

Biological Anthropology

Emőke J. E. Szathmary

My task is to reflect on the past fifty years of development in biological anthropology, and the role of the Wenner-Gren Foundation in it. The story begins in 1941, with the creation of the Viking Fund and with the singular role played by Paul Fejos in setting the directions the Foundation would pursue. I cannot comment on Fejos's attributes that permitted the happy conjunction between anthropology and the Foundation. I was not privileged to know him; and any fancies about an intuitive understanding flit aside when I recall Leo Szilárd's admonition: "It is not sufficient to be Hungarian!"

Paul Fejos died in 1963, the year I began my university education. By the time I encountered anthropology, its four-subdiscipline trajectory as defined in North America had been pursued for six decades. Indeed, the multiple fields within my own subdiscipline of physical anthropology had also been long pursued, if not necessarily consensually defined. Then, as now, "biological" anthropology was most often equated with studies on any aspect of the biology of living humans. Primate paleontology (including hominid paleontology) and primate behavior were therefore distinct. However, in Britain and among some physical anthropologists in the United States all of physical anthropology is called biological anthropology, since its subject matter is fundamentally biological and its ultimate unifying theory is evolutionary theory. In this essay, I will use "biological anthropology" to mean exclusively the study of living humans, singly or in populations, in form, function, development, heredity and adaptation.

Physical Anthropology Before 1941. The state of physical anthropology and its various branches at the advent of the Viking Fund can be readily established. In 1940 Marcus Goldstein published an analysis of research trends in the discipline based on publications in the American Journal of Physical Anthropology (AJPA) and Human Biology (HB); (in AJAP, vol. 26, 1940). The AJPA was established by Aleš Hrdlička in 1918, and HB by Raymond Pearl in 1929. Goldstein wished to elucidate the major kinds of research activities in physical anthropology, the disciplinary self-identifications of the authors in the journals, the institutions that supported them, and the kinds of contributions made by key individuals.

Goldstein grouped publications into eight categories: 1) anatomy – i.e., soft or hard tissue structure in the living or the dead, "including 'racial' anthropometric surveys;" 2) group biology – including "natality, fecundity, constitution, demography, public health, psychiatry and the like;" 3) growth – as seen in the living and identified in the skeleton; 4) evolution – of "specific structures" and human origins; 5) genetics; 6) physiology; 7) methodology; 8) general (p. 192). Marked topical contrasts were evident in the content of the two journals. Over half the articles published in the AJPA were anatomical in nature, and very few of its papers were on "group biology," while the proportions were virtually reversed in HB. Of the contributors, the largest proportion writing in the AJPA identified themselves as anatomists, with only a small number of physical anthropologists. In HB, no group of practitioners contributed disproportionately, but the largest single group of authors were anthropologists (including ethnologists and archaeologists). Relatively few institutions supported researchers in physical anthropology and in human

biology.

Goldstein's depiction of physical anthropology in 1940 was remarkable because of what he found, and also because of what was absent in his summation. Clearly, a split existed among physical anthropologists who focused on "anatomical" issues and those who studied the living. Furthermore, relatively few institutions housed the majority of active researchers; job openings for physical anthropologists in departments of anthropology were few. The absence of federal granting agencies before 1950 meant that research was supported primarily by institutions such as museums and private universities, another reason for the clustering of researchers at a few places. However, most striking to a modern reader is the complete absence of any reference to a theoretical basis in which pre-1941 research, "anatomical" or "biological," was embedded. Reasons for this can be deduced from Goldstein's references to the direction exerted by a few "influential personalities" on the discipline, and the subsequent failure of physical anthropologists to define disciplinary "principles" (p. 207).

According to Goldstein, four men had singular impact on physical anthropology by 1940. Two of them, Aleš Hrdlička and Earnest Albert Hooton, were "anatomically" oriented, and the propensity of the other two, Franz Boas and Raymond Pearl, was towards human biology. Hrdlička had established academic physical anthropology in the United States, established its journal and its professional organization (American Association of Physical Anthropologists). For him, physical anthropology was the comparative study of anatomical structure and function, and physiological variation. Hooton differed from Hrdlička in his early training: he had specialized in social as well as in physical anthropology. Nevertheless, after his appointment at Harvard, he eventually supervised some forty doctoral fellows in physical anthropology. Hooton's own work was very much in the "old" style of physical anthropology, that is, he was a typologist.

Boas, one of the two influential men of human biology, established a new field of research that sought to establish the limits of human plasticity. He was known for his use of sophisticated statistical methods, his treatment of growth, and "his masterful integration of the facts pertaining to race" (Goldstein, p. 202). Boas felt that a bridge had to be developed between physical and cultural anthropology. Unfortunately, perhaps because of institutional circumstances at Columbia, his attention was directed less towards the physical than the cultural side of anthropology at the time that Hrdlička and Hooton were building physical anthropology. Raymond Pearl's view of human biology included a cultural component, but his appointment at Johns Hopkins was as professor of biometry and vital statistics. While Pearl served as president of the AAPA, he does not seem to have been involved in the training of biological anthropologists. This suggests an absence in 1940 of a biological anthropologist of the older generation who might have nurtured the development of studies in human biology within anthropology.

Nothing in Goldstein's summation of the state of the discipline in 1940 suggested that the anatomically oriented physical anthropologists were dissatisfied with the status quo. However, a few, including Hooton's first doctoral student, Harry Shapiro, and W. M. Krogman, posed a challenge to the orientation of the day. They were critical of the static, descriptive, methods-preoccupied kind of research that served the rigid schemas (e.g., "early," "middle," "late") into which evolution was cast. They believed that the discipline should focus on the study of living humans, emphasizing dynamic process in

all possible biological-cultural dimensions, and including normal and abnormal variation in structure and function. Thus, by 1940 some of the younger men knew that although physiological and biochemical processes and genetic forces were widely studied by biologists, many physical anthropologists were ignorant of the relevance of this knowledge to their field. Accordingly, Shapiro and Krogman were proposing developments in the direction of biological anthropology. Hrdlička died in 1943; Hooton, in 1954. If there was to be a major shift to a new direction, its realization became possible in this period.

My review of the state of biological anthropology prior to 1940 confirms Goldstein's analysis. Research on human biological plasticity owed much to Boas's early insights, and many books and journal articles on changes in body size and shape were published prior to 1941. There were pioneering efforts in what is now called "migrant studies," and numerous articles identifying a secular trend in growth. Researchers had considered the impact of nutrition, illness, climate, and seasonal changes on human growth and stages of the life cycle. Physiological studies, ranging from the descriptive to the effect of altitude on respiration, were also undertaken.

In contrast to the concern with factors influencing human growth and with physiological and anatomical functioning, biological anthropologists did not seem to be much interested in human genetics. Although specific hereditary phenomena were investigated, anthropological focus tended to be on serological description of populations and racial classification. This emphasis prevailed throughout the pre-1941 period. However, the increasingly mathematical, experimentalist outlook among leading geneticists of the 1930s challenged prevailing "truths" about race. Assertions about negative biological consequences of interracial admixture were questioned, and eugenics, which had permeated human genetics throughout the first quarter of this century, was criticized widely. There was a ferment afoot among human population biologists and excitement about new understanding of the genetic mechanisms of evolutionary change, but as of 1940 these new developments had not yet had much impact on biological anthropology.

Biological Anthropology and the Wenner-Gren Foundation: Information Exchange and Reinvigoration. World War II effectively prevented any major developments for the new Viking Fund. In 1945, however, the highly successful lecture series, the "supper conferences," began. These meetings were held mainly at the Foundation headquarters in New York, but later they took place in other locations in the United States as well. Of the thirteen supper conferences held in 1945, two had biological content: one entitled simply "Physical Anthropology Conference", and the other, "Hormones and Behavior." Apparently the division between "physical" and "biological" anthropology survived the war. Given the nature of anthropology, the supper conferences covered a wide variety of topics each year. Nevertheless, physical and biological anthropologists were among the lecturers – at least one each year between 1945 and 1957. Thereafter the number of supper conferences diminished, and the Foundation's conference activity focused on Burg Wartenstein.

From a modern perspective, some of the earlier supper conferences were on subjects of peripheral interest. For example, Dr. D. J. McCune spoke on "Clinical Observations on Human Dwarfs," and Dr. A. E. Severinghaus described "An Experimental Study through a Gastric Fistula of a Man and his Stomach" (both in 1946). However,

consideration and re-consideration of old themes, among them "The Biological Basis of Measurement" (S. L. Washburn, 1946), a "Conference on Precision in Anthropometry" (1947), "The Somatotype: A Frame of Reference for Biological and Social Science" (W. H. Sheldon, 1947), and "Recent Trends in Constitutional Anthropology" (C. W. Dupertuis, 1948) also occurred. It was not until 1955, though, that a conference title finally indicated that a new theoretical orientation had infused an old disciplinary focus: "Population Genetics and Classification of Living Varieties of Man" was held at the University of Michigan. The geneticist Theodosius Dobzhansky had argued only five years before that anthropologists should direct their energies to understanding the factors and processes involved in the formation of human races. Then, in 1957, the Foundation sponsored a conference chaired by James N. Spuhler, on "Natural Selection in Man." Three things were unusual about Spuhler's symposium: members of both the AAPA and the American Society of Human Genetics were in attendance; a physical anthropologist rather than a geneticist had organized and chaired it; and the event was supported by the Wenner-Gren Foundation. A "new" physical anthropology (first described as such by Sherwood Washburn in 1951), with a paradigm grounded in evolutionary theory, was underway not just among those who studied the living but also among those whose focus was the fossil evidence. Evolutionary biology, which a scant decade before did not seem to be relevant for physical anthropology, was now "suddenly" relevant.

How did such a radical shift take place? According to Washburn, his rendition of the "new" physical anthropology was "based heavily on the discussions which have been held at the Wenner-Gren summer seminars for physical anthropologists, and those reading only current American physical anthropology would get little idea of the size or importance of these changes." The strategy of the discipline could now be articulated as 1) understanding process rather than merely classifying difference; 2) testing hypotheses arising from an underlying body of theory rather than regarding theory as neither essential nor desirable; 3) less emphasis on measurement and more emphasis on problem-specific techniques to obtain basic data and undertake their assessment; 4) interpreting the evidence arising from formal hypothesis-testing to determine what is fact and what is fancy about the course and process of human evolution (in A. L. Kroeber, ed., Anthropology Today, 1953, pp. 715-16). In effect, the ideas of great evolutionary biologists such as Dobzhansky, Mayr and Simpson had been absorbed, and key physical anthropologists had begun a disciplinary transformation.

The Viking Fund Summer Seminars in Physical Anthropology were the brainchild of Washburn, who had persuaded the Foundation of their importance. The first was held July 9 to August 15, 1946. The Foundation provided the financing, and Columbia University permitted them to be given under its summer school program. The sessions, running for six weeks, brought together leading physical anthropologists and graduate students to discuss data, theory, and methods; later seminars also provided training in methods and techniques. The eighth and last was held in 1955 at the Smithsonian Institution, under the direction of T. D. Stewart. Many a retired biological anthropologist has described the Summer Seminars as exciting and informative. They fostered an intellectual engagement that is required for research advances, and they facilitated the transformation of a corpus of knowledge. This change from the "old" to "new" physical anthropology has been equated by E. E. Hunt, Jr. with a paradigm shift in physical anthropology as a whole. Although it is likely that such a shift would have

occurred anyway as the conservative, older generation died away, the Summer Seminars permitted the transformation to be much more rapid than might otherwise have been the case.

International Symposia. The Wenner-Gren Foundation's international symposia began in 1952 and continue to this day. Between 1958 and 1980, they were held at Burg Wartenstein in Austria. With the sale of the castle, subsequent symposia took place at a variety of locations, but all continue to bear the unique organizational stamp of the Foundation.

Between 1958 and 1986, fourteen international symposia were held on topics of direct interest to biological anthropologists, ten of these at Burg Wartenstein. Because I was privileged to attend one conference at the castle and a later one in the United States, I can attest to the intensity of the meetings, especially in the closed confines of the Burg. The exclusion of spouses, friends and all others not actively involved and the isolation from the outside world produce an atmosphere in which participants can focus their attention and come to terms with points of controversy. At minimum, the international symposia have produced "state of the art" perspectives, and, at maximum, they have resulted in major advances in understanding of the topics confronted. Most of the symposia have yielded books, thereby ensuring that the ideas generated reached a large audience.

Washburn's articulation of the new physical anthropology was written specifically for the first international symposium, and his ideas were widely circulated in the volume arising from it, Anthropology Today: An Encyclopedic Inventory (A. L. Kroeber, ed., 1953). Accordingly, the support provided by the Foundation comprised a "double whammy": it sponsored the Summer Seminars that were so important for the shift from "old" to "new" physical anthropology, and it made news of the revolution available to thousands of readers.

Classification and Human Evolution (Washburn, ed., 1964), which arose from a 1962 conference, also had great impact within physical anthropology, but I recall being especially intrigued by the papers on genetic topics. These comprised four of the seventeen chapters, and included analysis of serum proteins to deduce human placement in the phylogeny of the primates (Goodman), a summary of known karyotypes of the hominoidea, along with a description of the methods to be used in the collection of skin and blood samples (Klinger et al.), and a very informative paper on protein evolution ("Perspectives in Molecular Anthropology") by Zuckerkandl. Finally, Dobzhansky brought fossil evidence, systematics and genetic theory together in a concluding chapter ("Genetic Entities in Hominid Evolution").

In biological anthropology specifically, eight significant texts arising from the Foundation's international symposia have been published in the past three decades. Of landmark consequence was P. T. Baker and J. S. Weiner's The Biology of Human Adaptability (1966), arising from the 1964 symposium on the "Biology of Populations of Anthropological Importance," organized jointly by the Foundation and the International Biological Programme (IBP). The IBP was a global ecological project that sought to determine the "functional relationship of living things to their environments...in relatively natural habitats and those in more disturbed or artificial conditions" (p. 1). The IBP had been established by the International Council of Scientific Unions in 1964, and ended a

decade later.

Several of the contributors to The Biology of Human Adaptability were members of the World Health Organization's Scientific Committee on Research in Population Genetics of Primitive Groups, which had been convened formally in 1962 and which in 1964 produced a plan for the Human Adaptability (HA) component of the IBP. The HA arose from the need to have information from comprehensive and coordinated studies on populations, particularly those at risk of major disruption or extinction. The "background to the considerations which prompted the formulation" of the HA is what is contained in The Biology of Human Adaptability. The text includes a chapter on research design in genetic surveys (W. J. Schull), one on growth and physique (J. M. Tanner), and another on work capacity (K. L. Anderson). The remaining chapters span every part of the globe and include papers on genetics and on known and putative physiological adaptations in given regions (Africa: J. Hiernaux, P. V. Tobias and C. H. Wyndham; America: J. V. Neel and F. M. Salzano, and P. T. Baker; Asia: L. D. Sanghvi, M. S. Malhotra, O. G. Edholm; Australia: R. L. Kirk, R. K. MacPherson; Circumpolar region: W. S. Laughlin, J. A. Hildes; high altitudes: G. A. Harrison, L. G. C. Pugh).

This volume expressed what was known at the time and also what needed to be known in human population biology. It set the stage for what was to come, and it indicated significant research directions that were going to be pursued by human biologists not only over the next decade but, as it turned out, for much longer. These included: 1) global surveys on genetic polymorphic systems; 2) comparable surveys on growth and physique; 3) in-depth, multidisciplinary regional studies on environmental physiology, high-altitude adaptations, genetic constitution, nutrition, longitudinal studies on growth and physique, and fitness; 4) special investigations, including studies on working capacity, on the impact of socio-demographic factors on genetic structure, on selection and disease, on nutritional requirements in special habitats, and on biological factors in population dynamics; 5) medical geographic surveys related to current WHO projects. That effort resulted in a half dozen comprehensive volumes, a plethora of research papers, and significant advances in our understanding of each of the research areas listed above. It also permitted the doctoral training of a large number of biological anthropologists, many of whom now hold senior positions.

The onset of the IBP also emphasized the need for updating and advancing methods used to assess population affinity. The preface to The Assessment of Population Affinities in Man (J. S. Weiner and J. Huizinga, eds., 1972) noted: "The literature in physical anthropology testifies to the enormous waste of time and energy resulting from taxonomic controversies in which the protagonists have remained oblivious to the possibility of settling their arguments by recourse to the available multivariate procedures" (p. v). This volume resulted from a Wenner-Gren international symposium held in Utrecht in 1969. The book represented a landmark because it made available the ideas of statisticians, geneticists and biological anthropologists on how to elucidate and assess the merits of different measures of genetic distance, and it presented the results of empirical studies employing the statistics. Other works of this kind soon followed (e.g., J. F. Crow and C. Denniston's Genetic Distance [1974] and N. E. Morton's Genetic Structure of Populations [1973]), thereby signaling the onset of a sophisticated research effort that is still ongoing, now largely in the hands of population geneticists and molecular evolutionary biologists.

The third book from this time period that had significant impact in the development of biological anthropology was the product of a conference held in 1970 at Burg Wartenstein. G. A. Harrison and A. J. Boyce, editors of The Structure of Human Populations (1972), intended their text for use in university classrooms, as well as for a general readership. Their focus was the nature of human populations, and the insights that can be provided by demographers, geneticists, anthropologists, ecologists, psychologists and sociologists. Fertility, mortality and migration are at the core of demographic studies, but these phenomena also influence the genetic structure of populations. Ecological constraints affect social organization, and both channel the transmission of genes from one generation to another. The twenty chapters in this book provided an excellent introduction to this aspect of human population biology. The exposition of theory, method, and application, followed by case studies of populations residing in a variety of settings (e.g., Arctic, tropical, high altitude, urban) made explicit the "interlinking themes which relate to the overall structure of human populations" (p. 15). If there is any truth to Thomas Kuhn's assertion that graduate students are trained more from books than from journals, then The Structure of Human Populations joins the ranks of The Assessment of Population Affinities in Man and The Biology of Human Adaptability in defining the themes of human population biology, and the research directions it has pursued for the past twenty years or more.

Other international symposia that have yielded books important to biological anthropologists include A. F. Roche and F. Falkner's Nutrition and Malnutrition: Identification and Measurement (1974), which heralded intensified interest in the assessment of nutritional status through physical measurements of children in their growing years. The Role of Natural Selection in Human Evolution (F. Salzano, ed., 1975) virtually marked the end of an era of genetic investigation seeking direct proof for the operation of natural selection in human populations. Simultaneously, Molecular Anthropology: Molecular Evolution in the Ascent of the Primates (M. Goodman and R. Tashian, eds., 1976) demonstrated the ever increasing utility of molecular evolutionary biology for answering long-standing questions regarding phylogenetic relationships within the primate order.

The Foundation has sometimes supported international symposia that focused on population biology in specific regions. W. S. Laughlin and A. B. Harper's book on The First Americans: Origins, Affinities, and Adaptations (1979) was of this genre. Since 1976 there has been a resurgence of interest in the peopling of the Americas, in part because of the deductions that can be made using genetic approaches, and also because of the detailed knowledge of population biology and adaptation emerging from studies on Arctic populations. An earlier book focusing on a very different region, The Ongoing Evolution of Latin American Populations (F. Salzano, ed., 1970), also received attention, especially among those who sought a regional context for J. V. Neel's multidisciplinary investigations on the Yanomamo.

More recent publications arising from the Foundation's international symposia include Food and Evolution (M. Harris and E. B. Ross, eds., 1987), and Disease in Populations in Transition (A. Swedlund and G. Armelagos, eds., 1990). The first represents the research focus on all aspects of human nutrition by social as well as biological anthropologists, while the second reflects the continuing interests of biological anthropologists in the interplay between genetic susceptibility and cultural propensity in

disease onset. With the curtailment or eradication of many infectious diseases in non-Western societies, the debilitating chronic diseases, particularly those associated with lifestyle changes, are emerging. Many of these diseases have genetic and environmental (including cultural) underpinnings; hence genetic epidemiology has become a research area that is increasingly attracting biological anthropologists.

Two other books arising from the Foundation's international symposia need also to be mentioned because they represent the apparent end and then a resurgence of research in the biology of social phenomena. The first, arising from a 1964 conference organized by J. N. Spuhler on "The Behavioral Consequences of Genetic Differences in Man," was Genetic Diversity and Human Behavior (Spuhler, 1967). This text did not have a strong influence within biological anthropology, perhaps because less contentious issues could be studied and major advances made in the research directions favored by the IBP. Although aspects of behavior genetics continued to attract scientific and public interest, particularly in the area of race differences and intelligence, biological anthropologists were not much involved in these investigations. The disciplinary lack of interest was reinforced by the findings of the psychologists S. L. Loehlin and G. Lindzey and physical anthropologist Spuhler, who concluded in their Race Differences in Intelligence (1976) that evidence on the causes of these group differences is consistent with "a relatively broad range of intellectual positions on the 'race-IQ' question" (p. 257). In consequence, practitioners of other branches of physical anthropology were more involved in looking at the interaction of biology and behavior than were biological anthropologists.

Glenn Hausfater and Sarah Hrdy's Infanticide: Comparative and Evolutionary Perspectives (1984) gives voice to this other focus, and the book is the second arising from a Foundation-supported international symposium on the biology of behavior. The anthropological paradigm has long argued that because of shared genetic ancestry the study of nonhuman primate behavior provides insights into the origins of human behavior. The contributors to the volume aimed to understand the factors – biological and ecological – that produce infanticidal behavior in a wide array of species. Anthropologists who are also sociobiologists seek to test the hypothesis that particular behaviors (e.g., infanticide) provide reproductive advantage to the actors (e.g., infanticidal males). Were evidence for this hypothesis found, it would show that natural selection is operating on a specific behavior, and hence given behaviors must be genetically encoded. Such findings would provide an underpinning to the claim that sociobiology provides an explanatory paradigm as powerful in its own domain as is the evolutionary paradigm conceived by Darwin.

While this essay has not attempted to cover developments in the study of the biology and behavior of nonhuman primates, it is worth noting that Wenner-Gren was also instrumental in fostering this branch of physical anthropology. In addition to the symposium that gave rise to Infanticide, the Foundation has supported six international symposia addressing aspects of nonhuman primate behavior, particularly those aspects related to human origins. Almost all have resulted in books, e.g., Primates: Studies in Adaptation and Variability (P. Jay, ed., 1968); The Great Apes (D. A. Hamburg and E. R. McCown); Environment, Behavior, and Morphology: Dynamic Interactions in Primates (M. E. Morbeck et al., eds., 1979); and Primate Ecology and Human Origins (I. S. Bernstein and E. O. Smith, eds., 1979).

The Foundation's international symposia have also played a role in the founding of

international professional associations. Notable among these was the 1967 conference forming the "World Association for the Study of Primate Variability (Human and Non-Human): Constitutional Session," organized by S. Genovés and P. T. Baker. Globally organized scientific societies are important for turning the world's attention to the need for research in particular areas. The International Council of Scientific Unions, for example, established the IBP in 1964 as the biological counterpart to the International Geophysical Year. The eleven members of the World Health Organization's Scientific Committee on Research in Population Genetics of Primitive Groups (J. V. Neel, chairman) established the format of the Human Adaptability component in the IBP, which might otherwise have excluded human biology. The Foundation's help with the formation of the International Association of Human Biologists provided support for development of an international lobbying group within biological anthropology.

Infrastructural Support. Major advances in biological anthropology, as in other fields, can rarely be achieved without developments at the infrastructural level, including an organizational structure that permits individual scientists to communicate effectively with each other. The Foundation has been involved in a variety of these kinds of activities, among them financial support for conferences and symposia, aid to international associations/congresses and to national societies/institutions; and education funding through such programs as the Museum Research Fellowships (1966-1972), Postdoctoral Training Fellowships (1982-1986) and Developing Countries Training Fellowships (begun in 1980). Biological anthropology has benefited in each of these areas.

The Foundation has contributed financial assistance to numerous conferences in biological anthropology, in addition to the international symposia for which it also provides organizational, logistic and other support. The small amounts of money awarded have been important in permitting the gathering of experts in given fields to discuss their research findings, often before an audience of peers. Many of these conferences have been published in journals or in book form, thus ensuring wide dissemination of the findings.

The 45th Anniversary Report (1941-1985) of the Foundation and reports for 1986-1989 list support for the following conferences (with names of organizers): G. Lasker, "Human Biology" (conjoint meeting of the AAPA and the Society for the Study of Human Biology in 1968); A. Roche, "Assessment of Skeletal Maturation" (annual meeting of the AAPA in 1971); R. Frisancho, "Adaptation and Human Variation in Latin American Populations" (XLI International Congress of Americanists in 1974, published in 1976); M. N. Cohen and H. G. Klein, "Biosocial Mechanisms of Population Regulation" (1978, published 1980); N. Chagnon, "Conference on Human Sociobiology" (Northwestern University, 1981); F. Salzano, "Workshop on Isolate Populations" (VIth International Congress of Human Genetics in 1981, published 1982); K. Gottlieb and G. Lasker, "Surnames as Biological Markers of Inbreeding and Migration" (annual meeting of the Human Biology Council [HBC] and the AAPA in 1982, published 1984); J. Hanna, "Impact of Modernization and Migration Stress on Samoans;" P. Rudan and L. Bennett, "Anthropology and Health: Biological and Socio-Cultural Contributions" (Dubrovnik, 1984); P. Rudan and S. L. Zegura, "Anthropology and Health: Native Populations of the Arctic and Subarctic" (Dubrovnik, 1986, published by Zegura 1986); W. S. Pollitzer and C. Cronk, "Biological Effects of Migration" (annual meeting of the HBC and the Society

for the Study of Human Biology, 1987); R. Garruto, "Symposium on Human Population Biology and Adaptability (Pennsylvania State University, 1987); W. S. Pollitzer and J. C. Long, "Uses of Molecular Biology: The Basis of Genetic and Determining Pathways" (annual meeting of the HBC, 1988, published 1989); A. R. Frisancho and R. Garruto, "AIDS and Human Biocultural Implications" (annual meeting of the HBC, 1989, published 1990).

Other meetings receiving Foundation support included J. Brozek's "Conference on the Biology of Human Variation." The papers, published in the Annals of the New York Academy of Sciences (1966), served to alert researchers in biomedicine to the importance of the study of human variation, especially in relation to such diseases as coronary heart disease and hypertension.

The themes in these conferences echo those that biological anthropologists have always pursued, but with greater basic information available since the close of the IBP: growth and maturation; regional adaptations; genetic structure of population isolates; demography and the genetic structure of populations; assessment of stress related to culture change (local or caused by migration) and measurement of stress effects on health status and physiological functioning; and regional adaptations, culture change and health outcomes. Inquiry into sociobiology can be regarded either as a new development in physical anthropology or a return to old interests, with more sophisticated tools and understanding than before.

Assistance to professional societies to permit organization, publish a newsletter, or fund student attendance at meetings are small activities that nevertheless loom large for the development of any scholarly field. Wenner-Gren has provided this kind of support for biological anthropology since 1964. The principal recipient has been the American Association of Physical Anthropologists, with eight awards in the period 1964-1980. In addition, the Foundation provided funds to publish the AAPA's Yearbook of Physical Anthropology in each of the years 1945-1951, again in 1962 and 1963, and after a hiatus, in 1972-1976. The earliest issues were especially important to the discipline because they contained the reports of the Summer Seminars that were integral to the transformation of the "old" physical anthropology into the "new."

Human biologists have not fared quite as well. In 1953 Gabriel Lasker, as editor of Human Biology, secured the Foundation's assistance to publish a full volume of the journal. The Newsletter of the International Association of Human Biologists has also received financial support from Wenner-Gren (1967, 1969, 1976, 1982). In 1978 funds were provided to the Canadian Association for Physical Anthropology, which includes biological anthropologists, to produce its Newsletter. In 1979 the first issue of the Canadian Review of Physical Anthropology also received Foundation support.

Research Grants. The Foundation's 45th Anniversary Report includes two volumes listing publications resulting from its program of small grants. The volume for the years 1941-1961 is 137 pages long, and that covering 1961-1985 runs 237 pages. The contents reflect substantial support for researchers in biological anthropology. Indeed, in the period 1944-1950, half the expenditures on physical anthropology went to support work in human population biology. The establishment of the National Science Foundation in the United States in 1950 ensured that biological anthropologists in American institutions would be able to compete for sizable federal funds. From that time on, the Wenner-

Gren small grants program became particularly useful to biological anthropologists as a source of seed money to launch pilot projects, which, if they proved successful, would permit application to NSF (or other federal agencies) for much larger grants justifying full-scale investigations. The program also provided subventions to individuals for the publication of books in biological anthropology.

The list of leading human geneticists, human biologists and biological anthropologists who have received grants from the Foundation at some point during their careers is impressive. It includes the Nobel Laureate Baruch S. Blumberg, whose prize-winning work was rooted in an early question: did the distribution of human polymorphisms play a role in observed differences in the global distribution of disease? This question was what prompted Blumberg to screen for new polymorphisms as blood samples arrived in his laboratory, and one day an unknown antigen was discovered in a sample obtained from an Australian aborigine. Years later, "Australia antigen" was identified as the outer surface protein of the hepatitis B virus (hepatitis B surface antigen) – and the rest, as they say, is history.

The human geneticist Luigi Luca Cavalli-Sforza received Foundation funding for his early work on Babinga pygmies. So also did Nigel Barnicot for work on the dermatoglyphics, blood pressure, serum-cholesterol levels, color blindness and PTC tasting ability of the Hadza of Tanzania. The Finnish geneticist Aldur Eriksson published sixteen papers based on Foundation-funded research in the Åland Islands and among other Finns, Swedes and Lapps. The recipients of research and/or book subventions are a truly international cast. Between 1961 and 1989, funds were awarded to A. A. Abbie (Australia), Gy. Acsádi and J. Nemeskéri (Hungary), K. K. Bhatia (Papua New Guinea), B. Bonné-Tamir (Israel), F. M. Salzano (Brazil), T. Brown (Australia), A. J. Boyce (England), R. G. Harvey (England), J. Huizinga (Netherlands), S. Genovés (Mexico), E. V. Glanville (Netherlands and Canada), T. Jenkins (South Africa), R. Lisker (Mexico), R. L. Kirk (Australia) and E. J. E. Szathmary (Canada), M. S. Goldstein and E. Kobyliansky (Israel), C. G. N. Mascie-Taylor (England), G. Olivier (France), R. O. Ojikutu (Nigeria), M. Pyzuk (Poland), C. E. M. Sauvain-Dugerdil (Switzerland), E. Sunderland (England), S. C. Tiwari (India).

American biological anthropologists who have received Foundation support from 1961 to 1989 include A. Brues (book subvention), J. J. Buettner-Janusch, M. H. Crawford, A. G. Fix, E. Giles and J. Friedlaender (book), A. H. Goodman, M. E. Goodman, L. P. Greksa, B. H. Heath, F. S. Hulse, R. Huss-Ashmore, J. Kelso, W. M. Krogman, W. S. Laughlin (research and book), G. W. Lasker (research and book), M. A. Little, F. B. Livingstone, J. M. Lowenstein, S. T. McGarvey, F. A. Milan, L. G. Moore, A. F. Roche, D. H. O'Rourke, L. Sattenspiel, W. J. Schull, F. Spencer (book), A. G. Steinberg, M. Stoneking, B. Winterhalder, J. W. Wood, R. Brooke Thomas, M. Weiss, and K. M. Weiss. The list grows longer after 1989. Biological anthropologists will recognize all of these names, underlining the important role that the Foundation has had in the development of this field in the United States and around the world.

Reflections. To understand developments in biological anthropology over the past fifty years and the role that the Wenner-Gren Foundation has played in them, one must first consider the meaning of "development." In a science, the most important developments are those of scientific achievements, the major landmarks of understanding, and

sometimes abandonments of ways of thinking about fact and process. Other kinds of developments are changes in the organization of the discipline itself, the nature and extent of funding sources, the number of universities in which the discipline is taught, the number of its practitioners, and the number of scientific societies and journals. In this essay I have focused on North American developments, not because of an intrinsic insularity, but because North America has occupied a central position in physical anthropology in comparison with the rest of the world.

To appreciate what has changed in biological anthropology, one must understand the nature of physical anthropology and human biology prior to the establishment of the Foundation. Without this background, it is too easy to imagine that all worthwhile achievements in these fields began after World War II. In fact, physical anthropology in general and biological anthropology in particular were alive and well prior to 1941, and the research record from that time period shows active pursuit of many of the same themes that are investigated today. There was a difference, however, and that was the absence of a theoretical foundation and a scarcity of formal testing of hypotheses. A few key individuals dominated the discipline, research funds were obtained largely from the scholars' own institutions, there were few institutions housing their fields, and the total number of practitioners was small.

The major scientific achievements of the past fifty years certainly include the transformation of the "old" physical anthropology into the "new." As G. A. Harrison has summarized it, the incorporation of the theory and method of genetics and evolutionary biology "transformed typological anthropology into population anthropology" (in The History of Physical Anthropology, 1930-1980, F. Spencer, ed., 1982, p. 468). Other achievements recognizable at the time Harrison wrote were the advances in anthropological genetics, although he asserted that the leaders in this field were located principally outside anthropology departments and did not consider themselves to be anthropologists (e.g., J. V. Neel, W. J. Schull, and N. E. Morton). There is truth to this, given the history of human genetics in the United States. Many anthropologists, myself among them, do research in population genetics, but until recently there was no anthropology department that actually trained students in modern laboratory methods, nor did researchers have in-house laboratories for analyzing basic blood data. Kenneth M. Weiss, head of the Department of Anthropology at Pennsylvania State University, decided to rectify this appalling situation in 1985, assembling a stellar group of geneticists and building a nucleus of people doing work on mitochondrial DNA, demography, genetic epidemiology, and population structure. The revitalization of anthropological genetics in this department may in the future belie Harrison's observation.

Harrison also recognized that by 1982 great strides had been made in demographic studies within human population biology, with American contributions being of paramount importance (e.g., by G. Lasker, A. Swedlund, B. Dyke, and J. MacCluer). However, in his judgment the greatest understandings were achieved in the in-depth, integrated investigations of whole populations: studies such as those directed by J. V. Neel on the Yanomamo, W. S. Laughlin on the Aleuts, and P. T. Baker on the Quechua Indians at high altitude in Peru (pp. 470-471). I agree with this assessment, and add to it the following update: M. H. Crawford on the Black Caribs, J. S. Friedlaender on the Solomon Islanders, and Baker and colleagues on the Samoans. This last work focuses

on health consequences of cultural change; hence it also represents the involvement of biological anthropologists in studies of genetic epidemiology – which is developing as a major research thrust in the field.

Growth, maturation and the adequacy of nutritional intake are also subjects investigated by human biologists, and in this area too there have been major advances: e.g., P. B. Eveleth and J. M. Tanner on worldwide growth patterns, and L. S. Green and F. E. Johnston on biological and social predictors of nutritional status, growth and development. C. Bouchard and F. E. Johnston's focus is more specific, concentrating on the differential distribution of body fat, which constitutes a risk for particular chronic diseases. Biological anthropologists have contributed extensively to the literature in these areas, as witnessed by papers in Human Biology and The American Journal of Human Biology. Although Wenner-Gren has supported international symposia, conferences and some projects in nutrition, growth, maturation, and body composition, the bulk of the funding for these activities has come from federal agencies: NSF and, particularly, the various branches of the National Institutes of Health.

The scientific achievements and the infrastructural developments outlined in this paper demonstrate that biological anthropology has changed substantially over the past fifty years. One hopes that the future will bring further conceptual revolutions and more technological advances, which will enhance our understanding of the forces that shape human biological diversity.

In my view, the Wenner-Gren Foundation's critical role in the development of my discipline has been to bet on people – sometimes young, and often without much influence initially, but imbued with conviction that their insights would advance knowledge of human biology. The Foundation's assistance has provided means with which to start projects, or explore risky propositions. The same assistance has also brought together for conferences scholars from different parts of the globe and diverse scientific backgrounds to explore biocultural themes from novel perspectives, with their findings disseminated in books. Good bets yield great payoffs, and Wenner-Gren has made good bets at critical times in the history of biological anthropology. With such assistance available in the future, the discipline will continue to expand understanding of the biocultural nature of humanity.

Emőke J. E. Szathmari is Professor of Anthropology, Honorary Professor of Zoology, and Dean of the Faculty of Social Science at The University of Western Ontario, Canada.