AMER. ZOOL., 35:189–190 (1995)

Introduction to the Symposium: Endocrinology of Arctic Birds and Mammals[1]

PIERRE DEVICHE AND BRIAN M. BARNES
Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, Alaska 99775-7000

Arctic and subarctic terrestrial regions are characterized by extreme environmental conditions of temperature and light duration, and thus have long been sites of intense and continued scientific research. Recently, interest in these regions by biologists has rapidly expanded and diversified for several reasons. In particular, the Arctic constitutes one of the last large-scale undisturbed ecosystems on earth. Arctic and high latitude regions, therefore, offer unique opportunities for investigating biological adaptations at levels ranging from the ecosystem to communities to individuals. Further, these regions contain vast energy reserves of great economic value. The development of increasingly efficient exploitation techniques has resulted in many such regions becoming easily accessible and vulnerable. Unfortunately, high latitude environments are also exquisitely fragile and sensitive to human-related disturbances, and it is suggested that they may be among the first to be affected by global climate change. As a result, biologists have come to realize the urgency of extending studies on arctic regions to all their biological components while these remain relatively untouched by human activities.

Animals that inhabit the Arctic on a permanent or temporary basis are frequently exposed to large seasonal changes in photoperiod and temperatures, and they must take advantage of very short growing seasons to reproduce. Investigation on these animals has found that they have evolved numerous and fascinating morphological, behavioral, and physiological adaptations to cope with their harsh environments (Irving, 1972). Until recently, studies on this subject were inevitably limited by the sensitivity and/or availability of some data collection and analytical techniques. The rapid development and perfection of new tools related to field endocrinology such as hormone radioimmunoassays, telemetry, and field energetics has led to new approaches and to the re-evaluation of numerous themes and hypotheses. It also has allowed researchers to study an ever increasing diversity of arctic-dwelling vertebrate species, providing critical comparative information. As a result, many new and exciting questions can now be addressed and tested experimentally. For example, are there general physiological characteristics that set arctic-dwelling species apart from temperate zone species? What are the behavioral and endocrine consequences of the constraints imposed by brief breeding seasons? How does exposure to extremely long summer photoperiods affect the physiology of arctic animals compared to lower latitude conspecifics?

This issue of *American Zoologist* contains the proceedings of a two-day symposium on Endocrinology of Arctic Birds and Mammals which took place during the 1993 Annual Meeting of the American Society of Zoologists in Los Angeles, California. This symposium, the first to be organized on this topic, gathered an international panel of scientists interested in comparative aspects of environmental physiology in high latitude terrestrial vertebrates. It included presentations on subjects ranging from the hormonal regulation of avian migration and breeding activities to the endocrine bases of hibernation, seasonal growth and body mass changes, response to stress, and diurnal rhythmicity of hormones. The articles presented here provide new and fascinating insights into the physiological adaptations of birds and mammals to living in extreme environmental conditions. They will hopefully serve not only as a valuable source of information to scientists interested in high

[1] From the Symposium *Endocrinology of Arctic Birds and Mammals* presented at the Annual Meeting of the American Society of Zoologists, 27–30 December 1993, at Los Angeles, California.

latitude biology, but also stimulate exchanges of ideas, as well as lead to formulation and testing of new hypotheses, and result in the development of new research initiatives, approaches, and collaborations.

As the organizers of the symposium, we would like to express our gratitude to the National Institute of Child Health and Development (Award R13 HD 31736-01), the National Science Foundation (Award IBN-9312641), and the American Society of Zoologists for their financial support. We also would like to thank the participants for their efforts and their patience, and the reviewers who evaluated the original manuscripts.

REFERENCES

IRVING, L. 1972. Arctic life of birds and mammals including man. *In* D. S. Farner, W. S. Hoar, J. Jacobs, H. Langer, and M. Lindauer (eds.), *Zoophysiology and ecology 2*. Springer-Verlag, Berlin.