

# Long-range migration and orientation behavior

Don R. Reynolds<sup>1</sup> and Jason W. Chapman<sup>2</sup>

<sup>1</sup> Natural Resources Institute, University of Greenwich, Chatham, Kent, UK

<sup>2</sup> Centre for Ecology and Conservation, and Environment and Sustainability Institute, University of Exeter, Penryn, Cornwall, UK

## 7.1 Introduction

*Migrations speak to us, not just as observers of nature but as integral parts of it. The world moves and, deep inside, we long to move with it* (Mike Bergin, 2009, of 10,000 birds)

*Migratory animals have long been powerful symbols of change and renewal in human cultures.*

(Ben Hoare, 2009)

Mass migrations of insects have fascinated mankind throughout recorded history. The sudden appearance of huge numbers of migrants have caused a range of emotions—delight, wonder, and awe at the marvels of nature, annoyance at the irritations of clouds of small insects, and trepidation at the approach of locust swarms. Presumably, it has always been so. To members of human hunter-gatherer societies, highly attuned to the natural world, dramatic seasonal movements of insects may well have been incorporated into folk wisdom, just as the present-day San (Bushman) of Botswana reportedly use the migrations of certain butterflies (*Belenois aurota*, *Catopsilia florella*) to predict the arrival, from the same direction, of herds of ungulates (Larsen 1992). After the development of agriculture, farming societies would have good reason to fear migratory insect pests, such as locusts and armyworms, which might

well bring famine in their wake. In fact, the locust swarms so entered the communal psyche of the Middle Eastern civilizations that these insects constituted one of the ‘Ten Plagues of Egypt’, which formed, perhaps, the earliest written record of insect migration (*Exodus* 10, 1–20, perhaps written around 600 BCE). Without modern means of famine relief, large numbers of people could die of starvation following locust invasions [e.g. 800,000 died in North Africa in 125 BC (Williams 1958)]. On a more joyful note, the monsoon rains essential for agriculture in many parts of India are heralded by migrating dragonflies (Corbet 1999, p. 404). In Nigeria, after the migration of *Libythea labdaca* butterflies early in the rains, farmers knew that sowing could safely begin (Farquharson, quoted in Williams 1930, p. 417).

Characteristics that have brought migrations to the attention of people throughout the ages, namely, the movement itself combined with the huge numbers involved, continue to amaze even experienced modern naturalists who must abandon their restrained scientific prose as they struggle to communicate the sheer wonder of what they see. One notes, for example, descriptions of immense butterfly migrations in C. B. Williams’ books (1930, 1958); or the accounts of the seasonal passage of hordes of