

Philosophy & Science: A Second Generation Perspective

by Clinton Combs

Very often it is only the second generation that is truly bilingual. At the recent conference on *Religious Interpretations of Evolutionary Biology*, Philip Clayton issued a call for bilingualism. Rather than just bringing scientists and philosophers into the same room, he envisioned truly constructive dialogue. As it happened, the conference did not culminate in the constructive bilingual dialogue that Clayton envisioned. The first generation of scholars were unable or unwilling to cross the language barrier.

Observing this, I thought it might be appropriate for a "second generation" audience member to bring together some of what was said in two languages.

Entropy

Although Dorion Sagan did not put it in these terms — indeed, he rarely mentioned Whitehead — Sagan put forward a theory that marked a direct challenge to an argument that Whitehead put forward in *The Function of Reason*. In this work, Whitehead discusses evolution. Whitehead's view is that there is a creative urge that is operative in everything and

that animates organisms to live, live well, and live better. Whitehead argues that this urge, which pervades the universe at the most basic level, is contrary to the second law of thermodynamics — perhaps better known as entropy. This law holds that in a closed system, energy differentials will average out. In lay terms, clocks

wind down. Whitehead observed that life and clocks seem to follow different law, and understood evolution to result from the cumulative effect of the individual urges of organisms. In these terms, the trend in evolution is away from entropy and towards complexity. Whitehead argued that individual organisms possess a creative urge to live better. At the species level, he believed that this urge explained the trends towards complexity that we observe in the fossil record. Life winds up in a world where clocks run down.

Sagan challenged this view, arguing that when an organism is seen as part of an ecosystem, it operates in such a way as to alleviate

differential. When the pressure and temperature differential is eliminated, the tornado loses its purpose and "dies." Sagan applied the same idea to organisms. He argued that when organisms are seen as functions of a larger environment, they too can be seen to function so as to alleviate differentials.

Though Sagan did not go so far, his mother and coauthor on many books, Lynn Margulis, did bring up an author who claimed that humans, as a species, excel at alleviating differentials. I will explain the gist of her remarks with two examples of my own. First, industrialization has brought about the consumption of fossil fuels. This consumption reduces

the potential energy differential between the fossil fuel and the byproducts of its combustion. Second, modern farming practices have depleted the nutrients in the topsoil. This reduces the differential between the rich topsoil and the poorer soil underneath. Clearly, many more examples could be given as to how human beings increase entropy in ecosystems.

Then I wondered if Cobb's views on sustainability challenge

Sagan's interpretation or support it. One possible means for moving towards sustainability is to alleviate the differential between the rich and the poor. This seems to indicate that Sagan's view is supported both by the mania of consumption as well as those in the sustainability movement. The only difference concerns which



Standing (from left): F. Ayala, R. Valenza, H. Van Till, J. Schloss, D. Sagan, P. Gunter, J. Haight, D. Griffin. Seated (from left): P. Clayton, L. Margulis, J. Cobb, J. Greene, I. Barbour, U. Goodenough

differentials. To illustrate this claim with non-living phenomena, Sagan explained that a tornado could be seen as an event that alleviated extreme temperature and pressure differences in the atmosphere. Seen in terms of what it does, the purpose of the tornado can be described as a process that alleviates this type of

differentials are being alleviated.

Emergence

The second conjunction I would like to raise is between Whitehead's argument in "Nature Lifeless" and "Nature Alive" (two related lectures collected in *Modes of Thought*) and Ursula Goodenough's view of emergent "awareness" as presented in her

Sunday evening presentation.

Goodenough strung together a narrative history of the universe. Some highlights from her narrative include the big bang, the formation of the planet earth, the stages of its cooling, and the formation of its atmosphere, the emergence of awareness as it applies to cells, then organisms, and finally to human consciousness.

In the question and answer session, I asked about the step in her narrative before which there was no "awareness" and after which there was "awareness." This, I take it, is the pivotal issue in Whitehead's "Nature" chapters. Whitehead argues that if one begins with the assumption that nature is lifeless—meaning that it has no insides, no awareness, no freedom; then one is arguing for a deterministic system of cause and effect. If this is the way nature is, then one should conclude that nature will always be deterministic and, hence, lifeless. Since this worldview finds expression at the beginning of Goodenough's narrative, Whitehead would argue that given such a beginning assumption, she would be unable to provide an explanation for the emergence of "awareness" at any later stage.

According to Whitehead, unless "awareness" is understood to go all the way down to the inorganic level, one will never be able to address the "status of life in nature" (MT 148).

Goodenough's talk would have been bilingual had she addressed this question. As it was, Goodenough did even not seem to be concerned about

"If science is not to degenerate into a medley of *ad hoc* hypotheses, it must become philosophical and must enter upon a thorough criticism of its own foundations."

-A.N WHITEHEAD, SCIENCE AND THE MODERN WORLD, P.17

this "philosophical" gap in her narrative.

Process or Substance

The third issue relates to the definition of an individual. Margulis argued that the primary actors in evolution are bacteria as opposed to macro-organisms. She advanced the theory that evolutionary changes in macro-organisms occur when bacteria assist the macro-organisms in a symbiotic manner. She gave interesting examples of mitochondria digesting wood in the abdomen of termites that otherwise could not digest wood and mitochondria in cows that have over time led to the shift from a cow having one stomach to having several. She argued that due to the essential nature of these bacteria for the termites and the cows, a rigorous definition cannot be given of a cow or a termite solely in terms of a single set of genomes. A macro-organism needs to be seen as the product of the major genomes as well as the genomes of all the symbiotic bacteria with which they are inseparably linked. Seen in these terms, macro-organisms like a cow or a termite are both individuals as well as societies.

In her view, the evolution of the cow as a macro-individual is inseparable from its symbiotic relation to bacteria. Cow evolution is thus a social phenomena that must be understood in relation to symbiotic bacteria. Evolutionary changes in cows occur when bacteria are taken in by the cow. At first this could mean

that the cow eats something that contains the bacteria. In which case the association is somewhat accidental. In other cases, the genome of the cow may actually swap genetic material with the genetic material of some bacteria.

Just as new advances in corporate know-how come by way of acquisition, so, too Margulis argues evolutionary change in macro organisms is achieved by acquisition.

Margulis' view is Whiteheadian to the extent that it involves discrete entities mutually and inseparably involved in each other. It holds that macro-organisms are both individuals as well as societies of other individuals. Her view, however, was resisted by the more mainline biologists, Goodenough and Ayala. They held a view that derives from the substance metaphysics of Aristotle. For them, evolution is explained in terms of enduring genomes undergoing changes over time. Margulis' Whiteheadian view, conversely, focuses on the inherited social patterns.

Conclusion

Were this conference truly bilingual, these topics would have been addressed in the discussion sections. They were not. Overall, the philosophers worked diligently to understand the scientific issues, but failed to demonstrate to the scientists the relevance of philosophical concerns. For instance, in *Adventures of Ideas* Whitehead argued that "the relevance of evidence is dictated by theory" (221). If science begins without due attention to metaphysics, science assumes the metaphysics "derived from one's grandfather" (222). If the philosophers had been able to convince the scientists of this point, perhaps the scientists would have recognized that not only does philosophy help conceptualize the finding of science, but its presuppositions also set the rules of scientific evidence. Realizing this, perhaps the scientists would have come to listen as much as to talk. We look to the next generation to realize a bilingual vision. * _;