动物学报 52(Supplement): 90, 2006
Acta Zoologica Sinica

Symposium 02 The role of high quality individuals in populations of long-lived birds

Introduction

Peter H. BECKER[1], Christophe BARBRAUD[2]
1. Institut für Vogelforschung, "Vogelwarte Helgoland", An der Vogelwarte 21, D-26386 Wilhelmshaven, Germany; peter.becker@ifv.terramare.de
2. Centre d'Etudes Biologiques de Chizé, CNRS, F-79360 Villiers en Bois, France; barbraud@cebc.cnrs.fr

Long-term studies have shown the importance of individual quality for fitness and bird population dynamics. This symposium seeks insights into the nature and consequences of individual quality, reviews the phenomenon, and focuses on recent findings of extended studies of long-lived birds using new field, laboratory and statistical techniques.

The papers address individual quality from various points of view and by a variety of field and statistical methods in long-lived sea- and water-birds during different life stages. S. Bradley and C. Meathrel focus on the prediction of individual reproductive success as a quality trait in short-tailed shearwaters, *Puffinus tenuirostris*, J.-D. Ludwigs and P. H. Becker address the influence of chick quality and conditions during early development on return and recruitment rates of common terns, *Sterna hirundo*, at the natal colony. C. Barbraud and H. Weimerskirch investigate the trade-off between survival and reproduction in the blue petrel, *Halobaena caerulea*, and its dependence on individual quality and environmental conditions. In two oral contributions, B. Ebbinge, G. Müskens and B. Spaans considered the importance of high quality individuals in a stabilizing population of dark-bellied brent geese *Branta bernicla bernicla*, and C. Perrins, R. McCleery, D. Wheeler and S. Groves focused on survival and senescence in mute swans *Cygnus olor* and the effects of age and quality on probability of their attempting to breed. Abstracts of the two oral papers are published in the Abstract Volume for the Congress.

The papers make clear that only a small percentage of individuals contributes recruits to the next generation, and show that selection favors one particular individual trait for breeding success and the survival of adults and subadults: body mass and condition. Assortative mating by age and/or condition, and mate fidelity, enhance fitness of the individuals further (short-tailed shearwater). Body mass in the blue petrel, furthermore, affects the probability of becoming a breeder, as well as the probability of survival, particularly among first time breeders; this may indicate that first reproduction imposes costs on survival. Age is of specific importance: in short-tailed shearwaters and brent geese, reproductive output increases with age, and in mute swans, age is the most important factor in reproductive success over lifetime.

All presentations reflect the value of long-term studies of individual birds for gaining insights into the nature and consequences of individual quality. Even if the evidence presented stresses the importance of high quality individuals in the dynamics, ecology and genetics of bird populations, and for evolution, many questions remain unanswered. Future research should move towards refining parameters of individual quality, using hormones, metabolism and cognitive abilities. The causes of strong inter-individual differences in quality and fitness should provide cues. Unequal information-gathering and learning, as well as cultural traits, may well be involved with quality too (see Annett and Pierotti, 1999) and might promote rapid evolutionary change through selection of the more adept individuals. These issues need investigation.

So do others. Do high quality individuals produce high quality offspring, and are quality related traits inherited? How important is the influence of parental effort in interactions with environmental effects and in controlling early development (Lindström, 1999)? Yet another is whether differences between gender involve fitness and individual quality. Furthermore, the role of high quality individuals as a possible buffer against environmental fluctuations, especially in declining populations (Newton, 1989), needs to be clarified by detailed population studies.

References

Annett C, Pierotti R, 1999. Long term reproductive output and recruitment in western gulls: consequences of alternate foraging tactics. Ecology 80: 288–297.
Lindström J, 1999. Early development and fitness in birds and mammals. TREE 14: 343–348.
Newton I, 1989. Lifetime Reproduction in Birds. London: Academic Press.