

Richard C. Lewontin, a pioneer in molecular genetics, dies at 92

Philip Guelpa
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Harvard geneticist Richard C. Lewontin, age 92, died on July 4, at his home in Cambridge, Massachusetts. He is considered one of the most prominent modern researchers in genetic diversity in humans and animals. Among his signal contributions was to demonstrate the exceedingly small genetic differences between various human populations (which are mischaracterized under the scientifically invalid concept of “races”) as compared to many other species, thus supporting the relatively recent, common ancestry of all living humans. He was a strong opponent of racist claims promoted by pseudo-scientific charlatans, such as Nicholas Wade, that there are significant, genetically based differences in intelligence between different races.

Born in 1929, Lewontin earned a Master’s degree in mathematical statistics (1952) and a Ph.D. in zoology (1954), both from Columbia University, then taught at various institutions until joining the Harvard faculty in 1973. He combined his knowledge of mathematics and molecular biology to elucidate the mechanisms of evolutionary change. He rejected attempts to explain human culture and behavior as being directed solely (or primarily) by genetics, as for example advocated by his Harvard colleague, E.O. Wilson, the founder of sociobiology, which he critiqued in *Not in Our Genes: Biology, Ideology, and Human Nature* (1984), cowritten with Steven Rose.

Lewontin’s early work, in the mid-1960s (Lewontin and Hubby, 1966), initially carried out using the fruit fly *Drosophila*, and pioneering the use of computer simulation in the study of single gene loci, demonstrated that genetic diversity within species was, in general, far greater than had been previously thought. Indeed, many different versions of a particular gene, known as alleles, can exist within a species at any given time with little deleterious effect under existing environmental conditions. This contrasted with the view that mutations are usually detrimental and are soon selected out, leading to relative genetic uniformity.

The “pool” of genetic diversity discovered by Lewontin may well be an evolutionary advantage in that it can provide the raw material on which a species may draw (figuratively speaking) when selective pressures change, and new adaptations based on the existing genetic variation allow the species to survive in an altered environment. This research prompted a whole new field of research into genetic polymorphism.

This earlier research gained added relevance when, in 1972, Lewontin published a paper in which he presented an analysis of human genetic variation, based on blood proteins (before DNA

sequencing was available), sampled from West Eurasian, African, East Asian, South Asian, Native American, Oceanian and Australian populations, which demonstrated a lower genetic diversity among *Homo sapiens* than in many other species. It revealed that within-group (e.g., population, “race”) variation is greater, approximately 85 percent, than between-group variation, at roughly 7 percent. These findings were described in a book, *The Genetic Basis of Evolutionary Change*, published in 1974.

To place this finding in context, the predominant factors in the development of genetic diversity between populations are distance and time. These include geographic separation leading to reduced interbreeding and, therefore, restricted gene flow, between populations, the length of time during which the separation has occurred, leading to the accumulation of different, random mutations in each population (known as “genetic drift”), compounded by the effects of different selective pressures due to varied environments cumulatively leading to the buildup of genetic differences. If enough time passes and inter-population gene flow is sufficiently reduced, these separate populations are likely to accumulate substantial genetic differences to the extent that they are no longer able to interbreed and, therefore, constitute separate species.

While modern racist theories do not go so far as to claim that human races represent different species, obviously false since all modern humans can successfully interbreed and produce viable offspring, the implication is that sufficient genetic differentiation has occurred between geographically disparate populations so as to lead to significant differences in such attributes as intelligence, propensity to violence, etc.

On the contrary, the strong implication of the contrast in genetic diversity between humans and many other species that was identified by Lewontin is that modern humans evolved relatively recently (in evolutionary terms) from a single ancestral population, located in Africa, and that, despite having spread widely across the globe, genetic differentiation between populations has been extremely limited. This interpretation has been strongly supported by subsequent research. In other words, observable variation in physical characteristics, such as skin color, which have been used to define races, are entirely superficial and of no fundamental significance.

The relative lack of genetic diversity among modern humans may be attributed to at least two factors. First, the well documented and extensive migrations of populations over

thousands of years, especially since the development of agriculture, have to a significant degree counter-acted the tendency toward regional genetic isolation. Secondly, and perhaps more importantly, the entirety of human evolution, at least from the first appearance of the genus *Homo* (roughly two million years ago), if not before, has been characterized by an ever-increasing reliance on culture and technology rather than changes in physical attributes. Intelligence has become human's primary mode of adaptation.

Lewontin often described himself as a Marxist. A dialectical and materialist approach in his scientific work is evident. It appears, for example, in his article "Organism and Environment." He argued that many researchers see Darwinism as viewing organisms merely reacting to selective forces generated by their environment. On the contrary, he argued that organisms play an active role in creating their environment. They are one opposite in the dialectical interaction among all the physical and biological components collectively acting and reacting to each other and are thus engaged in an ever-changing dynamic that produces the environment. Elsewhere, he criticized the concept that at any given time organisms are optimally adapted to their contemporaneous environment, rather than being in constant adaptive flux.

He once said, "Science is a social activity just like being a policeman, a factory worker or a politician." Intent on disseminating the results of his research to a wide audience, Lewontin authored or coauthored a number of books and essays, many of the latter published in the *New York Review of Books*, aimed at the non-specialist. In 1985, for example, he coauthored, with Richard Levins, *The Dialectical Biologist*, which he dedicated to Frederick Engels. In it, he characterized the concept of race as an "indication of the power of socioeconomically based ideology over the supposed objectivity of knowledge."

Curiously, he downplayed the significance of the Human Genome Project, which he viewed as a reductionist effort to define a "blueprint" for a human being, which he associated with attempts to genetically delineate races, IQ and promote eugenics. To the contrary, it is a significant accomplishment, when understood as elucidating one "opposite" in the dialectical interaction between biology and environment in the development of human beings.

Lewontin felt that a scientist also has a responsibility to engage in politics. "As academics we are supported by society in a pretty nice way." "To make a claim on the resources of society you have to do more than say 'I want to satisfy my intellectual curiosity'—that's just a kind of masturbation that is not justified as far as I'm concerned. So you have to do politics. [And in politics,] science provides you with legitimacy. When you lose your legitimacy as a scientist, you lose your legitimacy as a commentator."

His strong commitment to scientific integrity is well known. However, his view of himself as a "commentator" defined his political activities, which were clearly reformist and not revolutionary. While he criticized capitalism's distorting effects on science, Lewontin's "Marxism" does not appear to have gone beyond protest politics in his youth and social criticism in his later years. He opposed the Vietnam War, including resigning from the

prestigious National Academy of Sciences due to its collaboration with the US Department of Defense, and criticized scientists, such as Edward Teller, who were involved in military research. His later social commentary included criticism of agribusiness for developing genetically modified crops, not for superior quality but to entrap farmers into having to buy seed from them rather than being able to use a portion of the previous year's crop as seed stock for the new season.

He was associated with such protest groups as Science for the People (after it was purged of its more radical elements) and Science for Vietnam. There is no indication that he was ever directly involved in explicitly socialist politics or the specific struggles of the working class.

Lewontin collaborated for a time with Stephen Jay Gould, another Harvard professor, who is also noted for opposing genetic determinism, including in the famous essay, "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme." In it, they proposed that certain components of an organism's genetic makeup are necessary in order for other mechanisms to function properly but are not in themselves necessarily adaptive, highlighting the high degree of complexity in the interaction of various genes.

The scientific dispute between the three Harvard colleagues became so heated that Wilson reportedly would avoid sharing an elevator with either Gould or Lewontin. Lewontin is also known for refusing to take credit for work actually accomplished by his students. In this he is the rare exception to a practice all too common in academia.

Later he broke with Gould over what he perceived as the latter's quest for celebrity. In an interview, he described the basis for his falling out with Gould:

Now I should warn you about my prejudices. Steve and I taught evolution together for years and in a sense we struggled in class constantly because Steve, in my view, was preoccupied with the desire to be considered a very original and great evolutionary theorist. So he would exaggerate and even caricature certain features, which are true but not the way you want to present them.

Richard Lewontin made significant and substantial contributions to our understanding of biological evolution and human diversity. He will be missed.



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