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CHAPTER TEN

Parasite-mediated selection in red grouse – consequences for population dynamics and mate choice

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10.1 Introduction

The dynamic relationship between hosts and parasites has been maintained in evolutionary time for diverse reasons (Quigley et al., 2012; Gómez et al., 2015). On the one hand, directional selection can favour genotypes of host resistance and parasite infectivity. On the other, fluctuating selection may lead to variation in the pattern of these genotypes. Both perspectives are based on the idea that parasites impose costs on hosts. However, the nature of these costs is multi-faceted. First, there is the direct drain of energetic resources that undermine the reproductive budget and survival of individuals. This energetic constraint has an impact on the physiology of hosts, which may involve activating their immune defences or creating an imbalance between oxidation and antioxidant defences, resulting in oxidative stress and damage (Mougeot et al., 2009). Second, at a behavioural level, parasites may reduce resources that hosts can invest in social and sexual displays, which can indirectly affect mate choice and intrasexual competition (Mougeot et al., 2005a). The resolution of this trade-off between two energy-demanding functions (e.g. ornament expression and homeostasis) is postulated to ensure the reliability of social and sexual signals.

Physiological and behavioural costs may influence life-history traits and the resolution of life-history trade-offs can determine individual fitness. Hosts resistant to parasite infection are expected to be positively selected because they can allocate resources to produce more offspring or survive better. Translated into

survival. However, an issue central to understandi host fitness is determining the genetic bases that more resistant to parasite infection. This is partic population dynamics, but also from an evolutionar resistant hosts are expected to be favoured by select to the next generation (Hamilton & Zuk, 1982). There of the consequences of parasite infection for popul selection requires a detailed comprehension of the and genomic mechanisms involved.

A remarkable difficulty in exploring the effects o hosts are commonly parasitised by multiple paras species influences different aspects of the host (Schm Schmid-Hempel, 2011). Thus, research on the effec relies on the capacity to experimentally manipulate abundance and to investigate its individual- and po addition, such manipulations carried out in natural most realistic picture of the complex and diverse individual and population levels. However, studi change parasite abundance in wild settings are rare. the study of the association between a nematode p *tenuis*) and the red grouse (*Lagopus lagopus scoticus*; Fi long-lasting and fruitful research programme focused individual- and population-level causes and consequen infection in a wild bird. In this chapter, we summaris term effects of nematode parasites on red grouse from gical, and genomic perspectives and their consequence and population dynamics. We also highlight potentia research on this particular host–parasite system.