

assigned to  $f(t)$ . All this suggests that evolution follows variations on an exponential theme, and may be thought of as a relative growth process.

Let us imagine, for purposes of contrast, an environment with a fixed number of ecological niches each one of which can best be filled by a species having a specific inherited pattern. Then, given adequate time, all species with inherited patterns that do not fit best will be eliminated, leaving every niche perfectly filled. In this kind of panglossian world, where everything happens for the best if one waits long enough, evolution might be expected to follow a more or less linear course, and to have only one ultimate outcome. One wonders at times whether some such a world is not tacitly assumed in a good deal of present thinking<sup>5</sup>. Recent achievements in biochemistry indicating nice evolutionary series of molecular structure may have encouraged this thinking<sup>6</sup>: but such series are, of course, to be expected if evolution follows a course of relative growth.

If one adopts the idea that each chance step in evolution can only be taken in terms of an existing pattern—which seems imposed by modern concepts of genetics—one admits the possibility that evolution in another biosphere than ours might, although starting from nearly identical initial conditions, arrive at an array of species and cultures widely different from those we know, or even none what-

soever. Only by tacitly disregarding the possible alternate pathways open each time a facet of pattern was selected<sup>2</sup> does one arrive at the notion of inevitableness in evolution; yet selection from among alternate pathways is the essence of Darwinian theory.

I thank Prof. Roger S. Pinkham for his advice.

*Note added in proof.* After writing this article, one by Sir Karl Popper has appeared (*Nature*, 207, 233; 1965) which has been taken by at least one reader to suggest that evolution in the biosphere runs counter to the second law of thermodynamics. (My book, *Time's Arrow and Evolution*, Princeton Univ. Press, 1951, revised printing, Harpers, 1962, is wrongly cited there, which may be confusing to a reader wishing to examine the original statements referred to.) In both this and another recent paper (*Nature*, 206, 131; 1965) it is pointed out that a thermodynamic balance sheet cannot be drawn up for evolution in the biosphere, because the dimensions of the system cannot be properly evaluated; but there seems no reason to assume that the second law is disobeyed.

<sup>1</sup> Blum, H. F., *Amer. Scientist*, 51, 32 (1963).

<sup>2</sup> Blum, H. F., *Nature*, 206, 132 (1965).

<sup>3</sup> Lehman, H. C., *Social Forces*, 25, 281 (1947).

<sup>4</sup> Cailleux, A., *C. R. Soc. Geol. France*, 222 (1965).

<sup>5</sup> Premlin, J. H., *Nature*, 207, 668 (1965).

<sup>6</sup> Ehrensverd, G., *Life: Origin and Development* (Chicago Univ. Press, 1962).

## NEWS and VIEWS

### Pacific Science Center Foundation Arches of Science Award : Dr. Warren Weaver

DR. WARREN WEAVER has been elected to receive the Arches of Science Award of the Pacific Science Center Foundation. This comprises a cash prize of 25,000 dollars and a gold medal. It will be presented to Dr. Weaver at the Pacific Science Center on October 25. The Arches of Science Award is presented to an American who has made "the outstanding contribution to the public understanding of the meaning of science to contemporary man". The first recipient of the Award, Dr. Weaver is well known as a 'communicator of science', and is recognized as one of the outstanding public interpreters of the scientific revolution of the past half-century. Associated with the Rockefeller and Sloan Foundations for more than thirty years, he is also an internationally known mathematician, administrator of some of the leading scientific research institutions in the United States, an author, editor and lecturer. In announcing the Award, Dr. Edward E. Carlson, president of the Pacific Science Center Foundation, said: "Dr. Weaver's selection for this new Arches of Science Award adds prestige comparable to the highest prizes for science achievement. The scientific community, because of their regard for Warren Weaver, is characterizing the Award as an American Nobel Prize—and it is significant that more than fifteen Nobel Laureates in science have received Dr. Weaver's early recognition and support".

During his response to the announcement of the Award, Dr. Weaver said: "Most of the previous significant rewards for scientists have been given exclusively for what the individual has done inside of science, strictly for notable contributions to scientific research. Individuals who can make such contributions clearly deserve society's highest honours. But the relations of science to society, to our total culture, and incidentally to our government, are now quite unlike what they were even twenty-five years ago. It is essential that we to-day have individuals who are capable of understanding science, and who are willing to live their lives partly within science but also partly within the world of affairs. These persons, working at the interface of science and society, are more than

useful—they have become essential". Sponsor of the Award is the Pacific Science Center Foundation of Seattle, Washington. The Foundation is a non-profit agency composed of business, scientific and educational leaders in the Pacific north-west who have been joined by leading men of science throughout the nation to create an active and permanent centre dedicated to increasing the public understanding of science. The Foundation operates the Pacific Science Center which was the popular U.S. Science Exhibit at the Seattle World's Fair of 1962. The Arches of Science Award was named for the five instantly recognizable arches soaring into the sky above the Pacific Science Center. The arches have become symbols of the technological strides and superior climate for science and science understanding emerging from the Pacific north-west.

### New Zealand Department of Scientific and Industrial Research : Dr. K. A. Wodzicki

DR. K. A. WODZICKI, director of the Animal Ecology Division of the New Zealand Department of Scientific and Industrial Research, retired recently after holding the position for sixteen years. Dr. Wodzicki was born in Poland and educated at the University of Cracow where he completed his M.Sc. and Ph.D. degrees. After serving as a lecturer at this University he was later appointed professor of animal physiology at the University of Warsaw, where his research work was concerned mainly with the genetical and ecological aspects of birds and animals. At the outbreak of the Second World War he escaped to France where he joined the Polish Government in Exile, and in 1941 was appointed as its Consul-General in New Zealand. In 1946 he was employed by the Department of Scientific and Industrial Research to survey the wild-life problems in New Zealand, and following the preparation of his report—which was later issued as a Departmental *Bulletin*—it was decided to set up an Animal Ecology Section of the Department with Dr. Wodzicki as officer in charge. Under Dr. Wodzicki's direction the Section has undertaken basic research on the ecology and physiology of introduced small animals, such as rabbit, hare and the mustelid family, and of birds such as