoke probably are important also as causal factors. In addition, radiation from this source could act in association with viruses.

We believe our estimates of local radiation doses to certain regions of the bronchial epithelium are low principally because of variations within the samples of bronchial epithelium we