management program. We recognize that grizzly bears are not compatible with land development by human beings, but even these animals are certain to maintain their numbers over most of Alaska with the protection and management being afforded them by the state.

The question as to whether or not there was justification for establishing additional, enormous wildlife ranges in Alaska does not, therefore, hinge on the welfare and continued abundance of certain species of game animals, but is rather tied in much more closely with the issue of whether federal or state control of huge parcels of land is the more desirable.

Federal control of vast areas in Alaska precludes implementation of Section 4, Article 8 of the Constitution of the State of Alaska, which reads: "Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State, shall be utilized, developed and maintained on the sustained yield principle, subject to preference among beneficial uses."

It is the contention of many Alaskans that absentee authorities, which so long directed the destiny of Alaska as a territory, are less apt to provide the wisest possible management of the state's resources. It is, furthermore, certain that Alaskans above all others cherish and wish to preserve their wild and renewable resources, including the wilderness aspect of Alaska.

In view of these considerations I suggest that the pros and cons concerning establishment of these new wildlife ranges in Alaska are somewhat complex, and that more is involved than the protection of certain animals, as implied in your news note.

C. L. ANDERSON

Alaska Department of Fish and Game, Juneau

Quantum Mechanics and Freedom

The article by S. S. Kety, "A biologist examines the mind and behavior" [*Science* **132**, 1861 (1960)], points out correctly that in order to grasp a biological problem the investigator has to understand the necessity of using various approaches in both the methodological and the conceptual sense, because a biological structure is a composite of different levels of organization. Kety errs, however, when he brushes away, as irrelevant to the problems of mind and behavior, the principle of indeterminacy of quantum mechanics and the acausal character of the elementary quantum processes, by assumming that the source of this principle and of the acausality of elementary quantum processes is the clumsiness of our instru-

ments, which has made it impossible for us to determine, simultaneously, the position and motion of every particle. ("It would seem," he says, "that the concepts of freedom and purpose in the universe should be based upon nobler stuff than the clumsiness of our instruments.")

The point made by the quantum mechanics is that the inability to establish, simultaneously, precise measurements of the position and motion of an elementary particle is due to the inherent acausal "freedom" of this particle. As expressed by P. A. M. Dirac [*The Principles of Quantum Mechanics* (Oxford Univ. Press, New York, new ed., 1935), p. 10]: "When an observation is made on any atomic system which has been prepared in a given way and is thus in a given state, the result will not in general be determinate, i.e., if the experiment be repeated several times under identical conditions several different results may be obtained." Consequently, if certain mental processes are elicited by quantum processes on the molecular level of observation, which seems quite possible, the quantum mechanical "freedom" as highly relevant to these processes is a hypothesis not to be minimized in our concepts of the problems of mind. I am referring, in this connection, to the book by Pascual Jordan, *Die Physik und das Geheimniss des organischen Lebens* (Vieweg and Sohn, Brunswick, Germany, 1948).

SILVIO FIALA
Department of Pathology, Columbia University, New York, New York

I am grateful to Fiala for pointing out what could have been interpreted as a rather cavalier dismissal of a controversy which has rocked modern physics for the past three decades.

While the Heisenberg principle of indeterminism may originally have been only a simple recognition of instrumental interference, it quickly became elaborated by Bohr and by Heisenberg himself into a doctrine of the inherent unpredictability and, in fact, acausality in the behavior of the elementary subatomic particles. This inference of the "Copenhagen school of physics" has received wide acceptance by quantum physicists, although it would not be correct to imply that it has achieved universal acceptance. In fact, de Broglie, Planck, and Einstein remained unconvinced of its validity.

I should like to point out, however, that those who accept that doctrine and wish to use it as a scientific basis for a belief in human freedom should be willing to assume a difficult if not impossible task. Since a single neuron is composed of thousands of billions of such elementary particles and a single

voluntary act requires the approximately simultaneous action of at least several thousand neurons in concert, it will be necessary for them to explain what is difficult for me to imagine—the means by which sufficient order, let alone purpose, emerges from the random behavior of these countless congeries of particles, especially since the very concept of acausality brooks no possible interaction in this respect between the particles. It may be possible to imagine a means whereby certain particles may be given the possibility of dictating the behavior of the whole. Even by this great stretch of the imagination, however, what would result would not be "free will," or freedom of the individual or even of a single neuron, but a response which was completely random, acausal, and nonpurposive.

I should like to amend my previous statement, quoted by Fiala, to read: "It would seem that the concepts of freedom and purpose in the universe should be based upon nobler stuff than the clumsiness of our instruments *or the acasual, random noise of the subatomic particles.*"

SEYMOUR S. KETY
Laboratory of Clinical Science, National Institute of Mental Health, Bethesda, Maryland

I hope that Kety's article will be read widely, especially by college presidents, college division or department chairmen, and state and federal civil service executives. However, as one who has grubbed hard and long most of his professional life trying to modify human behavior through the techniques of social work and group psychotherapy, I am afraid that the fond wish behind such sentiments has little chance of being realized. I think that Kety's eloquent plea for flexibility and increased communication among the various disciplines, or even for checking the proliferation of specializations which continues to sweep the academic and scientific communities, will only be heard by those like myself who are already convinced.

Besides the over-all excellence of his essay I was especially delighted by his charming and sly parable, "The true nature of a book." Although it falters somewhat when it touches on the last group, the behavioral scientists ["Finally, the book is brought in desperation to the psychoanalyst in the hope that he will be able to read it. That he does not do precisely, but instead asks the author to select portions and read them while he listens. . . ." (What author?)], its over-all impact is not inconsiderable.

Kety suggests that psychoanalysts, despite their biases—or even because

of them—or their lack of scientific discipline, may have a great deal to offer. This is all to the good. But why stop at psychoanalysts? How about social workers, who are also in the day-to-day business of trying to understand and modify behavior? Although their terminology is not as exotic as that of the analysts, I can assure you that they are just as biased, and furthermore, they outnumber psychoanalysts about 50 to 1.

And finally, let us not forget the poets. Perhaps in the last analysis it may very well be the rare insight possessed only by some future poet which will unlock a few of the mysteries of human behavior.

JOSEPH ANDRIOLA
Department of Mental Hygiene, Atascadero State Hospital, Atascadero, California

Palestine Refugee Problem

Wendell Cleland, in his review of Lengyel's *The Changing Middle East* [*Science* **132**, 614 (1960)] cites Lengyel's failure to mention the assassination of Count Bernadotte as an example of pro-Israel bias. The assassination of Count Bernadotte, for which the small and dissident Stern group was held responsible, was abhorred and condemned by the government and people of Israel. The group was forcibly disbanded immediately afterwards. The military action of the Irgun Zvi Leumi (Etzel) at the village of Dir Yassin, near Jerusalem, took place before Israel existed as a state. Both of these terrorist groups during the British mandate refused to accept the discipline or the democratic will of the Jewish community of Palestine, expressed through its national council and defense group, Haganah. To hold Israel responsible for these two actions, condemned by the Jewish authorities, population, and defense forces, is certainly unjust. Moreover, this action at Dir Yassin was the only action of its kind conducted by any Jewish group, dissident or otherwise; hence, the expression "the massacres of Arab villagers which created the refugee problem" is a distortion.

The fact is that the Dir Yassin incident did not create the Palestine Arab refugee problem, nor the problem of the 450,000 Jewish refugees who fled from the Arab states (a problem which Cleland significantly fails to mention). Both of these refugee problems were the direct outcome of the Arab invasion of Palestine in 1947–1948 in violation of the United Nations Partition Decision of 29 November 1947. Had this invasion not taken place, had the Arab command not issued instructions to the