Grains in the diets of medium-sized carnivores – a case of diplochory?

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The dispersal of plant propagules is often a complex process, in some cases comprising two or even more phases through distinctly different dispersal mechanisms. This is called diplochory (Vander Wall and Longland 2004). The effectiveness of seed dispersal depends on many factors, including the characteristics of the dispersal agents. Three attributes of dispersal agents should be evaluated in order to test their presumed favourable effects on plants: (i) disperser legitimacy, that is, the occurrence of apparently undamaged seeds in their faeces; (ii) disperser efficiency, that is, their capacity to deliver seeds to safe sites for germination and survival; and (iii) disperser effectiveness, that is, the proportion of recruited seedlings for the dissemination of which a particular dispersal agent was responsible (see Bustamante et al. 1992). It is difficult to fulfil all of these conditions in directed dispersal; therefore the rate of established seedlings may be low. Accordingly, some authors suggest diplochory as a more effective manner of seed dispersal (Vander Wall and Longland 2004). It seems that diplochory is a widespread phenomenon in many regions of the world (Nogales et al. 1998, Nogales et al. 2007, D’hondt et al. 2008) including animals as the main agents (Vander Wall, Longland 2004, Vander Wall et al. 2005) or even abiotic factors such as wind (Redbo-Torstensson and Tele- nius 1995).

Grains may be dispersed in many ways (ballistic, via wind or attached to animal fur), but are not generally identified with a specific kind of dispersal. In general, grains are eaten by granivorous birds, which are not legitimate and efficient dispersal agents because of their muscular gizzards, which damage the seeds. They may rather be defined as seed predators. However, even active predation may also accomplish dispersal, albeit at the cost of the significant mortality of the seeds (Orłowski and Czarnecka 2009). Most of the grasses (to which cereals also belong) are characterised as having an epizoochoric or anemochoric predilection to dispersal (Frank and Klitz 1990). In accordance with the theory ‘foliage is the fruit’ (Janzen 1984), some authors have shown that grains lacking appendages determining the means of dispersal may also be dispersed in the digestive tract. This is known as endozoochory...