LETTERS

Structure of an Organism

I would like to question the validity of what I take to be Michael Polanyi's main argument in his article "Life's irreducible structure" (21 June, p. 1308). In his own words, it is this:

> 1) [An organism's] structure serves as a boundary condition harnessing the physical-chemical processes by which its organs perform their functions.
> 2) If the structure of living things is a set of boundary conditions, this structure is extraneous to the laws of physics and chemistry which the organism is harnessing.
> 3) Thus the morphology of living things transcends the laws of physics and chemistry.

Even without further elucidation of Polanyi's conception of an organism's structure as a boundary condition harnessing physical-chemical processes, it is easy to see that this argument is invalid. For, granting the premises, the most that follows is that the morphology of an organism "transcends" *those* physical-chemical processes which it harnesses. It does not follow that it "transcends" *all* physical-chemical processes. But the latter conclusion is surely what is needed if one is to go on to claim that "both machines and living mechanisms are irreducible to the laws of physics and chemistry."

Probing deeper we see that we may not even have to accept the weaker conclusion, for the second premise of the argument is questionable. Polanyi supports this premise with the following analogy:

> In Galileo's experiments on balls rolling down a slope, the angle of the slope was not derived from the laws of mechanics, but was chosen by Galileo. . . . this choice of slopes was extraneous to the laws of mechanics . . .

To take a different, but similar, example, consider the solar system. The positions and momenta of the components at a given time, t, serve as boundary conditions for determining the state of the system at all other times according to the laws of mechanics. Now it is an obvious truth that the boundary conditions at t do not follow from the laws of mechanics alone. But to describe this truth by saying that the structure of the solar system transcends the laws of mechanics is at best misleading, for clearly the boundary conditions at t do follow from the laws of mechanics provided only that we supply some other boundary conditions; for example, the state of the system at t'. Or, to carry the example somewhat further, it is at least logically possible that the solar system should have been formed from hydrogen atoms by the action of gravitation alone. Thus, while it may be of some interest to think of the universe as a hierarchy of systems, each providing boundary conditions for "lower" systems, it has not been shown that any but physical-chemical laws are needed throughout the hierarchy. It has not even been shown that the *same* laws may not be operative throughout. . . .

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UFO Story: Is Propriety the Issue?

In letters recently published here (30 Aug. and 27 Sept.), Condon and Branscomb question the propriety of *Science* reporting on the administrative difficulties surrounding the UFO study that Condon is conducting for the Air Force. Since they raise the question of propriety, I think it is desirable for *Science* readers to be informed of the following concerning the celestial Bay of Pigs that Condon is running in Boulder.

Not long after the publication of a *Look* article attacking Condon for his management of the project, Condon offered to help *Science* prepare a story about the project. It was his hope, he explained, that an article in *Science* would present the situation in a way that would counteract the effects of the *Look* article. As it turned out, independent of the *Look* article or Condon's invitation, the news department was planning a story anyway. Condon assured us of his complete cooperation and did not raise any question of propriety.

When the *Look* article, though critical, failed to evoke any significant public interest, Condon concluded that it would be inappropriate for *Science* to touch the matter, withdrew his offer of cooperation, and proceeded to enunciate high-sounding principles in support of his new-found belief that *Science* should not touch the subject until after publication of his report. When reminded that he had sought to initiate an article and had assured *Science* of his cooperation, Condon flatly refused to discuss the matter further.

Since Condon does not set the editorial policy of this journal, we pro-