Garland, T., Jr. 1993. Physical activity and health. (Review of volume edited by N. G. Norgan, Cambridge Univ. Press, Cambridge, 1992). *The Physiologist* 36:260-261.

Note: this is the original, submitted version, which was butchered in editing, including the mis-spelling of my last name!

Physical Activity and Health

N. G. Norgan (Editor).

Cambridge, U.K.: Cambridge University Press, 1992, 251 pp., illus., index, $69.95.

Possible causal relationships between physical activity and human health interest both physiologists and the general public. The media, for example, widely reported recent U.S. national public health recommendations that the desirable amount and intensity of exercise be revised downwards. The present volume, resulting from a Symposium of the Society for the Study of Human Biology, consists of 16 chapters covering many aspects of the exercise-health connection. Of 16 contributors, 13 are from institutions in the United Kingdom (including the editor), two are from the Netherlands, and only one is from a U.S. institution. Although many U.S. studies are referenced, the volume should prove especially useful for obtaining a non-U.S. perspective. Chapters are generally readable and informative, although the amount of jargon and acronyms, some apparently not defined in the text, seemed a little excessive (e.g., DIY = Do-It-Yourself home improvement?); a table summarizing and defining the acronyms would have helped.

My main conclusion from reading this volume is that the empirical data base pertaining to the exercise-human health relationship is tenuous at best and positively misleading in some cases. I suspect that many empirically-oriented physiologists would find this area of inquiry to be extremely frustrating. As in many scientific studies involving complex human behavior (e.g., amount of voluntary activity, diet, "health"), quality of basic data is a primary limiting factor. Much data on activity and health are based on surveys (often clearly biased), and estimates of something as straightforward as maximal oxygen consumption (VO_2max), which is widely considered to be the single best indicator of aerobic capacity, are sometimes taken from predictive equations rather than measured. Given the practical

problems of studying humans, one immediately imagines that animal models could be fruitfully pursued, but nary a chapter considers them. I do not know if this is due mainly to a lack of such studies, but I do know that some relevant studies exist. A chapter on animal models of human exercise and health relationships, following Alexander's chapter comparing humans to other animals, would have been most helpful. Alexander's conclusion that "human activity is unremarkable," as are their exercise abilities and associated physiological traits, strengthens the notion that animal models could prove useful. His comment that "by all other measures of activity, humans seem rather like pigs" should be emblazoned somewhere.

Another memorable comment is provided by Durnin (pp. 25-26), discussing jogging: "Surely, at no time in human history, has such useless and selfish exercise been undertaken by so many people ... many of them otherwise sensible and perhaps even intelligent ... . Nothing constructive is accomplished, no general improvement in anything has occurred, except of a temporary nature, and of concern only for the individual. ... it is depressing to think of this as a sign of the degradation to which our industrialized culture has descended." If Sir Winston had ever uttered such rhetoric, no Englishperson would today be a jogger!

Ironically enough, I read this volume while at a field site in southern France, measuring treadmill endurance capacities of lizards to test for possible relationships with survivorship or dispersal tendencies. As a physiological ecologist and evolutionary physiologist, I was struck by parallels between the questions asked of both humans and other animals. For example, do individual differences in aspects of physical fitness, such as locomotor performance abilities, correlate with aspects of Darwinian fitness (i.e., lifetime reproductive success) in natural populations? Do individual differences in habitual activity levels (e.g., home range size) correlate with physical abilities? And, if so, which comes first, the physical abilities or the high activity levels? Judging from Physical Activity and Health, we have virtually no hard evidence pertaining to such questions in humans. For other animal species, only slightly more data are available (see "Evolutionary physiology" in Annu. Rev. Physiol., 1994, 56:in press). Good studies of humans and of "wild" animals could offer reciprocal illumination. I must also note that doubly-labelled

water studies of whole-animal energy expenditure by free-living animals are not "new" (p. 160); physiological ecologists have employed them routinely since the late 1960's (e.g., review in Physiol. Zool., 1989, 62:237-252).

Several chapters deal with psychological aspects of "health," and these ideas and results should be new to most physiologists. I learned, for example (p. 28), that the World Health Organization in 1946 defined "Health (as) a state of complete physical, mental and social well being and not merely the absence of disease or physical infirmity." Proceeding from this definition to a discussion of measurements of "health, " Kemm (p. 42) goes so far as to conclude that: "In health measurement, the best that can be achieved is to make the value judgments used explicit so that those with other value systems can interpret the data." Again, I can imagine many physiologists squirming.

Misconceptions about genetics are presented more than once. For example, on page 143: "Differences (in VO_2max) of 100% or more between individuals of the same age and sex are ... too great ... to be attributable to training status alone and must reflect genetic predisposition." This is incorrect. Such differences do indeed appear too great to be caused by relatively short-term physical conditioning alone, and therefore must represent inherent differences among individuals. But such differences can be caused either by genetic or by environmental factors. The latter include any environmental difference experienced by individuals at any stage during development, even, perhaps, during gestation. We simply do not know if environmental factors, applied with sufficient intensity and duration, could produce inter-individual differences of 100% in VO_2max. Thus, "the capacity of the cardiorespiratory system ... is influenced by both genetic endowment and adaptation through training" (p. 66) and other environmental influences. Claims that "Individual potential for physical fitness is genetically based" (p. 58) are similarly without much empirical support.

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