

FRANCISCO JOSÉ AYALA AND THE AMERICAN PHILOSOPHICAL SOCIETY

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It is a truly an honor for me to speak at the University Pontificia Comillas at this 90th anniversary celebration of Francisco José Ayala.¹ I am truly grateful to Hana Ayala and to the leadership of the University for inviting me here today.

One of the privileges and pleasures of my life—in and out of academia—is that I have learned much of what I know from several geniuses. Perhaps the most influential was my mentor, Otis Dudley Duncan—sociologist, demographer, ecologist, musician, and musicologist—who made his way from the obscurity of East Texas to the heights of American academia. Another, whose works taught me about the beauty of intensive statistical data analysis was the precocious Leo A. Goodman, whose academic career spanned 70 years. A third—no doubt better known to those here today than the first two—was the geneticist and evolutionary biologist, Sewall Wright. Wright joined the faculty of the University of Wisconsin-Madison for many years after being forced into retirement by the University of Chicago. I not only benefitted

¹ I am greatly indebted to information and advice provided by Charles Greifenstein, Curator of Manuscripts, now *emeritus*, David Gary, Associate Director of the Library for Collections, and Jane M. Whitehill.

from a close reading of his writings on path analysis, but I had the privilege of meeting him in his 90s. It would be easy for me to name other geniuses I have known, but that would depart from the theme of my remarks this morning.

I am quite sure that Francisco José Ayala was as much a genius as any of those who I have met face to face. Francisco José Ayala's accomplishments ranged from truly sophisticated religious belief, to pure and applied science, to philosophy, to articulate public advocacy, to major public service, connoisseurship of art, and wine-growing entrepreneurship. Ayala's many honors, including the National Medal of Science and the Templeton Prize, and his role as a Presidential Science Advisor, speak for themselves. Sadly, while we corresponded briefly, I had no personal contact with him. I truly wish that I had met Francisco José Ayala in person and spent more time learning from his work, as I have from that of others much wiser than me.

Fortunately for me, I have shared memories of Francisco José Ayala with his brilliant and charming wife, Hana Ayala (Doctor in Natural Sciences, Founder Director (Co-Chair) and Chief Executive Officer of Pangea World) with whom he spent more than the last 37 years of his life. It is truly fitting that the Comillas Pontifical University has honored both Hana and Francisco José Ayala by creating the Hana and Francisco J. Ayala Center for Science, Technology, and Religion.

I met Hana last year, when the American Philosophical Society (APS) invited her to attend our November 2023 meeting as a guest of the Society. And Hana is invited to attend APS meetings whenever she may wish in future! Hana wrote to me that she and Francisco were married in 1985, around the time that, as I shall relate, he first spoke at a meeting of the Society. I think it is fair to say that a good part of Francisco's genius, in the last several decades of his life, is due in large part to his partnership with the equally creative Hana, whose own accomplishments are manifest in Pangea World. As she related, in a 2006 interview with the American Association for the Advancement of Science, "... we both dare to think out of the box. We are not necessarily satisfied with existing concepts. And the other similarity or synergy I see is that we both cut across disciplines in our thinking and our acting in professional work." Today's celebration is justifiably for Hana Ayala as well as Francisco José Ayala.

As a sociologist and social statistician, my meager exposure to contemporary genetics and evolutionary biology has left me poorly equipped to address Francisco Jose Ayala's major scientific contributions. However, I understand

and appreciate his elegantly devastating, historically informed, and highly accessible deconstruction of the myth of intelligent design (2007) and his subsequent willingness to debate that argument in public.

I came to know Francisco José Ayala's work through my position as Executive Officer of the APS. The Society was founded by Benjamin Franklin in 1743 as the colonial counterpart to the Royal Society. From the founding, its mission has been "promoting useful knowledge." The American Philosophical Society has become the most prestigious learned academy in the United States. I will say more about the Society later today. I want to emphasize the Society's founding mission—"promoting useful knowledge," and the relevance of Ayala's life and work to that mission.

The American Philosophical Society elected Francisco José Ayala to Membership in 1984, when he was just 50 years old. That, in itself, was an exceptional event. The typical age at election of the Society's Members hovers in the mid to late 60s. Fewer than 6,000 individuals have been elected to Membership in its 281-year history. In the past 50 years, 1,429 have been elected to Membership, and only 115 of those have been 50 years old or younger.

Professor Ayala made only a few personal appearances at the American Philosophical Society. However, he voted regularly in the election of new Members, and—as I will explain this afternoon—he had a beneficial influence on the Society in other ways. It is highly likely that Professor Ayala was nominated for election to the APS by Theodosius Dobzhansky, his doctoral advisor. He was inducted into the Society and signed our Great Book—the Membership roster—in April 1985. The citation read at his induction said that Professor Ayala was "... a leading investigator in the fields of population genetics and enzyme polymorphisms in *Drosophila*, and in populations of marine pelagic, benthic, and littoral animals. His work is characterized by great originality, remarkable diversity, and a profound philosophical outlook. He is a principal exponent of the selectionist, and opponent of the neutralist (or non-Darwinian), theory of evolution. [He is] co-author of [a] widely used textbook on evolution and editor of a valuable monographic series on modern evolutionary problems."

At his induction, Professor Ayala presented a paper entitled "On Chinese Boxes and the Evolution of Genes." Unfortunately, his presentation predated the contemporary practice of recording APS Meeting presentations, and his scientific papers include only a page-long precis of the talk. By 1985, when Professor Ayala was inducted into the APS, there was burgeoning understanding of the genetic information underlying how this diversity and com-

plexity had come about since the beginning of life on Earth (about 3.7 billion years ago) and how what we were beginning to call molecular biology could open new levels of understanding. Here is what Professor Ayala wrote:

Since the beginning of life on Earth there has been an enormous increase in the morphological diversity and complexity of living forms. How does the genetic information underlying this diversity and complexity come about? Preliminary answers are emerging.

New genes, or specific DNA sequences, may arise by three types of processes that are named elongation, combination, and duplication. Some genes arise by multiple tandem replications of a simple sequence followed by mutant substitutions at different sites in the replicates (elongation). Complex genes may arise by combination of ancestral simple genes, which can now be recognized as different exons (combination). Genes may duplicate in toto. The duplicates may afterwards diversify, remain identical, or be rendered inactive by mutations. Some sequences are duplicated into thousands of copies that are often interspersed throughout the genome of higher organisms.

Chinese boxes within boxes provide a didactic metaphor of the processes by which modern genomes have arisen through evolutionary change. The smallest “boxes” are very short sequences consisting of 9-15 nucleotide pairs. How these small information units may be formed is not yet known, but they can be accounted for by simple processes of natural selection and chance.

Sadly—and especially because of the provocative metaphor of Chinese boxes—I have not been able to find his full text, either in *The Proceedings of the American Philosophical Society* or anywhere else.

At the APS Millennial Symposium of 1999, Professor Ayala commented on a paper by Senator Nancy Kassebaum Baker (1999), “Health Care in American Society.” Baker observed that, unlike the dispersed and disconnected public of early America, we now have the technological capacity to support direct democracy. She then addressed—citing several exemplary controversies about health care—the contrast between how these issues might be resolved under direct or representative democracy. She clearly favored the latter as more likely to be based on evidence, rather than fraudulent manipulation of public opinion. (Given the present state of the US Congress, one might argue that this distinction is no longer viable.) One of Baker’s examples was the unsuccessful proposal of the Clinton administration to require childhood

vaccinations nationwide. It closely parallels the tragic political history of vaccination against COVID-19.

After recapitulating Baker's argument, Ayala (1999) first raised the possibility that some form of libertarianism—not necessarily to his liking—might pose reasonable objections to her preference for representative democracy. Then he turned to more familiar territory, other examples of potentially controversial medical innovations and interventions. These included gene therapy, genetic enhancement, and the possibility that these might enter the germ line, rather than remaining somatic. Those issues are all the more significant in light of subsequent advancements in gene editing, e.g., CRISPR Cas9. Second, he raised the possibility of human cloning, arguing that a human clone, if one were created, would only superficially resemble its twin because of the inevitable influences of environmental differences. Last, without much elaboration, he raised the issue of legal control of abortion. In my opinion, while human cloning appears to have vanished from public discussion, at least for a while, Ayala was truly prescient in raising the issues of genetic technology and abortion.

Francisco Ayala's voluminous publications included only one from the APS Press, a biological memoir of Walter Monroe Fitch, who was Ayala's colleague, co-author, and friend at the University of California-Irvine. Together Fitch and Ayala led some four colloquia at the National Academy of Sciences between 1994 and 2005 (Ayala & Fitch, 1997; Ayala, Fitch, & Clegg, 2000; Ayala, Fitch, & Hey, 2005; Fitch & Ayala, 1994), each of which was based on a major work "in the formulation of the modern theory of evolution," and led to the publication of an edited volume. Also, many more of Francisco José Ayala's edited works have been published by the National Academy of Sciences and are readily available on its website. Most notable is the series entitled "In the Light of Evolution," which honors the 1973 essay by Ayala's teacher, Theodosius Dobzhansky (1973), "Nothing in Biology Makes Sense Except in the Light of Evolution."

Much as Ayala appreciated Fitch's collegueship, the biographical memoir reads also as an introduction to and review of Fitch's many scientific contributions, beginning with his 1967 paper with Margoliash (1967), a seminal contribution, introducing the concept and exemplars of molecular phylogenetics. This made it possible to map the course of evolution at the molecular genetic level, thus complementing, revising, extending, and completing findings using traditional methods. For example, paleontology leaves unexplained gaps in evolutionary history. Fitch's ideas and investigations played a major role Ayala's later expositions and defenses of the theory of evolution.

There is much more to be said about other highly significant contributions that Francisco José Ayala made to the American Philosophical Society, but I will save those for my second contribution to today's celebration. For the present, I can say, on behalf of the APS, that we are proud and grateful to have had Francisco José Ayala as a Member. The life and work of Francisco José Ayala will be both studied and honored at the American Philosophical Society.

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